This manual is for GNU GnuLib (updated 2019-02-24 00:53:53), which is a library of common routines intended to be shared at the source level.

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1 Brief Overview

Gnulib is a source code library that provides basic functionality to programs and libraries. Many software packages make use of Gnulib to avoid reinventing the portability wheel.

Resources:
- Gnulib is hosted at Savannah: https://savannah.gnu.org/projects/gnulib. Get the sources through Git from there.

1.1 Gnulib Basics

While portability across operating systems is not one of GNU’s primary goals, it has helped introduce many people to the GNU system, and is worthwhile when it can be achieved at a low cost. This collection helps lower that cost.

Gnulib is intended to be the canonical source for most of the important “portability” and/or common files for GNU projects. These are files intended to be shared at the source level; Gnulib is not a typical library meant to be installed and linked against. Thus, unlike most projects, Gnulib does not normally generate a source tarball distribution; instead, developers grab modules directly from the source repository.

The easiest, and recommended, way to do this is to use the gnulib-tool script. Since there is no installation procedure for Gnulib, gnulib-tool needs to be run directly in the directory that contains the Gnulib source code. You can do this either by specifying the absolute filename of gnulib-tool, or by using a symbolic link from a place inside your PATH to the gnulib-tool file of your preferred Gnulib checkout. For example:

```
$ ln -s $HOME/gnu/src/gnulib.git/gnulib-tool $HOME/bin/gnulib-tool
```

1.2 Git Checkout

Gnulib is available for anonymous checkout. In any Bourne-shell the following should work:

```
$ git clone git://git.sv.gnu.org/gnulib.git
```

For a read-write checkout you need to have a login on ‘savannah.gnu.org’ and be a member of the Gnulib project at https://savannah.gnu.org/projects/gnulib. Then, instead of the URL git://git.sv.gnu.org/gnulib, use the URL `ssh://user@git.sv.gnu.org/srv/git/gnulib` where user is your login name on savannah.gnu.org.

```
$ ln -s $HOME/gnu/src/gnulib.git/gnulib-tool $HOME/bin/gnulib-tool
```

git resources:
- Overview: https://en.wikipedia.org/wiki/Git_(software)
- Homepage: https://git-scm.com/

When you use git annotate or git blame with Gnulib, it’s recommended that you use the -w option, in order to ignore massive whitespace changes that happened in 2009.
1.3 Keeping Up-to-date

The best way to work with Gnulib is to check it out of git. To synchronize, you can use git pull.

Subscribing to the bug-gnulib@gnu.org mailing list will help you to plan when to update your local copy of Gnulib (which you use to maintain your software) from git. You can review the archives, subscribe, etc., via https://lists.gnu.org/mailman/listinfo/bug-gnulib.

Sometimes, using an updated version of Gnulib will require you to use newer versions of GNU Automake or Autoconf. You may find it helpful to join the autotools-announce mailing list to be advised of such changes.

1.4 Contributing to Gnulib

All software here is copyrighted by the Free Software Foundation—you need to have filled out an assignment form for a project that uses the module for that contribution to be accepted here.

If you have a piece of code that you would like to contribute, please email bug-gnulib@gnu.org.

Generally we are looking for files that fulfill at least one of the following requirements:

• If your .c and .h files define functions that are broken or missing on some other system, we should be able to include it.

• If your functions remove arbitrary limits from existing functions (either under the same name, or as a slightly different name), we should be able to include it.

If your functions define completely new but rarely used functionality, you should probably consider packaging it as a separate library.

1.4.1 Gnulib licensing

Gnulib contains code both under GPL and LGPL. Because several packages that use Gnulib are GPL, the files state they are licensed under GPL. However, to support LGPL projects as well, you may use some of the files under LGPL. The “License:” information in the files under modules/ clarifies the real license that applies to the module source.

Keep in mind that if you submit patches to files in Gnulib, you should license them under a compatible license, which means that sometimes the contribution will have to be LGPL, if the original file is available under LGPL via a “License: LGPL” information in the projects’ modules/ file.

1.4.2 Indent with spaces not TABs

We use space-only indentation in nearly all files. This includes all *.h, *.c, *.y files, except for the regex module. Makefile and ChangeLog files are excluded, since TAB characters are part of their format.

In order to tell your editor to produce space-only indentation, you can use these instructions.

• For Emacs: Add these lines to your Emacs initialization file ($HOME/.emacs or similar):


;; In Gnulib, indent with spaces everywhere (not TABs).
Chapter 1: Brief Overview

;; Exceptions: Makefile and ChangeLog modes.
(add-hook 'find-file-hook (lambda ()
  (if (and buffer-file-name
       (string-match \"/gnulib/\>" (buffer-file-name))
       (not (string-equal mode-name "Change Log"))
       (not (string-equal mode-name "Makefile")))
    (setq indent-tabs-mode nil)))))

• For vi (vim): Add these lines to your $HOME/.vimrc file:
  " Don't use tabs for indentation. Spaces are nicer to work with.
  set expandtab

For Makefile and ChangeLog files, compensate for this by adding this to your $HOME/.vim/after/indent/make.vim file, and similarly for your $HOME/.vim/after/indent/changelog.vim file:
  " Use tabs for indentation, regardless of the global setting.
  set noexpandtab

• For Eclipse: In the “Window | Preferences” dialog (or “Eclipse | Preferences” dialog on Mac OS),
  1. Under “General | Editors | Text Editors”, select the “Insert spaces for tabs” checkbox.
  2. Under “C/C++ | Code Style”, select a code style profile that has the “Indentation | Tab policy” combobox set to “Spaces only”, such as the “GNU [built-in]” policy.

If you use the GNU indent program, pass it the option --no-tabs.

1.4.3 How to add a new module

• Add the header files and source files to lib/.

• If the module needs configure-time checks, write an Autoconf macro for it in m4/module.m4. See m4/README for details.

• Write a module description modules/module, based on modules/TEMPLATE.

• If the module contributes a section to the end-user documentation, put this documentation in doc/module.texi and add it to the “Files” section of modules/module. Most modules don’t do this; they have only documentation for the programmer (= Gnu/ user). Such documentation usually goes into the lib/ source files. It may also go into doc/; but don’t add it to the module description in this case.

• Add the module to the list in MODULES.html.sh.

You can test that a module builds correctly with:
$ ./gnulib-tool --create-testdir --dir=/tmp/testdir module1 ... moduleN
$ cd /tmp/testdir
$ ./configure && make

Other things:
• Check the license and copyright year of headers.
• Check that the source code follows the GNU coding standards; see https://www.gnu.org/prep/standards.
• Add source files to `config/srclist*` if they are identical to upstream and should be upgraded in Gnulib whenever the upstream source changes.

• Include header files in source files to verify the function prototypes.

• Make sure a replacement function doesn’t cause warnings or clashes on systems that have the function.

• Autoconf functions can use `gl_*` prefix. The `AC_*` prefix is for autoconf internal functions.

• Build files only if they are needed on a platform. Look at the `alloca` and `fnmatch` modules for how to achieve this. If for some reason you cannot do this, and you have a `.c` file that leads to an empty `.o` file on some platforms (through some big `#if` around all the code), then ensure that the compilation unit is not empty after preprocessing. One way to do this is to `#include <stddef.h>` or `<stdio.h>` before the big `#if`.

1.5 Portability guidelines

Gnulib code is intended to be portable to a wide variety of platforms, not just GNU platforms. Gnulib typically attempts to support a platform as long as it is still supported by its provider, even if the platform is not the latest version. See Section 2.4 [Target Platforms], page 8.

Many Gnulib modules exist so that applications need not worry about undesirable variability in implementations. For example, an application that uses the `malloc` module need not worry about `malloc (0)` returning `NULL` on some Standard C platforms; and `glob` users need not worry about `glob` silently omitting symbolic links to nonexistent files on some platforms that do not conform to POSIX.

Gnulib code is intended to port without problem to new hosts, e.g., hosts conforming to recent C and POSIX standards. Hence Gnulib code should avoid using constructs that these newer standards no longer require, without first testing for the presence of these constructs. For example, because C11 made variable length arrays optional, Gnulib code should avoid them unless it first uses the `vararrays` module to check whether they are supported.

The following subsections discuss some exceptions and caveats to the general Gnulib portability guidelines.

1.5.1 C language versions

Currently Gnulib assumes at least a freestanding C99 compiler, possibly operating with a C library that predates C99; with time this assumption will likely be strengthened to later versions of the C standard. Old platforms currently supported include AIX 6.1, HP-UX 11i v1 and Solaris 10, though these platforms are rarely tested. Gnulib itself is so old that it contains many fixes for obsolete platforms, fixes that may be removed in the future.

Because of the freestanding C99 assumption, Gnulib code can include `<float.h>`, `<limits.h>`, `<stdarg.h>`, `<stdbool.h>`, `<stddef.h>`, and `<stdint.h>` unconditionally. Gnulib code can also assume the existence of `<ctype.h>`, `<errno.h>`, `<fcntl.h>`, `<locale.h>`, `<signal.h>`, `<stdio.h>`, `<stdlib.h>`, `<string.h>`, and `<time.h>`. Similarly, many modules include `<sys/types.h>` even though it’s not even in C11; that’s OK since `<sys/types.h>` has been around nearly forever.

Even if the include files exist, they may not conform to the C standard. However, GCC has a `fixincludes` script that attempts to fix most C89-conformance problems. Gnulib
currently assumes include files largely conform to C89 or better. People still using ancient hosts should use fixincludes or fix their include files manually.

Even if the include files conform, the library itself may not. For example, `strtod` and `mktime` have some bugs on some platforms. You can work around some of these problems by requiring the relevant modules, e.g., the Gnulib `mktime` module supplies a working and conforming `mktime`.

1.5.2 C99 features assumed by Gnulib

Although the C99 standard specifies many features, Gnulib code is conservative about using them, partly because Gnulib predates the widespread adoption of C99, and partly because many C99 features are not well-supported in practice. C99 features that are reasonably portable nowadays include:

- A declarations after a statement, or as the first clause in a `for` statement.
- `long long int`.
- `<stdbool.h>`, assuming the `stdbool` module is used. See Section 8.46 [stdbool.h], page 58.
- `<stdint.h>`, assuming the `stdint` module is used. See Section 8.48 [stdint.h], page 59.
- Compound literals and designated initializers.
- Variadic macros.
- `static inline` functions.
- `__func__`, assuming the `func` module is used. See Section 14.16 [func], page 657.
- The `restrict` qualifier, assuming `ACQUIRE([AC_C_RESTRICT])` is used.
- Flexible array members (however, see the `flexmember` module).

1.5.3 C99 features avoided by Gnulib

Gnulib avoids some features even though they are standardized by C99, as they have portability problems in practice. Here is a partial list of avoided C99 features. Many other C99 features are portable only if their corresponding modules are used; Gnulib code that uses such a feature should require the corresponding module.

- Variable length arrays, unless `__STDC_NO_VLA__` is defined. See the `vararrays` module.
- `extern inline` functions, without checking whether they are supported. See Section 14.6 [extern inline], page 641.
- Type-generic math functions.
- Universal character names in source code.
- `<iso646.h>`, since GNU programs need not worry about deficient source-code encodings.
- Comments beginning with ‘//’. This is mostly for style reasons.

1.5.4 Other portability assumptions made by Gnulib

The GNU coding standards allow one departure from strict C: Gnulib code can assume that standard internal types like `size_t` are no wider than `long`. POSIX requires implementations to support at least one programming environment where this is true, and such environments are recommended for Gnulib-using applications. When it is easy to port to
non-POSIX platforms like MinGW where these types are wider than `long`, new Gnulib code should do so, e.g., by using `ptrdiff_t` instead of `long`. However, it is not always that easy, and no effort has been made to check that all Gnulib modules work on MinGW-like environments.

Gnulib code makes the following additional assumptions:

- `int` and `unsigned int` are at least 32 bits wide. POSIX and the GNU coding standards both require this.
- Signed integer arithmetic is two’s complement.
  Previously, Gnulib code sometimes assumed that signed integer arithmetic wraps around, but modern compiler optimizations sometimes do not guarantee this, and Gnulib code with this assumption is now considered to be questionable. See Section 14.5 [Integer Properties], page 635.
  Although some Gnulib modules contain explicit support for the other signed integer representations allowed by the C standard (ones’ complement and signed magnitude), these modules are the exception rather than the rule. All practical Gnulib targets use two’s complement.
- There are no “holes” in integer values: all the bits of an integer contribute to its value in the usual way.
- Addresses and sizes behave as if objects reside in a flat address space. In particular:
  - If two nonoverlapping objects have sizes $S$ and $T$ represented as `size_t` values, then $S + T$ cannot overflow.
  - A pointer $P$ points within an object $O$ if and only if $(\text{char} *) &O <= (\text{char} *) P \&\& (\text{char} *) P < (\text{char} *) (\&O + 1)$.
  - If an existing object has size $S$, and if $T$ is sufficiently small (e.g., 8 KiB), then $S + T$ cannot overflow. Overflow in this case would mean that the rest of your program fits into $T$ bytes, which can’t happen in realistic flat-address-space hosts.
  - Objects with all bits zero are treated as 0 or NULL. For example, `memset (A, 0, sizeof A)` initializes an array $A$ of pointers to NULL.
  - Adding zero to a null pointer does not change the pointer. For example, $0 + (\text{char} *) \text{NULL} == (\text{char} *) \text{NULL}$.

The above assumptions are not required by the C or POSIX standards but hold on all practical porting targets that we’re familiar with. If you have a porting target where these assumptions are not true, we’d appreciate hearing of any fixes. We need fixes that do not increase runtime overhead on standard hosts and that are relatively easy to maintain.

1.6 High Quality

We develop and maintain a test suite for Gnulib. The goal is to have a 100% firm interface so that maintainers can feel free to update to the code in git at any time and know that their application will not break. This means that before any change can be committed to the repository, a test suite program must be produced that exposes the bug for regression testing. All experimental work should be done on branches to help promote this.
2 Philosophy

Gnulib’s design and development philosophy is organized around steady, collaborative, and open development of reusable modules that are suitable for a reasonably wide variety of platforms.

2.1 Benefits of using Gnulib

Gnulib is useful to enhance various aspects of a package:

- **Portability**: With Gnulib, a package maintainer can program against the POSIX and GNU libc APIs and nevertheless expect good portability to platforms that don’t implement POSIX.
- **Maintainability**: When a package uses modules from Gnulib instead of code written specifically for that package, the maintainer has less code to maintain.
- **Security**: Gnulib provides functions that are immune against vulnerabilities that plague the uses of the corresponding commonplace functions. For example, `asprintf`, `canonicalize_file_name` are not affected by buffer sizing problems that affect `sprintf`, `realpath`, `openat`. `openat` does not have the race conditions that `open` has. Etc.
- **Reliability**: Gnulib provides functions that combine a call to a system function with a check of the result. Examples are `xalloc`, `xprintf`, `xstrtod`, `xgetcwd`.
- **Structure**: Gnulib offers a way to structure code into modules, typically one include file, one source code file, and one autoconf macro for each functionality. Modularity helps maintainability.

2.2 Library vs. Reusable Code

Classical libraries are installed as binary object code. Gnulib is different: It is used as a source code library. Each package that uses Gnulib thus ships with part of the Gnulib source code. The used portion of Gnulib is tailored to the package: A build tool, called `gnulib-tool`, is provided that copies a tailored subset of Gnulib into the package.

2.3 Portability and Application Code

One of the goals of Gnulib is to make portable programming easy, on the basis of the standards relevant for GNU (and Unix). The objective behind that is to avoid a fragmentation of the user community into disjoint user communities according to the operating system, and instead allow synergies between users on different operating systems.

Another goal of Gnulib is to provide application code that can be shared between several applications. Some people wonder: "What? glibc doesn’t have a function to copy a file?" Indeed, the scope of a system’s libc is to implement the relevant standards (ISO C, POSIX) and to provide access functions to the kernel’s system calls, and little more.

There is no clear borderline between both areas.

For example, Gnulib has a facility for generating the name of backup files. While this task is entirely at the application level—no standard specifies an API for it—the naïve code has some portability problems because on some platforms the length of file name components is limited to 30 characters or so. Gnulib handles that.
Similarly, Gnulib has a facility for executing a command in a subprocess. It is at the same time a portability enhancement (it works on GNU, Unix, and Windows, compared to the classical fork/exec idiom which is not portable to Windows), as well as an application aid: it takes care of redirecting stdin and/or stdout if desired, and emits an error message if the subprocess failed.

2.4 Target Platforms

Gnulib supports a number of platforms that we call the “reasonable portability targets”. This class consists of widespread operating systems, for three years after their last availability, or—for proprietary operating systems—as long as the vendor provides commercial support for it. Already existing Gnulib code for older operating systems is usually left in place for longer than these three years. So it comes that programs that use Gnulib run pretty well also on these older operating systems.

Some operating systems are not very widespread, but are Free Software and are actively developed. Such platforms are also supported by Gnulib, if that OS’s developers community keeps in touch with the Gnulib developers, by providing bug reports, analyses, or patches. For such platforms, Gnulib supports only the versions of the last year or the last few months, depending on the maturity of said OS project, the number of its users, and how often these users upgrade.

Niche operating systems are generally unsupported by Gnulib, unless some of their developers or users contribute support to Gnulib.

The degree of support Gnulib guarantees for a platform depends on the amount of testing it gets from volunteers. Platforms on which Gnulib is frequently tested are the best supported. Then come platforms with occasional testing, then platforms which are rarely tested. Usually, we fix bugs when they are reported. Except that some rarely tested platforms are also low priority; bug fixes for these platforms can take longer.

As of 2018, the list of supported platforms is the following:

- glibc systems. With glibc 2.19 or newer, they are frequently tested. About the kernels:
  - glibc on Linux is frequently tested.
  - glibc on kFreeBSD is rarely tested.
- Mac OS X. In versions 10.13, it’s occasionally tested. In version 10.5, it’s rarely tested.
- FreeBSD 11.0 or newer is occasionally tested.
- OpenBSD 6.1 or newer is occasionally tested.
- NetBSD 7.0 or newer is occasionally tested.
- AIX 7.1 is occasionally tested.
- Solaris 10 and 11 are occasionally tested. Solaris 9 and older are rarely tested and low priority.
- Cygwin 2.9 is occasionally tested. Cygwin 1.7.x is rarely tested.
- mingw is occasionally tested. But note that some modules are currently unsupported on mingw: mgetgroups, getgrouper, idcache, userspec, openpty, login_tty, forkpty, pt_chown, grantpt, pty, savewd, mkancesdirs, mkdir-p, euidaccess, faccessat. The versions of Windows that are supported are Windows XP and newer. Only the latest version of mingw is tested; older versions are not supported.
GNU Hurd 0.7 is rarely tested.

Native Windows, with MSVC as compiler, is rarely tested and low priority. The versions of MSVC that are supported are MSVC 14 (Visual Studio 2015) or newer.

musl libc is rarely tested.

Minix 3.3.0 is rarely tested.

HP-UX 11.31 is very rarely tested.

IRIX 6.5 is very rarely tested.

OSF/1 5.1 is no longer tested.

Interix 6.1 is no longer tested, and requires the suacomp library (https://sourceforge.net/projects/suacomp/) in version 0.6.8 or newer.

Haiku and BeOS are no longer tested.

uClibc on Linux is no longer tested.

QNX is no longer tested.

Gnulib supports these operating systems only in an unvirtualized environment. When you run an OS inside a virtual machine, you have to be aware that the virtual machine can bring in bugs of its own. For example, floating-point operations on Solaris can behave slightly differently in QEMU than on real hardware. And Haiku’s bash program misbehaves in VirtualBox 3, whereas it behaves fine in VirtualBox 4.

Similarly, running native Windows binaries on GNU/Linux under WINE is rarely tested and low priority: WINE has a set of behaviours and bugs that is slightly different from native Windows.

The following platforms are not supported by Gnulib. The cost of supporting them would exceed the benefit because they are rarely used, or poorly documented, or have been supplanted by other platforms, or diverge too much from POSIX, or some combination of these and other factors. Please don’t bother sending us patches for them.

- Windows 95/98/ME.
- DJGPP and EMX (the 32-bit operating systems running in DOS).
- MSDOS (the 16-bit operating system).
- Windows Mobile, Symbian OS, iOS.

2.5 Modules

Gnulib is divided into modules. Every module implements a single facility. Modules can depend on other modules.

A module consists of a number of files and a module description. The files are copied by gnulib-tool into the package that will use it, usually verbatim, without changes. Source code files (.h, .c files) reside in the lib/ subdirectory. Autoconf macro files reside in the m4/ subdirectory. Build scripts reside in the build-aux/ subdirectory.

The module description contains the list of files; gnulib-tool copies these files. It contains the module’s dependencies; gnulib-tool installs them as well. It also contains the autoconf macro invocation (usually a single line or nothing at all); gnulib-tool ensures this is invoked from the package’s configure.ac file. And also a Makefile.am snippet; gnulib-tool collects these into a Makefile.am for the tailored Gnulib part. The module
description and include file specification are for documentation purposes; they are combined into
MODULES.html.

The module system serves two purposes:

1. It ensures consistency of the used autoconf macros and Makefile.am rules with the
   source code. For example, source code which uses the getopt_long function—this is
   a common way to implement parsing of command line options in a way that complies
   with the GNU standards—needs the source code (lib/getopt.c and others), the
   autoconf macro which detects whether the system’s libc already has this function (in
   m4/getopt.m4), and a few Makefile.am lines that create the substitute getopt.h if
   not. These three pieces belong together. They cannot be used without each other. The
   module description and gnulib-tool ensure that they are copied altogether into the
   destination package.

2. It allows for scalability. It is well-known since the inception of the MODULA-2 language
   around 1978 that dissection into modules with dependencies allows for building large
   sets of code in a maintainable way. The maintainability comes from the facts that:
   
   • Every module has a single purpose; you don’t worry about other parts of the
     program while creating, reading or modifying the code of a module.
   
   • The code you have to read in order to understand a module is limited to the
     source of the module and the .h files of the modules listed as dependencies. It
     is for this reason also that we recommend to put the comments describing the
     functions exported by a module into its .h file.

   In other words, the module is the elementary unit of code in Gnulib, comparable to a
   class in object-oriented languages like Java or C#.

   The module system is the basis of gnulib-tool. When gnulib-tool copies a part of
   Gnulib into a package, it first compiles a module list, starting with the requested modules
   and adding all the dependencies, and then collects the files, configure.ac snippets and
   Makefile.am snippets.

2.6 Various Kinds of Modules

There are modules of various kinds in Gnulib. For a complete list of the modules, see in
MODULES.html.

2.6.1 Support for ISO C or POSIX functions.

When a function is not implemented by a system, the Gnulib module provides an imple-
mentation under the same name. Examples are the ‘sprintf’ and ‘readlink’ modules.

Similarly, when a function is not correctly implemented by a system, Gnulib provides a
replacement. For functions, we use the pattern

```c
#if !HAVE_WORKING_FOO
#define foo rpl_foo
#endif
```

and implement the foo function under the name rpl_foo. This renaming is needed to
avoid conflicts at compile time (in case the system header files declare foo) and at link/run
 time (because the code making use of foo could end up residing in a shared library, and
the executable program using this library could be defining foo itself).
For header files, such as `stdbool.h` or `stdint.h`, we provide the substitute only if the system doesn’t provide a correct one. The template of this replacement is distributed in a slightly different name, with ‘.in’ inserted before the ‘.h’ extension, so that on systems which do provide a correct header file the system’s one is used.

### 2.6.2 Enhancements of ISO C or POSIX functions

These are sometimes POSIX functions with GNU extensions also found in glibc—examples: ‘getopt’, ‘fnmatch’—and often new APIs—for example, for all functions that allocate memory in one way or the other, we have variants which also include the error checking against the out-of-memory condition.

### 2.6.3 Portable general use facilities

Examples are a module for copying a file—the portability problems relate to the copying of the file’s modification time, access rights, and extended attributes—or a module for extracting the tail component of a file name—here the portability to native Windows requires a different API than the classical POSIX `basename` function.

### 2.6.4 Reusable application code

Examples are an error reporting function, a module that allows output of numbers with K/M/G suffixes, or cryptographic facilities.

### 2.6.5 Object oriented classes

Examples are data structures like ‘list’, or abstract output stream classes that work around the fact that an application cannot implement an stdio `FILE` with its logic. Here, while staying in C, we use implementation techniques like tables of function pointers, known from the C++ language or from the Linux kernel.

### 2.6.6 Interfaces to external libraries

Examples are the ‘iconv’ module, which interfaces to the `iconv` facility, regardless whether it is contained in libc or in an external `libiconv`. Or the ‘readline’ module, which interfaces to the GNU readline library.

### 2.6.7 Build / maintenance infrastructure

An example is the ‘maintainer-makefile’ module, which provides extra Makefile tags for maintaining a package.

### 2.7 Collaborative Development

Gnulib is maintained collaboratively. The mailing list is <bug-gnulib at gnu dot org>. Be warned that some people on the list may be very active at some times and unresponsive at other times.

Every module has one or more maintainers. While issues are discussed collaboratively on the list, the maintainer of a module nevertheless has a veto right regarding changes in his module.

All patches should be posted to the list, regardless whether they are proposed patches or whether they are committed immediately by the maintainer of the particular module. The
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purpose is not only to inform the other users of the module, but mainly to allow peer review.
It is not uncommon that several people contribute comments or spot bugs after a patch was proposed.

Conversely, if you are using GnuLib, and a patch is posted that affects one of the modules
that your package uses, you have an interest in proofreading the patch.

2.8 Copyright

Most modules are under the GPL. Some, mostly modules which can reasonably be used
in libraries, are under LGPL. The source files always say "GPL", but the real license
specification is in the module description file. If the module description file says "GPL", it
means "GPLv3+" (GPLv3 or newer, at the licensee's choice); if it says "LGPL", it means
"LGPLv3+" (LGPLv3 or newer, at the licensee's choice).

More precisely, the license specification in the module description file applies to the files
in lib/ and build-aux/. Different licenses apply to files in special directories:

modules/  Module description files are under this copyright:
            Copyright © 20XX–20YY Free Software Foundation, Inc.
            Copying and distribution of this file, with or without modification,
            in any medium, are permitted without royalty provided the copy-
            right notice and this notice are preserved.

m4/      Autoconf macro files are under this copyright:
            Copyright © 20XX–20YY Free Software Foundation, Inc.
            This file is free software; the Free Software Foundation gives un-
            limited permission to copy and/or distribute it, with or without
            modifications, as long as this notice is preserved.

tests/    If a license statement is not present in a test module, the test files are under
            GPL. Even if the corresponding source module is under LGPL, this is not a
            problem, since compiled tests are not installed by “make install”.

doc/      Documentation files are under this copyright:
            Copyright © 2004–20YY Free Software Foundation, Inc.
            Permission is granted to copy, distribute and/or modify this doc-
            ument under the terms of the GNU Free Documentation License,
            Version 1.3 or any later version published by the Free Software
            Foundation; with no Invariant Sections, no Front-Cover Texts, and
            no Back-Cover Texts. A copy of the license is included in the sec-
            tion entitled “GNU Free Documentation License”.

If you want to use some GnuLib modules under LGPL, you can do so by passing the
option ‘--lgpl’ to gnuLib-tool. This will replace the GPL header with an LGPL header
while copying the source files to your package. Similarly, if you want some GnuLib modules
under LGPLv2+ (Lesser GPL version 2.1 or newer), you can do so by passing the option
‘--lgpl=2’ to gnuLib-tool.

Keep in mind that when you submit patches to files in GnuLib, you should license them
under a compatible license. This means that sometimes the contribution will have to be
LGPL, if the original file is available under LGPL. You can find out about it by looking for
a "License: LGPL," information in the corresponding module description.
2.9 Steady Development

Gnulib modules are continually adapted, to match new practices, to be consistent with newly added modules, or simply as a response to build failure reports.

If you are willing to report an occasional regression, we recommend to use the newest version from git always, except in periods of major changes. Most Gnulib users do this.

2.10 Openness

Gnulib is open in the sense that we gladly accept contributions if they are generally useful, well engineered, and if the contributors have signed the obligatory papers with the FSF.

The module system is open in the sense that a package using Gnulib can
1. locally patch or override files in Gnulib,
2. locally add modules that are treated like Gnulib modules by gnulib-tool.

This is achieved by the ‘--local-dir’ option of gnulib-tool (see Chapter 5 [Extending Gnulib], page 35).
3 Invoking gnulib-tool

The `gnulib-tool` command is the recommended way to import Gnulib modules. It is possible to borrow Gnulib modules in a package without using `gnulib-tool`, relying only on the meta-information stored in the `modules/*` files, but with a growing number of modules this becomes tedious. `gnulib-tool` simplifies the management of source files, `Makefile.ams` and `configure.ac` in packages incorporating Gnulib modules.

`gnulib-tool` is not installed in a standard directory that is contained in the `PATH` variable. It needs to be run directly in the directory that contains the Gnulib source code. You can do this either by specifying the absolute filename of `gnulib-tool`, or you can also use a symbolic link from a place inside your `PATH` to the `gnulib-tool` file of your preferred and most up-to-date Gnulib checkout, like this:

```
$ ln -s $HOME/gnu/src/gnulib.git/gnulib-tool $HOME/bin/gnulib-tool
```

Run ``gnulib-tool --help`' for information. To get familiar with `gnulib-tool` without affecting your sources, you can also try some commands with the option `--dry-run`; then `gnulib-tool` will only report which actions it would perform in a real run without changing anything.

3.1 Finding modules

There are four ways of finding the names of Gnulib modules that you can use in your package:

- You have the complete module list, sorted according to categories, in [https://www.gnu.org/software/gnulib/MODULES.html](https://www.gnu.org/software/gnulib/MODULES.html).
- If you are looking for POSIX function replacements that you don’t know about yet, follow the procedure described in section Section 3.7 [Finding POSIX substitutes], page 20.
- If you are looking for a particular POSIX header or function replacement, look in the chapters Chapter 8 [Header File Substitutes], page 43, and Chapter 9 [Function Substitutes], page 73. For headers and functions that are provided by Glibc but not standardized by POSIX, look in the chapters Chapter 11 [Glibc Header File Substitutes], page 441, and Chapter 12 [Glibc Function Substitutes], page 452.
- If you have already found the source file in Gnulib and are looking for the module that contains this source file, you can use the command `gnulib-tool --find filename`.

3.2 Initial import

Gnulib assumes that your project uses Autoconf. When using Gnulib, you will need to have Autoconf among your build tools.

Gnulib also assumes that your project’s `configure.ac` contains the line

```
AC_CONFIG_HEADERS([config.h])
```

The `config.h` file gets generated with platform dependent C macro definitions, and the source files include it (see Section 3.5 [Source changes], page 19).

Unless you use `gnulib-tool`’s `--gnu-make` option, Gnulib also assumes that your project uses Automake at least in a subdirectory of your project. While the use of Automake in
your project’s top level directory is an easy way to fulfil the Makefile conventions of the GNU coding standards, Gnumlib does not require it.

Invoking `gnulib-tool --import` will copy source files, create a `Makefile.am` to build them, generate a file `gnulib-comp.m4` with Autoconf M4 macro declarations used by `configure.ac`, and generate a file `gnulib-cache.m4` containing the cached specification of how Gnumlib is used.

Our example will be a library that uses Autoconf, Automake and Libtool. It calls `strdup`, and you wish to use gnumlib to make the package portable to C99 and C11 (which don’t have `strdup`).

```
~$ gnulib-tool --import strdup
Module list with included dependencies:
  absolute-header
  extensions
  strdup
  string
File list:
  lib/dummy.c
  lib/strdup.c
  lib/string.in.h
  m4/absolute-header.m4
  m4/extensions.m4
  m4/gnulib-common.m4
  m4/strdup.m4
  m4/string_h.m4
Creating directory ./lib
Creating directory ./m4
Copying file lib/dummy.c
Copying file lib/strdup.c
Copying file lib/string.in.h
Copying file m4/absolute-header.m4
Copying file m4/extensions.m4
Copying file m4/gnulib-common.m4
Copying file m4/gnulib-tool.m4
Copying file m4/strdup.m4
Copying file m4/string_h.m4
Creating lib/Makefile.am
Creating m4/gnulib-cache.m4
Creating m4/gnulib-comp.m4
Finished.
```

You may need to add `#include` directives for the following .h files.

```
#include <string.h>
```

Don’t forget to
- add "lib/Makefile" to AC_CONFIG_FILES in ./configure.ac,
- mention "lib" in SUBDIRS in Makefile.am,
- mention "-I m4" in ACLOCAL_AMFLAGS in Makefile.am,
- invoke gl_EARLY in ./configure.ac, right after AC_PROG_CC,
- invoke gl_INIT in ./configure.ac.

```
~/src/libfoo$
```

By default, the source code is copied into lib/ and the M4 macros in m4/. You can override these paths by using --source-base=DIRECTORY and --m4-base=DIRECTORY. Some modules also provide other files necessary for building. These files are copied into the directory specified by `AC_CONFIG_AUX_DIR` in configure.ac or by the --aux-dir=DIRECTORY option. If neither is specified, the current directory is assumed.

**gnulib-tool** can make symbolic links instead of copying the source files. The option to specify for this is '--symlink', or '-s' for short. This can be useful to save a few kilobytes of disk space. But it is likely to introduce bugs when gnulib is updated; it is more reliable to use **gnulib-tool --update** (see below) to update to newer versions of gnulib. Furthermore it requires extra effort to create self-contained tarballs, and it may disturb some mechanism the maintainer applies to the sources. For these reasons, this option is generally discouraged.

**gnulib-tool** will overwrite any pre-existing files, in particular Makefile.am. It is also possible to separate the generated Makefile.am content (for building the gnulib library) into a separate file, say gnulib.mk, that can be included by your handwritten Makefile.am, but this is a more advanced use of **gnulib-tool**.

Consequently, it is a good idea to choose directories that are not already used by your projects, to separate gnulib imported files from your own files. This approach is also useful if you want to avoid conflicts between other tools (e.g., gettextize that also copy M4 files into your package. Simon Josefsson successfully uses a source base of gl/, and a M4 base of gl/m4/, in several packages.

After the '--import' option on the command line comes the list of Gnulib modules that you want to incorporate in your package. The names of the modules coincide with the filenames in Gnulib's modules/ directory.

Some Gnulib modules depend on other Gnulib modules. **gnulib-tool** will automatically add the needed modules as well; you need not list them explicitly. **gnulib-tool** will also memorize which dependent modules it has added, so that when someday a dependency is dropped, the implicitly added module is dropped as well (unless you have explicitly requested that module).

If you want to cut a dependency, i.e., not add a module although one of your requested modules depends on it, you may use the option 'avoid=module' to do so. Multiple uses of this option are possible. Of course, you will then need to implement the same interface as the removed module.

A few manual steps are required to finish the initial import. **gnulib-tool** printed a summary of these steps.

First, you must ensure Autoconf can find the macro definitions in gnulib-comp.m4. Use the ACLOCAL_AMFLAGS specifier in your top-level Makefile.am file, as in:

```
ACLOCAL_AMFLAGS = -I m4
```

You are now ready to call the M4 macros in gnulib-comp.m4 from configure.ac. The macro gl_EARLY must be called as soon as possible after verifying that the C compiler is working. Typically, this is immediately after AC_PROG_CC, as in:
AC_PROG_CC
gl_EARLY

If you are using AC_PROG_CC_STDC, the macro gl_EARLY must be called after it, like this:

AC_PROG_CC
AC_PROG_CC_STDC
gl_EARLY

The core part of the gnulib checks are done by the macro gl_INIT. Place it further down in the file, typically where you normally check for header files or functions. It must come after other checks which may affect the compiler invocation, such as AC_MINIX. For example:

# For gnulib.

gl_INIT

gl_INIT will in turn call the macros related with the gnulib functions, be it specific gnulib macros, like gl_FUNC_ALLOCA or Autoconf or Automake macros like ACFUNC_ALLOCA or AM_FUNC_GETLINE. So there is no need to call those macros yourself when you use the corresponding gnulib modules.

You must also make sure that the gnulib library is built. Add the Makefile in the gnulib source base directory to AC_CONFIG_FILES, as in:

AC_CONFIG_FILES(... lib/Makefile ...)

You must also make sure that make will recurse into the gnulib directory. To achieve this, add the gnulib source base directory to a SUBDIRS Makefile.am statement, as in:

SUBDIRS = lib

or if you, more likely, already have a few entries in SUBDIRS, you can add something like:

SUBDIRS += lib

Finally, you have to add compiler and linker flags in the appropriate source directories, so that you can make use of the gnulib library. Since some modules ('getopt', for example) may copy files into the build directory, top_builddir/lib is needed as well as top_srcdir/lib. For example:

AM_CPPFLAGS = -I$(top_builddir)/lib -I$(top_srcdir)/lib

LDADD = lib/libgnu.a

Don't forget to #include the various header files. In this example, you would need to make sure that '#include <string.h>' is evaluated when compiling all source code files, that want to make use of strdup.

In the usual case where Autoconf is creating a config.h file, you should include config.h first, before any other include file. That way, for example, if config.h defines 'restrict'
to be the empty string on a non-C99 host, or a macro like ‘_FILE_OFFSET_BITS’ that affects
the layout of data structures, the definition is consistent for all include files. Also, on some
platforms macros like ‘_FILE_OFFSET_BITS’ and ‘_GNU_SOURCE’ may be ineffective, or may
have only a limited effect, if defined after the first system header file is included.

Finally, note that you cannot use AC_LIBOBJ or AC_REPLACE_FUNCS in your
configure.ac and expect the resulting object files to be automatically added to
lib/libgnu.a. This is because your AC_LIBOBJ and AC_REPLACE_FUNCS invocations
from configure.ac augment a variable @LIBOBJS@ (and/or @LTLIBOBJS@ if using
Libtool), whereas lib/libgnu.a is built from the contents of a different variable, usually
@gl_LIBOBJS@ (or @gl_LTLIBOBJS@ if using Libtool).

3.3 Modified imports

You can at any moment decide to use Gnulib differently than the last time.

There are two ways to change how Gnulib is used. Which one you’ll use, depends on
where you keep track of options and module names that you pass to gnulib-tool.

- If you store the options and module names in a file under your own control, such
  as autogen.sh, bootstrap, bootstrap.conf, or similar, simply invoke gnulib-tool
  again, with modified options and more or fewer module names.
- gnulib-tool remembers which modules were used last time. If you want to rely on
gnulib-tool’s own memory of the last used options and module names, you can use
the commands gnulib-tool --add-import and gnulib-tool --remove-import.

So, if you only want to use more Gnulib modules, simply invoke
gnulib-tool --add-import new-modules. The list of modules that you pass after ‘--add-import’ is added
to the previous list of modules.

Similarly, if you want to use fewer Gnulib modules, simply invoke
 gnulib-tool --remove-import unneeded-modules. The list of modules that you pass after
‘--remove-import’ is removed from the previous list of modules. Note that if
a module is then still needed as dependency of other modules, it will be used
nevertheless. If you want to really not use a module any more, regardless of whether
other modules may need it, you need to use the ‘--avoid’ option.

For other changes, such as different choices of ‘--lib’, ‘--source-base’ or ‘--aux-dir’,
the normal way is to modify manually the file gnulib-cache.m4 in the M4 macros
directory, then launch ‘gnulib-tool --add-import’.

The only change for which this doesn’t work is a change of the ‘--m4-base’ directory.
Because, when you pass a different value of ‘--m4-base’, gnulib-tool will not find
the previous gnulib-cache.m4 file any more. A possible solution is to manually copy
the gnulib-cache.m4 into the new M4 macro directory.

In the gnulib-cache.m4 file, the macros have the following meaning:

gl_MODULES
The argument is a space separated list of the requested modules, not including dependencies.

gl_AVOID
The argument is a space separated list of modules that should not be used, even if they occur as dependencies. Corresponds to the ‘--avoid’ command line argument.
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3.4 Simple update

When you want to update to a more recent version of Gnulib, without changing the list of modules or other parameters, a simple call does it:

```
$ gnulib-tool --add-import
```

This will create, update or remove files, as needed.

Note: From time to time, changes are made in Gnulib that are not backward compatible. When updating to a more recent Gnulib, you should consult Gnulib’s NEWS file to check whether the incompatible changes affect your project.

3.5 Changing your sources for use with Gnulib

Gnulib contains some header file overrides. This means that when building on systems with deficient header files in `/usr/include/`, it may create files named `string.h`, `stdlib.h`, `stdint.h` or similar in the build directory. In the other source directories of your package you will usually pass `-I` options to the compiler, so that these Gnulib substitutes are visible and take precedence over the files in `/usr/include/`.

These Gnulib substitute header files rely on `<config.h>` being already included. Furthermore `<config.h>` must be the first include in every compilation unit. This means that
to all your source files and likely also to all your tests source files you need to add an
#include <config.h> at the top. Which source files are affected? Exactly those whose
compilation includes a ‘-I’ option that refers to the Gnulib library directory.

This is annoying, but inevitable: On many systems, <config.h> is used to set system
dependent flags (such as _GNU_SOURCE on GNU systems), and these flags have no effect
after any system header file has been included.

3.6 Changing your link commands for use with Gnulib

When you use Gnulib, you need to augment the set of libraries against which your
programs and libraries are linked. This is done by augmenting the Automake variable LDADD
(for all programs) or prog_LDDADD (for a single program prog) or library_la_LIBADD (for
a single library library.la).

What do you need to add to this Automake variable?
1. The reference to the Gnulib library. In the example of section Section 3.2 [Initial
import], page 14, this would be lib/libgnu.a for source in the top-level directory, or
../lib/libgnu.a for source in a sibling directory of lib/.
2. References to additional libraries, brought in by some of the Gnulib modules that you
use (directly or indirectly). The complete list of such libraries is printed when you
invoke gnulib-tool. Alternatively, you can retrieve the set of additional libraries
required by a specific Gnulib module by running

./gnulib-tool --extract-recursive-link-directive module

Beware: By looking into the module description file modules/module or by running

./gnulib-tool --extract-link-directive module

you would miss the link dependencies of indirectly used modules.

3.7 Finding recommended ISO C and POSIX function
substitutes

Gnulib contains a wealth of portability workarounds for ISO C and POSIX functions. They are listed in detail in the chapter Chapter 9 [Function Substitutes], page 73. If you
want to know which function substitutes are recommended for your package, you can search
your source code for ISO C and POSIX functions that it uses and read the corresponding
sections of said documentation chapter. But this is a tedious task. Here is an alternative
approach that makes this task easier.
1. Add the Gnulib module ‘posixcheck’ to the Gnulib imports of your package, as de-
scribed earlier in this chapter.
2. Do a make distclean if you previously built in the top-level directory. Then regenerate
the Autotools-generated parts of the package.
3. On a glibc system, build your package. Pay attention to the compiler warnings. Warn-
ings are generated for uses of ISO C and POSIX functions that have portability prob-
lems or other important pitfalls and for which you have not yet imported the corre-
sponding Gnulib module. If you get, say, a warning “warning: call to ’close’ declared
with attribute warning: close does not portably work on sockets - use gnulib module
close for portability”, put ‘close’ on your list of modules to import.
4. Add the modules you noted to the Gnulib imports of your package.
5. Optionally, you can do the same steps again, and make sure that there are no warnings left except those that you want to intentionally ignore.
6. Finally, remove the Gnulib module `posixcheck` from the Gnulib imports, and run `make distclean`.

### 3.8 Modifying the build rules of a Gnulib import directory

In some cases, you may want to set additional compiler options for use within the Gnulib import directory. For example, the `relocatable` module operates better if you define the C macros `ENABLE_COSTLY_RELOCATABLE` and `INSTALLDIR` during its compilation.

There are two ways to do so: Use of the `gnulib-tool` option `--makefile-name`, and a kitchen-sink module.

With the `gnulib-tool` option `--makefile-name`, you are telling `gnulib-tool` to generate an includable `Makefile.am` portion, rather than a self-contained `Makefile.am`. For example, when you use `--makefile-name=Makefile.gnulib`, `gnulib-tool` will generate `Makefile.gnulib`, and you will provide a hand-written `Makefile.am` that includes `Makefile.gnulib` through a line such as `include Makefile.gnulib`.

Before this include, you need to initialize this set of `Makefile.am` variables:

- `AUTOMAKE_OPTIONS`
- `SUBDIRS`
- `noinst_HEADERS`
- `noinst_LIBRARIES`
- `noinst_LTLIBRARIES`
- `pkgdata_DATA` (only with Automake ≥ 1.11.4)
- `EXTRA_DIST`
- `BUILT_SOURCES`
- `SUFFIXES`
- `MOSTLYCLEANFILES`
- `MOSTLYCLEANDIRS`
- `CLEANFILES`
- `DISTCLEANFILES`
- `MAINTAINERCLEANFILES`
- `AM_CPPFLAGS`
- `AM_CFLAGS`

`AUTOMAKE_OPTIONS` should be initialized as described in Section “Changing Automake’s Behavior” in *GNU Automake*. The other variables can be initialized to empty. However, you will most likely want to initialize some of them with non-empty values, in order to achieve the desired customization.

The other approach, the kitchen-sink module, is more advanced. See chapter Chapter 5 [Extending Gnulib], page 35.
3.9 Using Gnutip for both a library and a program

Your project might build both a library and some accompanying programs in the same source tree. In that case you might want to use different modules for the library than for the programs. Typically the programs might want to make use of `getopt-posix` or `version-etc`, while the library wants to stay clear of these modules for technical or licensing reasons.

Let’s assume that your project contains a `lib` directory where the source of the library resides and a `src` directory for the sources of the programs as follows.

```
|-- configure.ac
|-- lib
  |-- foo.c
  `-- Makefile.am
|-- Makefile.am
  `-- src
    |-- bar.c
    `-- Makefile.am
```

You can now add two instances of Gnutip to your project in separate source trees:

```
~/src/libfoo$ gnutip-tool --import --lib=libgnu --source-base=gnulib 
    --m4-base=gnulib/m4 --macro-prefix=gl strndup
~/src/libfoo$ gnutip-tool --import --lib=libgnutools 
    --source-base=src/gnulib --m4-base=src/gnulib/m4 
    --macro-prefix=gl_tools getopt-gnu
```

The first one will import the module `strndup` in `gnulib` and the second one will import `getopt-gnu` in `src/gnulib` and you will end up with the following source tree (many files omitted in the interest of brevity):

```
|-- configure.ac
|-- gnutip
  |-- m4
  `-- strndup.c
|-- lib
  |-- foo.c
  `-- Makefile.am
|-- Makefile.am
  `-- src
    |-- bar.c
    `-- gnutip
      |-- getopt.c
      |-- getopt.in.h
      `-- m4
        `-- Makefile.am
```

Integration with your code is basically the same as outlined in Section 3.2 [Initial import], page 14, with the one exception that you have to add both the macro `gl_EARLY` and the macro `gl_tools_EARLY` to your `configure.ac` (and of course also both macros `gl_INIT`
and gl_tools_INIT). Obviously the name of the second macro is dependent on the value of the --macro-prefix option in your gnulib-tool invocation.

```
... AC_PROG_CC
  gl_EARLY
  gl_tools_EARLY
...
# For gnulib.
  gl_INIT
  gl_tools_INIT
...
```

Also as outlined in Section 3.2 [Initial import], you will have to add compiler and linker flags. For the library you might have to add something along the line of the following to your Makefile.am:

```
... AM_CPPFLAGS = -I$(top_srcdir)/gnulib -I$(top_builddir)/gnulib
...
  libfoo_la_LIBADD = $(top_builddir)/gnulib/libgnu.la
... Corresponsingly for the programs you will have to add something like this:
...
  AM_CPPFLAGS = -I$(top_srcdir)/src/gnulib -I$(top_builddir)/src/gnulib
...
  LIBADD = $(top_builddir)/src/gnulib/libgnutools.la
...
```

The name of the library that you have pass in the linker option depends on the --lib option in gnulib-tool invocation.

### 3.10 Caveat: gettextize and autopoint users

The programs gettextize and autopoint, part of GNU gettext, import or update the internationalization infrastructure. Some of this infrastructure, namely ca. 20 Autoconf macro files and the config.rpath file, is also contained in GnuLib and may be imported by gnulib-tool. The use of gettextize or autopoint will therefore overwrite some of the files that gnulib-tool has imported, and vice versa.

Avoiding to use gettextize (manually, as package maintainer) or autopoint (as part of a script like autoreconf or autogen.sh) is not the solution: These programs also import the infrastructure in the po/ and optionally in the intl/ directory.

The copies of the conflicting files in GnuLib are more up-to-date than the copies brought in by gettextize and autopoint. When a new gettext release is made, the copies of the files in GnuLib will be updated immediately.

The choice of which version of gettext to require depends on the needs of your package. For a package that wants to comply to GNU Coding Standards, the steps are:

1. When you run gettextize, always use the gettextize from the matching GNU gettext release. For the most recent GnuLib checkout, this is the newest release found on
2. After running \texttt{gettextize}, invoke \texttt{gnulib-tool} and import the \texttt{gettext} module. Also, copy the latest version of gnulib’s \texttt{build-aux/po/Makefile.in.in} to your \texttt{po/} directory (this is done for you if you use gnulib’s \texttt{bootstrap} script).

3. If you get an error message like \texttt{*** error: gettext infrastructure mismatch: using a Makefile.in.in from gettext version ... but the Autoconf macros are from gettext version ...}, it means that a new GNU gettext release was made, and its Autoconf macros were integrated into Gnulib and now mismatch the \texttt{po/} infrastructure. In this case, fetch and install the new GNU gettext release and run \texttt{gettextize} followed by \texttt{gnulib-tool}.

On the other hand, if your package is not as concerned with compliance to the latest standards, but instead favors development on stable environments, the steps are:

1. Determine the oldest version of \texttt{gettext} that you intend to support during development (at this time, gnulib recommends going no older than version 0.17). Run \texttt{autopoint} (not \texttt{gettextize}) to copy infrastructure into place (newer versions of gettext will install the older infrastructure that you requested).

2. Invoke \texttt{gnulib-tool}, and import the \texttt{gettext-h} module.

Regardless of which approach you used to get the infrastructure in place, the following steps must then be used to preserve that infrastructure (gnulib’s \texttt{bootstrap} script follows these rules):

1. When a script of yours runs \texttt{autopoint}, invoke \texttt{gnulib-tool} afterwards.

2. When you invoke \texttt{autoreconf} after \texttt{gnulib-tool}, make sure to not invoke \texttt{autopoint} a second time, by setting the \texttt{AUTOPOINT} environment variable, like this:

   
   
   $ env AUTOPOINT=true autoreconf --install

3.11 Handling Gnulib’s own message translations

Gnulib provides some functions that emit translatable messages using GNU gettext. The \texttt{gnulib} domain at the Translation Project (\url{https://translationproject.org/}) collects translations of these messages, which you should incorporate into your own programs.

There are two basic ways to achieve this. The first, and older, method is to list all the source files you use from Gnulib in your own \texttt{po/POTFILES.in} file. This will cause all the relevant translatable strings to be included in your POT file. When you send this POT file to the Translation Project, translators will normally fill in the translations of the Gnulib strings from their “translation memory”, and send you back updated PO files.

However, this process is error-prone: you might forget to list some source files, or the translator might not be using a translation memory and provide a different translation than another translator, or the translation might not be kept in sync between Gnulib and your package. It is also slow and causes substantial extra work, because a human translator must be in the loop for each language and you will need to incorporate their work on request.

For these reasons, a new method was designed and is now recommended. If you pass the \texttt{--po-base=directory} and \texttt{--po-domain=domain} options to \texttt{gnulib-tool}, then
gnulib-tool will create a separate directory with its own POTFILES.in, and fetch current translations directly from the Translation Project (using rsync or wget, whichever is available). The POT file in this directory will be called domain-gnulib.pot, depending on the domain you gave to the --po-domain option (typically the same as the package name). This causes these translations to reside in a separate message domain, so that they do not clash either with the translations for the main part of your package nor with those of other packages on the system that use possibly different versions of Gnulib. When you use these options, the functions in Gnulib are built in such a way that they will always use this domain regardless of the default domain set by textdomain.

In order to use this method, you must—in each program that might use Gnulib code—add an extra line to the part of the program that initializes locale-dependent behavior. Where you would normally write something like:

```c
setlocale (LC_ALL, "");
bindingtextdomain (PACKAGE, LOCALEDIR);
textdomain (PACKAGE);
```

you should add an additional bindingtextdomain call to inform gettext of where the MO files for the extra message domain may be found:

```c
bindingtextdomain (PACKAGE "-gnulib", LOCALEDIR);
```

(This example assumes that the domain that you specified to gnulib-tool is the same as the value of the PACKAGE preprocessor macro.)

Since you do not change the textdomain call, the default message domain for your program remains the same and your own use of gettext functions will not be affected.

### 3.12 Issues with Version Control Systems

If a project stores its source files in a version control system (VCS), such as CVS, Subversion, or Git, one needs to decide which files to commit.

In principle, all files created by gnulib-tool, except gnulib-cache.m4, can be treated like generated source files, like for example a parser.c file generated from parser.y. Alternatively, they can be considered source files and updated manually.

Here are the three different approaches in common use. Each has its place, and you should use whichever best suits your particular project and development methods.

1. In projects which commit all source files, whether generated or not, into their VCS, the gnulib-tool generated files should all be committed. In this case, you should pass the option `--no-vc-files` to gnulib-tool, which avoids alteration of VCS-related files such as .gitignore.

   Gnulib also contains files generated by make (and removed by make clean), using information determined by configure. For a Gnulib source file of the form lib/foo.in.h, the corresponding lib/foo.h is such a make-generated file. These should not be checked into the VCS, but instead added to .gitignore or equivalent.

2. In projects which customarily omit from their VCS all files that are generated from other source files, none of these files and directories are added into the VCS. As described in Section 3.3 [Modified imports], page 18, there are two ways to keep track of options and module names that are passed to gnulib-tool. The command for restoring the omitted files depends on it:
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- If they are stored in a file other than `gnulib-cache.m4`, such as `autogen.sh`, `bootstrap`, `bootstrap.conf`, or similar, the restoration command is the entire `gnulib-tool ... --import ...` invocation with all options and module names.
- If the project relies on `gnulib-tool`'s memory of the last used options and module names, then the file `gnulib-cache.m4` in the M4 macros directory must be added to the VCS, and the restoration command is:
  
  ```bash
  $ gnulib-tool --update
  ```

  The `--update` option operates much like the `--add-import` option, but it does not offer the possibility to change the way Gnulib is used. Also it does not report in the ChangeLogs the files that it had to add because they were missing.

Gnulib includes the file `build-aux/bootstrap` to aid a developer in using this setup. Furthermore, in projects that use git for version control, it is possible to use a git submodule containing the precise commit of the gnulib repository, so that each developer running `bootstrap` will get the same version of all gnulib-provided files. The location of the submodule can be chosen to fit the package’s needs; here’s how to initially create the submodule in the directory `.gnulib`:

```bash
$ dir=.gnulib
$ git submodule add -- git://git.sv.gnu.org/gnulib.git $dir
$ git config alias.syncsub "submodule foreach git pull origin master"
```

Thereafter, `bootstrap` can run this command to update the submodule to the recorded checkout level:

```bash
$ git submodule update --init $dir
```

and a developer can use this sequence to update to a newer version of gnulib:

```bash
$ git syncsub
$ git add $dir
$ ./bootstrap
```

3. Some projects take a “middle road”: they do commit Gnulib source files as in the first approach, but they do not commit other derived files, such as a `Makefile.in` generated by Automake. This increases the size and complexity of the repository, but can help occasional contributors by not requiring them to have a full Gnulib checkout to do a build, and all developers by ensuring that all developers are working with the same version of Gnulib in the repository. It also supports multiple Gnulib instances within a project. It remains important not to commit the `make`-generated files, as described above.

### 3.13 Bundling the unit tests of the Gnulib modules

You can bundle the unit tests of the Gnulib modules together with your package, through the `--with-tests` option. Together with `--with-tests`, you also specify the directory for these tests through the `--tests-base` option. Of course, you need to add this directory to the `SUBDIRS` variable in the `Makefile.am` of the parent directory.

The advantage of having the unit tests bundled is that when your program has a problem on a particular platform, running the unit tests may help determine quickly if the problem is on Gnulib’s side or on your package’s side. Also, it helps verifying Gnulib’s portability, of course.

The unit tests will be compiled and run when the user runs `make check`. When the user runs only `make`, the unit tests will not be compiled.
In the `SUBDIRS` variable, it is useful to put the GnuLib tests directory after the directory containing the other tests, not before:

```
SUBDIRS = gnulib-lib src man tests gnulib-tests
```

This will ensure that on platforms where there are test failures in either directory, users will see and report the failures from the tests of your program.

Note: In packages which use more than one invocation of `gnulib-tool` in the scope of the same `configure.ac`, you cannot use `--with-tests`. You will have to use a separate `configure.ac` in this case.

### 3.14 Avoiding unnecessary checks and compilations

In some cases, a module is needed by another module only on specific platforms. But when a module is present, its Autoconf checks are always executed, and its `Makefile.am` additions are always enabled. So it can happen that some Autoconf checks are executed and some source files are compiled, although no other module needs them on this particular platform, just in case some other module would need them.

The option `--conditional-dependencies` enables an optimization of configure checks and `Makefile.am` snippets that avoids this. With this option, whether a module is considered “present” is no longer decided when `gnulib-tool` is invoked, but later, when `configure` is run. This applies to modules that were added as dependencies while `gnulib-tool` was run; modules that were passed on the command line explicitly are always “present”.

For example, the `timegm` module needs, on platforms where the system’s `timegm` function is missing or buggy, a replacement that is based on a function `mktime_internal`. The module `mktime-internal` that provides this function provides it on all platforms. So, by default, the file `mktime-internal.c` will be compiled on all platforms, even on glibc and BSD systems which have a working `timegm` function. When the option `--conditional-dependencies` is given, on the other hand, and if `mktime-internal` was not explicitly required on the command line, the file `mktime-internal.c` will only be compiled on the platforms where the `timegm` needs them.

Conditional dependencies are specified in the module description by putting the condition on the same line as the dependent module, enclosed in brackets. The condition is a boolean shell expression that can assume that the `configure.ac` snippet from the module description has already been executed. In the example above, the dependency from `timegm` to `mktime-internal` is written like this:

```
Depends-on:
...
  mktime-internal [test $HAVE_TIMEGM = 0 || test $REPLACE_TIMEGM = 1]
...
```

Note: The option `--conditional-dependencies` cannot be used together with the option `--with-tests`. It also cannot be used when a package uses `gnulib-tool` for several subdirectories, with different values of `--source-base`, in the scope of a single `configure.ac` file.
4 Writing modules

This chapter explains how to write modules of your own, either to extend Gnulib for your own package (see Chapter 5 [Extending Gnulib], page 35), or for inclusion in gnulib proper.

The guidelines in this chapter do not necessarily need to be followed for using gnulib-tool. They merely represent a set of good practices. Following them will result in a good structure of your modules and in consistency with gnulib.

4.1 Source code files

Every API (C functions or variables) provided should be declared in a header file (.h file) and implemented in one or more implementation files (.c files). The separation has the effect that users of your module need to read only the contents of the .h file and the module description in order to understand what the module is about and how to use it—not the entire implementation. Furthermore, users of your module don’t need to repeat the declarations of the functions in their code, and are likely to receive notification through compiler errors if you make incompatible changes to the API (like, adding a parameter or changing the return type of a function).

4.2 Header files

The .h file should declare the C functions and variables that the module provides.

The .h file should be stand-alone. That is, it does not require other .h files to be included before. Rather, it includes all necessary .h files by itself.

It is a tradition to use CPP tricks to avoid parsing the same header file more than once, which might cause warnings. The trick is to wrap the content of the header file (say, foo.h) in a block, as in:

```c
#ifndef FOO_H
#define FOO_H
...
body of header file goes here
...
#define FOO_H */
```

Whether to use FOO_H or _FOO_H is a matter of taste and style. The C99 and C11 standards reserve all identifiers that begin with an underscore and either an uppercase letter or another underscore, for any use. Thus, in theory, an application might not safely assume that _FOO_H has not already been defined by a library. On the other hand, using FOO_H will likely lead the higher risk of collisions with other symbols (e.g., KEY_H, XK_H, BPF_H, which are CPP macro constants, or COFF_LONG_H, which is a CPP macro function). Your preference may depend on whether you consider the header file under discussion as part of the application (which has its own namespace for CPP symbols) or a supporting library (that shouldn’t interfere with the application’s CPP symbol namespace).

Adapting C header files for use in C++ applications can use another CPP trick, as in:

```c
#ifndef __cplusplus
extern "C"
```
Chapter 4: Writing modules

```c
{
    #endif
    ...

    body of header file goes here
    ...
    #ifdef __cplusplus
}
    #endif
```

The idea here is that `__cplusplus` is defined only by C++ implementations, which will wrap the header file in an `extern "C"` block. Again, whether to use this trick is a matter of taste and style. While the above can be seen as harmless, it could be argued that the header file is written in C, and any C++ application using it should explicitly use the `extern "C"` block itself. Your preference might depend on whether you consider the API exported by your header file as something available for C programs only, or for C and C++ programs alike.

Note that putting a `#include` in an `extern "C" { ... }` block yields a syntax error in C++ mode on some platforms (e.g., glibc systems with g++ v3.3 to v4.2, AIX, OSF/1, IRIX). For this reason, it is recommended to place the `#include` before the `extern "C"` block.

### 4.3 Implementation files

The `.c` file or files implement the functions and variables declared in the `.h` file.

**Include ordering**

Every implementation file must start with `#include <config.h>`. This is necessary for activating the preprocessor macros that are defined on behalf of the Autoconf macros. Some of these preprocessor macros, such as `__GNU_SOURCE`, would have no effect if defined after a system header file has already been included.

Then comes the `#include "..."` specifying the header file that is being implemented. Putting this right after `#include <config.h>` has the effect that it verifies that the header file is self-contained.

Then come the system and application headers. It is customary to put all the system headers before all application headers, so as to minimize the risk that a preprocessor macro defined in an application header confuses the system headers on some platforms.

In summary:

- First comes #include `<config.h>`.
- Second comes the `#include "..."` specifying the module being implemented.
- Then come all the `#include <...>` of system or system-replacement headers, in arbitrary order.
- Then come all the `#include "..."` of gnulib and application headers, in arbitrary order.

### 4.4 Specification

The specification of a function should answer at least the following questions:

- What is the purpose of the function?
• What are the arguments?
• What is the return value?
• What happens in case of failure? (Exit? A specific return value? Errno set?)
• Memory allocation policy: If pointers to memory are returned, are they freshly allocated and supposed to be freed by the caller?

Where to put the specification describing exported functions? Three practices are used in gnulib:
• The specification can be as comments in the header file, just above the function declaration.
• The specification can be as comments in the implementation file, just above the function definition.
• The specification can be in texinfo format, so that it gets included in the gnulib manual.

In any case, the specification should appear in just one place, unless you can ensure that the multiple copies will always remain identical.

The advantage of putting it in the header file is that the user only has to read the include file normally never needs to peek into the implementation file(s).

The advantage of putting it in the implementation file is that when reviewing or changing the implementation, you have both elements side by side.

The advantage of texinfo formatted documentation is that it is easily published in HTML or Info format.

Currently (as of 2010), half of gnulib uses the first practice, nearly half of gnulib uses the second practice, and a small minority uses the texinfo practice.

4.5 Module description

For the module description, you can start from an existing module’s description, or from a blank one: module/TEMPLATE for a normal module, or module/TEMPLATE-TESTS for a unit test module. Some more fields are possible but rarely used. Use module/TEMPLATE-EXTENDED if you want to use one of them.

Module descriptions have the following fields. Absent fields are equivalent to fields with empty contents.

Description
This field should contain a concise description of the module’s functionality. One sentence is enough. For example, if it defines a single function ‘frob’, the description can be ‘frob() function: frobnication.’ Gnulib’s documentation generator will automatically convert the first part to a hyperlink when it has this form.

Status
This field is either empty/absent, or contains the word ‘obsolete’. In the latter case, gnulib-tool will, unless the option --with-obsolete is given, omit it when it used as a dependency. It is good practice to also notify the user about an obsolete module. This is done by putting into the ‘Notice’ section (see below) text like ‘This module is obsolete.’
Notice  This field contains text that gnulib-tool will show to the user when the module is used. This can be a status indicator like ‘This module is obsolete.’ or additional advice. Do not abuse this field.

Applicability
This field is either empty/absent, or contains the word ‘all’. It describes to which Makefile.am the module is applied. By default, a normal module is applied to source_base/Makefile.am (normally lib/Makefile.am), whereas a module ending in -tests is applied to tests_base/Makefile.am (normally tests/Makefile.am). If this field is ‘all’, it is applied to both Makefile.ams. This is useful for modules which provide Makefile.am macros rather than compiled source code.

Files  This field contains a newline separated list of the files that are part of the module. gnulib-tool copies these files into the package that uses the module. This list is typically ordered by importance: First comes the header file, then the implementation files, then other files.
It is possible to have the same file mentioned in multiple modules. That is, if the maintainers of that module agree on the purpose and future of said file.

Depends-on
This field contains a newline separated list of the modules that are required for the proper working of this module. gnulib-tool includes each required module automatically, unless it is specified with option --avoid or it is marked as obsolete and the option --with-obsolete is not given.
A test modules foo-tests implicitly depends on the corresponding non-test module foo. foo implicitly depends on foo-tests if the latter exists and if the option --with-tests has been given.
Tests modules can depend on non-tests modules. Non-tests modules should not depend on tests modules. (Recall that tests modules are built in a separate directory.)
Each listed required module may be declared a conditional dependency. This is indicated by placing the condition for the dependency on the same line, enclosed in brackets, after the name of the required module. The condition is a shell expression that is run after the module’s configure.ac statements. For example:

\texttt{strtoull \[test \$ac_cv_func_strtoumax = no\]}

Lines starting with # are recognized as comments and are ignored.

configure.ac-early
This field contains configure.ac stuff (Autoconf macro invocations and shell statements) that are logically placed early in the configure.ac file: right after the AC_PROG_CC invocation. This section is adequate for statements that modify CPPFLAGS, as these can affect the results of other Autoconf macros.

configure.ac
This field contains configure.ac stuff (Autoconf macro invocations and shell statements).
It is forbidden to add items to the CPPFLAGS variable here, other than temporarily, as these could affect the results of other Autoconf macros.

We avoid adding items to the LIBS variable, other than temporarily. Instead, the module can export an Autoconf-substituted variable that contains link options. The user of the module can then decide to which executables to apply which link options. Recall that a package can build executables of different kinds and purposes; having all executables link against all libraries is inappropriate.

If the statements in this section grow larger than a couple of lines, we recommend moving them to a .m4 file of their own.

Makefile.am

This field contains Makefile.am statements. Variables like lib_SOURCES are transformed to match the name of the library being built in that directory. For example, lib_SOURCES may become libgnu_a_SOURCES (for a plain library) or libgnu_la_SOURCES (for a libtool library). Therefore, the normal way of having an implementation file lib/foo.c compiled unconditionally is to write

```
lib_SOURCES += foo.c
```

Include

This field contains the preprocessor statements that users of the module need to add to their source code files. Typically it's a single include statement. A shorthand is allowed: You don't need to write the word "#include", just the name of the include file in the way it will appear in an include statement. Example:

```
"foo.h"
```

Link

This field contains the set of libraries that are needed when linking libraries or executables that use this module. Often this will be written as a reference to a Makefile variable. Please write them one per line, so that gnulib-tool can remove duplicates when presenting a summary to the user. Example:

```
$(POW_LIBM)
$(LTLIBICONV) when linking with libtool, $(LIBICONV) otherwise
```

When this field is omitted, it defaults to the union of the Link field of the dependencies.

License

This field specifies the license that governs the source code parts of this module. See Section 2.8 [Copyright], page 12, for details.

Maintainer

This field specifies the persons who have a definitive say about proposed changes to this module. You don’t need to mention email addresses here: they can be inferred from the ChangeLog file.

Please put at least one person here. We don’t like unmaintained modules.

4.6 Autoconf macros

For a module foo, an Autoconf macro file m4/foo.m4 is typically created when the Autoconf macro invocations for the module are longer than one or two lines.
The name of the main entry point into this Autoconf macro file is typically `gl_FOO`. For modules outside GnuLib that are not likely to be moved into GnuLib, please use a prefix specific to your package: `gt_` for GNU gettext, `cu_` for GNU coreutils, etc.

For modules that define a function `foo`, the entry point is called `gl_FUNC_FOO` instead of `gl_FOO`. For modules that provide a header file with multiple functions, say `foo.h`, the entry point is called `gl_FOO_H` or `gl_HEADER_FOO_H`. This convention is useful because sometimes a header and a function name coincide (for example, `fcntl` and `fcntl.h`).

For modules that provide a replacement, it is useful to split the Autoconf macro into two macro definitions: one that detects whether the replacement is needed and requests the replacement using `AC_LIBOBJ` (this is the entry point, say `gl_FUNC_FOO`), and one that arranges for the macros needed by the replacement code `lib/foo.c` (typically called `gl_PREREQ_FOO`). The reason of this separation is

1. to make it easy to update the Autoconf macros when you have modified the source code file: after changing `lib/foo.c`, all you have to review is the `Depends-on` section of the module description and the `gl_PREREQ_FOO` macro in the Autoconf macro file.

2. The Autoconf macros are often large enough that splitting them eases maintenance.

### 4.7 Unit test modules

A unit test that is a simple C program usually has a module description as simple as this:

Files:
- `tests/test-foo.c`
- `tests/macros.h`

Depends-on:
- `configure.ac`
- `Makefile.am`

```
TESTS += test-foo
check_PROGRAMS += test-foo
```

The test program `tests/test-foo.c` often has the following structure:

- First comes the obligatory `#include <config.h>`.
- Second comes the include of the header file that declares the API being tested. Including it here verifies that said header file is self-contained.
- Then come other includes. In particular, the file `macros.h` is often used here. It contains a convenient `ASSERT` macro.

The body of the test, then, contains many `ASSERT` invocations. When a test fails, the `ASSERT` macro prints the line number of the failing statement, thus giving you, the developer, an idea of which part of the test failed, even when you don’t have access to the machine where the test failed and the reporting user cannot run a debugger.

Sometimes it is convenient to write part of the test as a shell script. (For example, in areas related to process control or interprocess communication, or when different locales should be tried.) In these cases, the typical module description is like this:

Files:
- `tests/test-foo.sh`
tests/test-foo.c
tests/macros.h

Depends-on:

configure.ac:

Makefile.am:
TESTS += test-foo.sh
TESTS_ENVIRONMENT += FOO_BAR='@FOO_BAR@'
check_PROGRAMS += test-foo

Here, the TESTS_ENVIRONMENT variable can be used to pass values determined by configure or by the Makefile to the shell script, as environment variables. The Autoconf values EXEEXT and srcdir are already provided as environment variables, through an initial value of TESTS_ENVIRONMENT that gnutool puts in place.

Regardless of the specific form of the unit test, the following guidelines should be respected:

• A test indicates success by exiting with exit code 0. It should normally not produce output in this case. (Output to temporary files that are cleaned up at the end of the test are possible, of course.)

• A test indicates failure by exiting with an exit code different from 0 and 77, typically 1. It is useful to print a message about the failure in this case. The ASSERT macro already does so.

• A test indicates "skip", that is, that most of its interesting functionality could not be performed, through a return code of 77. A test should also print a message to stdout or stderr about the reason for skipping. For example:

    fputs ("Skipping test: multithreading not enabled\n", stderr);
    return 77;

Such a message helps detecting bugs in the autoconf macros: A simple message ‘SKIP: test-foo’ does not sufficiently catch the attention of the user.

4.8 Incompatible changes

Incompatible changes to GnuLib modules should be mentioned in GnuLib’s NEWS file. Incompatible changes here mean that existing source code may not compile or work any more.

We don’t mean changes in the binary interface (ABI), since

1. GnuLib code is used in source-code form.
2. The user who distributes libraries that contain GnuLib code is supposed to bump the version number in the way described in the Libtool documentation before every release.
5 Extending Gnulib

Gnulib modules are intended to be suitable for widespread use. Most problems with Gnulib can and should be fixed in a generic way, so that all of Gnulib’s users can benefit from the change. But occasionally a problem arises that is difficult or undesirable to fix generically, or a project that uses Gnulib may need to work around an issue before the Gnulib maintainers commit a final fix. Maintainers may also want to add their own pools of modules to projects as Gnulib “staging areas.”

The obvious way to make local changes to Gnulib modules is to use gnulib-tool to check out pristine modules, then to modify the results in-place. This works well enough for short-lived experiments. It is harder to keep modified versions of Gnulib modules for a long time, even though Git (or another distributed version control systems) can help out a lot with this during the development process.

Git, however, doesn’t address the distribution issue. When a package “foobar” needs a modified version of, say, stdint.in.h, it either has to put a comment into foobar/autogen.sh saying “Attention! This doesn’t work with a pristine Gnulib, you need this and that patch after checking out Gnulib,” or it has to use the ‘--avoid=stdint’ option and provide the modified stdint module in a different directory.

The --local-dir option to gnulib-tool solves this problem. It allows the package to override or augment Gnulib. This means:

- You can store files that are to override Gnulib files or modules.
- You can store context diffs to be applied to Gnulib files.
- You can add modules of your own, that are not (yet) in Gnulib.
- You can also add unstructured amounts of code to the library, by grouping the non-Gnulib files of the library in a single kitchen-sink “module.” (This kind of kitchen-sink module is not needed when you use the gnulib-tool option --makefile-name.)

In a release tarball, you can distribute the contents of this --local-dir directory that will be combinable with newer versions of Gnulib, barring incompatible changes to Gnulib.

If the --local-dir=directory option is specified, then gnulib-tool looks in directory whenever it reads a file from the Gnulib directory. Suppose gnulib-tool is looking for file. Then:

- If directory/file exists, then gnulib-tool uses it instead of the file included in Gnulib.
- Otherwise, if directory/file.diff exists, then gnulib-tool uses the file from Gnulib after applying the diff using the patch program.
- Otherwise, gnulib-tool uses the file included in Gnulib.

You can specify the --local-dir multiple times. In this case, the first specified directory has the highest precedence. That is, a file found in one directory will shadow any file and file.diff in the later directories and in the Gnulib directory. And a file file.diff found in one directory will be applied on top of the combination of file and file.diff files found in the later directories and in the Gnulib directory.

Please make wise use of this option. It also allows you to easily hold back modifications you make to Gnulib macros in cases it may be better to share them.
6 Miscellaneous Notes

6.1 Out of memory handling

The gnulib API does not have a standard error code for the out of memory error condition. Instead of adding a non-standard error code, gnulib has chosen to adopt a different strategy. Out of memory handling happens in rare situations, but performing the out of memory error handling after almost all API function invocations pollute your source code and might make it harder to spot more serious problems. The strategy chosen improves code readability and robustness.

For most applications, aborting the application with an error message when the out of memory situation occurs is the best that can be wished for. This is how the library behaves by default (using the 'xalloc-die' module).

However, we realize that some applications may not want to abort execution in any situation. Gnulib supports a hook to let the application regain control and perform its own cleanups when an out of memory situation has occurred. The application can define a function (having a void prototype, i.e., no return value and no parameters) and set the library variable xalloc_die to that function. The variable should be declared as follows.

```c
extern void (*xalloc_die)(void);
```

Gnulib will invoke this function if an out of memory error occurs. Note that the function should not return. Of course, care must be taken to not allocate more memory, as that will likely also fail.

6.2 Obsolete modules

Modules can be marked obsolete. This means that the problems they fix don’t occur any more on the platforms that are reasonable porting targets now. `gnulib-tool` warns when obsolete modules are mentioned on the command line, and by default ignores dependencies from modules to obsolete modules. When you pass the option `--with-obsolete` to `gnulib-tool`, dependencies to obsolete modules will be included, however, unless blocked through an `--avoid` option. This option is useful if your package should be portable even to very old platforms.

In order to mark a module obsolete, you need to add this to the module description:

```plaintext
Status: obsolete
Notice: This module is obsolete.
```

6.3 Extra tests modules

Test modules can be marked with some special status attributes. When a test module has such an attribute, `gnulib-tool --import` will not include it by default.

The supported status attributes are:

- `c++-test` Indicates that the test is testing C++ interoperability. Such a test is useful in a C++ or mixed C/C++ package, but is useless in a C package.
longrunning-test
Indicates that the test takes a long time to compile or execute (more than five minutes or so). Such a test is better avoided in a release that is made for the general public.

privileged-test
Indicates that the test will request special privileges, for example, ask for the superuser password. Such a test may hang when run non-interactively and is therefore better avoided in a release that is made for the general public.

unportable-test
Indicates that the test is known to fail on some systems, and that there is no workaround about it. Such a test is better avoided in a release that is made for the general public.

gnulib-tool --import --with-tests will not include tests marked with these attributes by default. When gnulib-tool is invoked with one of the options --with-c++-tests, --with-longrunning-tests, --with-privileged-tests, --with-unportable-tests, it will include tests despite the corresponding special status attribute. When gnulib-tool receives the option --with-all-tests, it will include all tests regardless of their status attributes.

gnulib-tool --create-testdir --with-tests and gnulib-tool --create-megatestdir --with-tests by default include all tests of modules specified on the command line, regardless of their status attributes. Tests of modules occurring as dependencies are not included by default if they have one of these status attributes. The options --with-c++-tests, --with-longrunning-tests, --with-privileged-tests, --with-unportable-tests are recognized here as well. Additionally, gnulib-tool also understands the options --without-c++-tests, --without-longrunning-tests, --without-privileged-tests, --without-unportable-tests.

In order to mark a module with a status attribute, you need to add it to the module description, like this:

    Status:
    longrunning-test

If only a part of a test deserves a particular status attribute, you can split the module into a primary and a secondary test module, say foo-tests and foo-extra-tests. Then add a dependency from foo-tests to foo-extra-tests, and mark the foo-extra-tests with the particular status attribute.

6.4 Modules that modify the way other modules work

The normal way to design modules is that each module has its own code, and the module dependencies provide the facilities on which this code can rely. But sometimes it is necessary to use more advanced techniques. For example:

- You may want to have optional module dependencies: Let module A use facilities provided by module B, if module B is present, but without requiring that module B is present.
- A module can indicate support for particular behaviours. For example, Gnulib has a module ‘sigpipe’ that requests POSIX compatible SIGPIPE behaviour from all other
modules – something that is not enabled by default. Or consider the ‘**nonblocking**’ module, that is an indicator that all I/O functions should handle non-blocking file descriptors – something that, equally, is not enabled by default.

- A module can indicate to other modules that they can rely on certain guarantees, and thus omit specific code. For example, when GnuLib’s ‘**malloc-gnu**’ module is present, you can omit code that test \( n \) against zero when you call `malloc(n)`.

  Be aware that these advanced techniques likely cause breakage in the situation of multiple `gnulib-tool` invocations in the scope of a single `configure` file. This is because the question “is module B present?” does not have a unique answer in such situations. `gnulib-tool` has support for these techniques in the situation of `--create-testdir --single-configure`, which basically has two `gnulib-tool` invocations, one for a set of modules that end up in `gllib`, and one for the set of modules that end up in `gltests`. But you should be aware that this does not cover the general situation.

  Which technique to use, depends on the answer to the question: “If my module occurs among the modules of `gltests`, should it have an effect on the modules in `gllib`?”

  If the answer is “no”, your module description should invoke the Autoconf macro `gl_MODULE_INDICATOR`. This Autoconf macro takes one argument: the name of your module. The effect of `gl_MODULE_INDICATOR([my-module])` is to define, in `config.h`, a C macro `GNULIB_MY_MODULE` that indicates whether your macro is considered to be present. This works even when your macro is used in `gltests`: `GNULIB_MY_MODULE` will then evaluate to 1 in `gltests` but to 0 in `gllib`.

  If the answer is “yes”, you have two techniques available. The first one is to invoke a similar Autoconf macro, named `gl_MODULE_INDICATOR_FOR_TESTS`. It works similarly. However, when your macro is used in `gltests`, `GNULIB_MY_MODULE` will evaluate to 1 both in `gltests` and in `gllib`.

  The second one is to define a shell variable in the `configure` file that tells whether your module is present, through use of `m4_divert_text`. The Autoconf macros of a dependency module will initialize this shell variable, through `m4_divert_text([DEFAULTS], [my_shell_var=no])`. The Autoconf macros of your module will override this value, through `m4_divert_text([INIT_PREPARE], [my_shell_var=yes])`. Then you can use `my_shell_var` in the Autoconf macros of both modules. You can find more details about this technique in the GnuLib module `getopt-gnu`.

  Reminder: These techniques are advanced. They have the potential to cause lots of headaches if you apply them incorrectly.

### 6.5 A C++ namespace for gnuLib

The function definitions provided by GnuLib (.c code) are meant to be compiled by a C compiler. The header files (.h files), on the other hand, can be used in either C or C++.

By default, when used in a C++ compilation unit, the .h files declare the same symbols and overrides as in C mode, except that functions defined by GnuLib or by the system are declared as ‘**extern “C”**’.

It is also possible to indicate to GnuLib to provide many of its symbols in a dedicated C++ namespace. If you define the macro `GNULIB_NAMESPACE` to an identifier, many functions will
be defined in the namespace specified by the identifier instead of the global namespace. For example, after you have defined

```c
#define GNULIB_NAMESPACE gnulib
```

at the beginning of a compilation unit, GnuLib’s `<fcntl.h>` header file will make available the `open` function as `gnulib::open`. The symbol `open` will still refer to the system’s `open` function, with its platform specific bugs and limitations.

The symbols provided in the GnuLib namespace are those for which the corresponding header file contains a `_GL_CXXALIAS_RPL` or `_GL_CXXALIAS_SYS` macro invocation.

The benefits of this namespace mode are:

- GnuLib defines fewer symbols as preprocessor macros. For example, on a platform where `open` has to be overridden, GnuLib normally does `#define open rpl_open`. If your package has a class with a member `open`, for example a class `foo` with a method `foo::open`, then if you define this member in a compilation unit that includes `<fcntl.h>` and use it in a compilation unit that does not include `<fcntl.h>`, or vice versa, you will get a link error. Worse: You will not notice this problem on the platform where the system’s `open` function works fine. This problem goes away in namespace mode.

- It provides a safety check whether the set of modules your package requests from GnuLib is sufficient. For example, if you use the function `gnulib::open` in your code, and you forgot to request the module ‘`open`’ from GnuLib, you will get a compilation error (regardless of the platform).

The drawback of this namespace mode is that the system provided symbols in the global namespace are still present, even when they contain bugs that GnuLib fixes. For example, if you call `open (...)` in your code, it will invoke the possibly buggy system function, even if you have requested the module ‘`open`’ from gnuLib-tool.

You can turn on the namespace mode in some compilation units and keep it turned off in others. This can be useful if your package consists of an application layer that does not need to invoke POSIX functions and an operating system interface layer that contains all the OS function calls. In such a situation, you will want to turn on the namespace mode for the application layer—to avoid many preprocessor macro definitions—and turn it off for the OS interface layer—to avoid the drawback of the namespace mode, mentioned above.

### 6.6 Running self-tests under valgrind

For projects written in C or similar languages, running the self-tests under Valgrind can reveal hard to find memory issues. GnuLib supports two ways to make use of Valgrind: one that enables use of Valgrind at configure time, when `configure` found it to be present; and one at the discretion of the developer.

#### 6.6.1 Using valgrind without developer intervention

The `valgrind-tests` module searches for Valgrind at configure time and declares the `VALGRIND` automake variable for use with automake’s `TESTS_ENVIRONMENT`.

After importing the `valgrind-tests` module to your project, you use it by adding the following to the `Makefile.am` that runs the self-tests:

```plaintext
TESTS_ENVIRONMENT = $(VALGRIND)
```

This will run all self-checks under valgrind.
6.6.2 Using valgrind at the developer’s discretion

In this approach, you define a Makefile.am variable ‘VALGRIND’ (or, more abstractly, ‘CHECKER’), that is usually set to empty. When you have configured and built the package and you decide that you want to run the tests with valgrind, you do so by modifying the definition of ‘VALGRIND’ in the Makefile.

6.6.3 How to use Valgrind with shell scripts

It is not desirable to apply valgrind to shell scripts or other non-binaries, because

- It is wasteful, and you usually don’t want to look for memory leaks in bash.
- On a bi-arch system, you may get an error message such as "valgrind: wrong executable class (eg. 32-bit instead of 64-bit)".

There are two ways to avoid this:

- You can make use of the build-aux/run-test script from Gnuilb. Add these lines to your Makefile.am:
  ```
  # This must be the last thing that gets added to TESTS_ENVIRONMENT.
  TESTS_ENVIRONMENT += $(SHELL) $(top_srcdir)/build-aux/run-test '$(VALGRIND)'
  ```

- Using the Automake parallel-tests feature, you can use the following instead:
  ```
  AUTOMAKE_OPTIONS = parallel-tests
  TEST_EXTENSIONS = .pl .sh
  LOG_COMPILER = $(VALGRIND)
  ```

Then valgrind will only be used for the non-.sh and non-.pl tests.

However, with this measure in place, binaries invoked through scripts will not be invoked under valgrind. This can be solved by defining environment variables in the TESTS_ENVIRONMENT variable that are then used by the shell scripts. For example, add the following:

```
TESTS_ENVIRONMENT = VALGRIND='$(VALGRIND)'
```

And then modify the shell scripts to invoke the binary prefixed with $VALGRIND.

6.7 License Texinfo sources

Gnuilb provides copies of the GNU GPL, GNU LGPL, and GNU FDL licenses in Texinfo form. (The master location is https://www.gnu.org/licenses/). These Texinfo documents do not have any node names and structures built into them; for your manual, you should @include them in an appropriate @node.

The conventional name for the GPL node is ‘Copying’ and for the FDL ‘GNU Free Documentation License’. The LGPL doesn’t seem to have a conventional node name.

Of course the license texts themselves should not be changed at all.

6.8 Building gnulib

If you wish to help the gnulib development effort with build logs for your favorite platform, you may perform these steps:

1. Prerequisites tools

   Install the proper development tools. To build and test all of Gnuilb, you will need development tools for the programming languages C, C++, Java, and Perl, along with
standard POSIX utilities such as `awk`, `make` and `sh`. You will also need development tools that include Autoconf, Automake, Bison, Gettext, Git, GNU M4, Gperf, Libtool, and Texinfo. Some of these tools are needed only by some modules. More details can be found in Gnulib’s `DEPENDENCIES` file.

2. Obtain Gnulib

See [https://www.gnu.org/software/gnulib/](https://www.gnu.org/software/gnulib/) for how to get the current Gnulib sources via Git.

3. Create gnulib directory

On a machine with GNU development tools installed and with a gnulib git checkout, use

```bash
gnulib-tool --create-megatestdir --with-tests --dir=...
```

Note: The created directory uses ca. 512 MB on disk.

4. Transfer gnulib directory

Transfer this directory to a build machine (HP-UX, Cygwin, or whatever). Often it is easier to transfer one file, and this can be achieved by running, inside the directory the following commands:

```bash
./configure
make dist
```

And then transferring the `dummy-0.tar.gz` file.

5. Build modules

On the build machine, run `./do-autobuild` (or "nohup ./do-autobuild"). It creates a directory `logs/` with a log file for each module.
7 Building the ISO C and POSIX Substitutes

This section shows a radically different way to use Gnulib.

You can extract the ISO C / POSIX substitutes part of gnulib by running the command

```
$ gnulib-tool --create-testdir --source-base=lib \ 
  --dir=/tmp/posixlib 'posix-modules'
```

The command `posix-modules` is found in the same directory as `gnulib-tool`.

The resulting directory can be built on a particular platform, independently of the program being ported. Then you can configure and build any program, by setting CPPFLAGS and LDFLAGS at configure time accordingly: set CPPFLAGS="-I.../posixlib/lib", plus any essential type definitions and flags that you find in `.../posixlib/config.h`, and set LDFLAGS=".../posixlib/lib/libgnu.a".

This way of using Gnulib is useful when you don’t want to modify the program’s source code, or when the program uses a mix between C and C++ sources (requiring separate builds of the posixlib for the C compiler and for the C++ compiler).
8 ISO C and POSIX Header File Substitutes

This chapter describes which header files specified by ISO C or POSIX are substituted by Gnulib, which portability pitfalls are fixed by Gnulib, and which (known) portability problems are not worked around by Gnulib.

The notation “Gnulib module: —” means that Gnulib does not provide a module providing a substitute for the header file. When the list “Portability problems not fixed by Gnulib” is empty, such a module is not needed: No portability problems are known. Otherwise, it indicates that such a module would be useful but is not available: No one so far found this header file important enough to contribute a substitute for it. If you need this particular header file, you may write to <bug-gnulib at gnu dot org>.

8.1 aio.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/aio.h.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This header file is missing on some platforms: Mac OS X 10.3, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

8.2 arpa/inet.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/arpa_inet.h.html

Gnulib module: arpa_inet
Portability problems fixed by Gnulib:
- This header file is missing on some platforms: mingw, MSVC 14, BeOS.

Portability problems not fixed by Gnulib:

8.3 assert.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/assert.h.html

Gnulib module: assert-h
See also the Gnulib module assert.
Portability problems fixed by Gnulib:
- The C11 and C++11 static_assert, and the C11 _Static_assert, are not supported by many platforms. For example, GCC versions before 4.6.0 do not support _Static_assert, and G++ versions through at least 4.6.0 do not support static_assert.

Portability problems not fixed by Gnulib:
- C11 _Static_assert and C++11 static_assert are keywords that can be used without including <assert.h>. The Gnulib substitutes are macros that require including <assert.h>.
• The C11 static_assert and _Static_assert can also be used within a struct or union specifier, in place of an ordinary declaration of a member of the struct or union. The Gnulib substitute can be used only as an ordinary declaration.
• In C99, assert can be applied to any scalar expression. In C89, the argument to assert is of type int.

8.4 complex.h
POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/complex.h.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, BeOS.

8.5 cpio.h
POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/cpio.h.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: Mac OS X 10.3, Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS.

8.6 ctype.h
POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/ctype.h.html
Gnulib module: ctype
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

8.7 dirent.h
POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/dirent.h.html
Gnulib module: dirent
Portability problems fixed by Gnulib:
• This header file is missing on some platforms: MSVC 14.
• The type ino_t is missing on some platforms: glibc 2.23 and others.
Portability problems not fixed by Gnulib:

- Although many systems define a `struct dirent` member named `d_type` and directory entry type macros like `DT_DIR` and `DT_LNK`, some do not: Minix 3.1.8, AIX 7.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, Interix 3.5, BeOS.
- On systems with `d_type`, not every filesystem supports `d_type`, and those lacking support will set it to `DT_UNKNOWN`.
- Some systems define a `struct dirent` member named `d_namlen` containing the string length of `d_name`, but others do not: glibc 2.23 on Linux, Minix 3.1.8, Solaris 11.4, Cygwin, BeOS. All of these, except Cygwin, have a member `d_reclen` instead, that has a different semantics.
- Some systems define a `struct dirent` member named `d_off` containing a magic cookie suitable as an argument to `seekdir`, but others do not: glibc 2.23 on Hurd, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Cygwin, mingw, Interix 3.5, BeOS.
- Some systems define a `struct dirent` member named `d_reclen` containing the number of bytes in the directory entry record, but others do not. This member has limited utility, as it is an implementation detail.

8.8 dlopen.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/dlfcn.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS.

8.9 errno.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/errno.h.html

Gnulib module: errno

Portability problems fixed by Gnulib:

- The macros `EOVERFLOW`, `ENOLINK` are not defined on some platforms: OpenBSD 4.0, OSF/1 5.1, mingw, MSVC 9.
- The macro `EMULTIHOP` is not defined on some platforms: OpenBSD 4.0, OSF/1 5.1, mingw, MSVC 14.
- The macro `ECANCELED` is not defined on some platforms: OpenBSD 4.0, Cygwin, mingw, MSVC 9.
- The macros `ENOMEM`, `EIDRM`, `EPROTO`, `EBADMSG`, `ENOTSUP` are not defined on some platforms: OpenBSD 4.0, mingw, MSVC 9.
- The macro `ESTALE` is not defined on some platforms: mingw, MSVC 14, Interix 3.5.
- The macro `EDQUOT` is not defined on some platforms: NonStop Kernel, mingw, MSVC 14.
• The macros `ENETRESET`, `ECONNABORTED` are not defined on some platforms: Minix 3.1.8, mingw, MSVC 9.
• The macros `EWOULDBLOCK`, `ETXTBSY`, `ELOOP`, `ENOTSOCK`, `EDESTADDRREQ`, `EMSGSIZE`, `EPROTOTYPE`, `ENOPROTOOPT`, `EPROTONOSUPPORT`, `EADDRINUSE`, `EADDRNOTAVAIL`, `ENETDOWN`, `ENETUNREACH`, `ECONNRESET`, `ENOBUF`, `EISCONN`, `ENOTCONN`, `ETIMEDOUT`, `ECONNREFUSED`, `EHOSTUNREACH`, `EALREADY`, `EINPROGRESS` are not defined on some platforms: mingw, MSVC 9.
• The macros `EOWNERDEAD`, `ENOTRECOVERABLE` are not defined on some platforms: glibc/Linux 2.3.6, glibc/Hurd 2.15, glibc/kFreeBSD 2.15, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw without pthreads-win32, MSVC 9, Interix 3.5, BeOS.
• The macro `EILSEQ` is not defined on some platforms: LynxOS 178 2.2.2.

Portability problems not fixed by GnuLib:

8.10 `fcntl.h`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/fcntl.h.html

GnuLib module: fcntl-h

Portability problems fixed by GnuLib:
• The type `pid_t` is not defined on some platforms: MSVC 14.
• The type `mode_t` is not defined on some platforms: MSVC 14.
• `'O_CLOEXEC'`, `'O_DIRECTORY'`, `'O_DSYNC'`, `'O_NOCTTY'`, `'O_NOFOLLOW'`, `'O_RSYNC'`, `'O_SYNC'`, and `'O_TTY_INIT'` are not defined on some platforms. GnuLib defines these macros to 0, which is generally safe.
• `'O_NONBLOCK'` is not defined on some platforms. If the `'nonblocking'` module is in use, gnuLib guarantees a working non-zero value; otherwise, the gnuLib replacement is 0.
• `'O_EXEC'` and `'O_SEARCH'` are not defined on some platforms. GnuLib defines these macros to `'O_RDONLY'`, which is typically 0. The `'O_PATH'` macro of GNU/Linux is not a suitable substitute, as fchmod fails with `errno==EBADF` when invoked on a file descriptor that was opened with `'O_PATH'`.
• `'O_ACCMODE'` is not defined on some platforms: MSVC 14.
• The `'O_ACCMODE'` mask mistakenly omits `'O_SEARCH'` and `'O_EXEC'` on some platforms: Cygwin.
• `'O_BINARY'`, `'O_TEXT'` (not specified by POSIX, but essential for portability to native Windows platforms) are defined on some platforms but not on others.
• `'O_CLOEXEC'`, `'O_NOFOLLOW'`, and `'O_TTY_INIT'` are defined to values that are too large for an int on some platforms: AIX 7.1 with XL C 12.1.
• `'O_DIRECT'`, `'O_IGNORE_CTTY'`, `'O_NDELAY'`, `'O_NOLINK'`, `'O_NOLINKS'`, and `'O_NOTRANS'` (not specified by POSIX) are defined on some platforms but not on others.
• `'FD_CLOEXEC'`, `'F_DUPFD'`, and `'F_GETFD'` are not defined on some platforms: mingw, MSVC 14.
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• ‘F_DUPFD_CLOEXEC’ is not defined on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11 2010-11, Cygwin 1.7.1, mingw, MSVC 14, Interix 3.5, BeOS.

• ‘AT_FDCWD’, ‘AT_EACCESS’, ‘AT_SYMLINK_NOFOLLOW’, ‘AT_SYMLINK_FOLLOW’, and ‘AT_REMOVEDIR’ are not defined on many platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 8, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS.

• ‘AT_FDCWD’ is defined with a value too large for an int on some platforms: Solaris 11.3.

Portability problems not fixed by Gnulib:


8.11 fenv.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/fenv.h.html

Gnulib module: —

Portability problems not fixed by Gnulib:

• This header file is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Cygwin 1.7.7, MSVC 9, Interix 3.5, BeOS.

8.12 float.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/float.h.html

Gnulib module: float

Portability problems not fixed by Gnulib:

• The conversion from int to long double in incorrect on some platforms: glibc 2.7 on Linux/SPARC64.

• The values of LDBL_* macros are incorrect on some platforms: On OpenBSD 4.0, MirBSD 10, and BeOS, they are the same as the values of DBL_* macros, although ‘long double’ is a larger type than ‘double’. On FreeBSD/x86 6.4, they represent the incorrect 53-bit precision assumptions in the compiler, not the real 64-bit precision at runtime. On Linux/PowerPC with GCC 4.4, on AIX 7.1 with GCC 4.2, and on IRIX 6.5, they don’t reflect the “double double” representation of long double correctly.

Portability problems not fixed by Gnulib:

• The macro FLT_ROUNDS is a constant expression and does not represent the current rounding mode on some platforms: glibc 2.11, HP-UX 11, mingw.
8.13 fmtmsg.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/fmtmsg.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This header file is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix
3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

8.14 fnmatch.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/fnmatch.h.html

Gnulib module: fnmatch-h

Portability problems fixed by Gnulib:

• This header file is missing on some platforms: mingw, MSVC 14, BeOS.

Portability problems not fixed by Gnulib:

8.15 ftw.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/ftw.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This header file is missing on some platforms: Mac OS X 10.3, FreeBSD 5.2.1, NetBSD
3.0, Minix 3.1.8, mingw, MSVC 14, BeOS.

8.16 glob.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/glob.h.html

Gnulib module: glob-h

Portability problems fixed by Gnulib:

• This header file is missing on some platforms: mingw, MSVC 14, BeOS.

Portability problems not fixed by Gnulib:
8.17 grp.h

POSSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/grp.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: mingw, MSVC 14.

8.18 iconv.h

POSSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/iconv.h.html

Gnulib module: iconv

Portability problems fixed by Gnulib:

- The <iconv.h> from GNU libiconv is not found if installed in $PREFIX/include.

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, when GNU libiconv is not installed.

8.19 inttypes.h

POSSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/inttypes.h.html

Gnulib module: inttypes

Portability problems fixed by Gnulib:

- This header file is missing on some platforms: OSF/1 4.0, MSVC 9, Interix 3.5.
- This header file is very incomplete on some platforms.
- The PRI* macros are defined to non-string values on AIX 4.3.3.
- The declarations of imaxabs and imaxdiv are missing on some platforms: NetBSD 3.0, OpenBSD 3.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, BeOS.
- The declarations of strtoimax and strtoumax are missing on some platforms: OpenBSD 3.8, AIX 4.3.2, AIX 5.1 (missing only strtoumax), OSF/1 5.1.
- On some hosts that predate C++11, when using C++ one must define __STDC_FORMAT_MACROS to make visible the declarations of format macros such as PRIdMAX.

Portability problems not fixed by Gnulib:

8.20 iso646.h

POSSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/iso646.h.html

Gnulib module: —
Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This header file is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, OSF/1 4.0, Cygwin, mingw, BeOS.

### 8.21 langinfo.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/langinfo.h.html

GnuLib module: langinfo

Portability problems fixed by GnuLib:

- This header file is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS.
- The constant CODESET is not defined on some platforms: glibc 2.0.6, OpenBSD 3.8.
- The constants ALTMON_1 to ALTMON_12 are not defined on some platforms: glibc 2.26 and many others.
- The constants ERA, ERA_D_FMT, ERA_D_T_FMT, ERA_T_FMT, ALT_DIGITS are not defined on some platforms: OpenBSD 3.8.
- The constants T_FMT_AMPM, YESEXPR, NOEXPR are not defined on some platforms: IRIX 5.3.

Portability problems not fixed by GnuLib:

### 8.22 libgen.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/libgen.h.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This header file is missing on some platforms: mingw, MSVC 14, BeOS.

The GnuLib module dirname provides similar API, with functions base_name and dir_name that also work with Windows file names.

### 8.23 limits.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/limits.h.html

GnuLib module: limits-h or gethostname

Portability problems fixed by GnuLib module limits-h:

- The macros LLONG_MIN, LLONG_MAX, ULLONG_MAX are not defined on some platforms: older glibc systems (e.g. Fedora 1), AIX 5.1, HP-UX 11, IRIX 6.5, OpenVMS, OSF/1 5.1 with gcc.
- The macros WORD_BIT, LONG_BIT are not defined on some platforms: glibc 2.11 without -D_GNU_SOURCE, Cygwin, mingw, MSVC 14.
Macros like `CHAR_WIDTH` are not defined on some platforms: glibc 2.24, many others.

Portability problems fixed by Gnulib module `gethostname`:

- The `HOST_NAME_MAX` macro is not defined on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS.

Portability problems not fixed by Gnulib:

- The macro `SSIZE_MAX` has the wrong type, albeit with the correct value: 32-bit glibc 2.24 (on some architectures), Cygwin 2.5.2.
- The macro `SSIZE_MAX` is not defined on some platforms: MSVC 14.

For `PATH_MAX`, Gnulib provides a module `pathmax` with a header file "pathmax.h". It defines `PATH_MAX` to a constant on platforms with a file name length limit.

### 8.24 locale.h

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/basedefs/locale.h.html

Gnulib module: `locale`

Portability problems fixed by Gnulib:

- The definition of ‘LC_MESSAGES’ is missing on some platforms: mingw, MSVC 14.
- The `locale_t` type is not defined on some platforms: glibc 2.11, Mac OS X 10.5.
- The `struct lconv` type does not contain any members on some platforms: Android up to 2014.
- The `struct lconv` type does not contain the members `int_p_cs_precedes`, `int_p_sign_posn`, `int_p_sep_by_space`, `int_n_cs_precedes`, `int_n_sign_posn`, `int_n_sep_by_space` on some platforms: glibc, OpenBSD 4.9, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14.
- Some platforms provide a `NULL` macro that cannot be used in arbitrary expressions: NetBSD 5.0

Portability problems not fixed by Gnulib:

### 8.25 math.h

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/basedefs/math.h.html

Gnulib module: `math`

Portability problems fixed by Gnulib:

- The conversion from `int` to `long double` in incorrect on some platforms: glibc 2.7 on Linux/SPARC64.
- The macro `NAN` is not defined on some platforms: OpenBSD 4.0, AIX 5.1, IRIX 6.5, OSF/1 5.1.
- The macro `NAN` is not exposed outside of C99 compilation on some platforms: glibc.
• The macros `NAN` and `HUGE_VAL` expand to a function address rather than a floating point constant on some platforms: Solaris 10.
• The macros `HUGE_VALF` and `HUGE_VALL` are not defined on some platforms: glibc/HPPA, glibc/SPARC, AIX 5.1, IRIX 6.5, Solaris 9, MSVC 9.
• The macros `FP_ILOGB0` and `FP_ILOGBNAN` are not defined on some platforms: NetBSD 5.1, AIX 5.1, IRIX 6.5, Solaris 9, MSVC 9.
• The macros `FP_ILOGB0` and `FP_ILOGBNAN` have wrong values on some platforms: Haiku 2017.
• The macros `NAN`, `HUGE_VALL`, and `INFINITY` are not defined on some platforms: OpenVMS.

Portability problems not fixed by Gnulib:
• `NAN` is not a compile time constant with some compilers: OSF/1 with Compaq (ex-DEC) C 6.4, OpenVMS.
• The macro or variable `math_errhandling` is not defined on some platforms: glibc 2.11, OpenBSD 4.9, NetBSD 5.1, UP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.7.9, mingw, MSVC 9.

### 8.26 monetary.h

POSIX specification:
http://www.opengroup.org/onlinelpubs/9699919799/basedefs/monetary.h.html

Gnulib module: monetary
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

### 8.27 mqueue.h

POSIX specification:
http://www.opengroup.org/onlinelpubs/9699919799/basedefs/mqueue.h.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

### 8.28 ndbm.h

POSIX specification:
http://www.opengroup.org/onlinelpubs/9699919799/basedefs/ndbm.h.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This header file is missing on some platforms: mingw, MSVC 14, BeOS, Android 9.0.

8.29 net/if.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/net_if.h.html

Gnulib module: net_if

Portability problems fixed by Gnulib:
- This header file is not self-contained on some platforms (needing <sys/socket.h> to be included first): FreeBSD 8.2, OpenBSD 5.2.

Portability problems not fixed by Gnulib:
- This header file is missing on some platforms: mingw, MSVC 14, Interix 3.5, BeOS.

8.30 netdb.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/netdb.h.html

Gnulib module: netdb

Portability problems fixed by Gnulib:
- This header file is missing on some platforms: mingw, MSVC 14, BeOS.
- This header file is incomplete on some platforms: Cygwin 1.5.x, Haiku.
- This header file does not define the type socklen_t on some platforms: HP-UX 10.20, IRIX 6.5, OSF/1 4.0, Interix 3.5, BeOS.
- This header file does not define AI_ALL, AI_V4MAPPED, AI_ADDRCONFIG on some platforms: NetBSD 5.0.

Portability problems not fixed by Gnulib:

8.31 netinet/in.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/netinet_in.h.html

Gnulib module: netinet_in

Portability problems fixed by Gnulib:
- This header file is missing on some platforms: mingw, MSVC 14, BeOS.
- This header file is not self-contained on some platforms (it requires <sys/types.h> to be included first): OpenBSD 4.6.

Portability problems not fixed by Gnulib:
8.32  *netinet/tcp.h*

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/netinet_tcp.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This header file is missing on some platforms: mingw, MSVC 14, BeOS.

8.33  *nl_types.h*

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/nl_types.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This header file is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

8.34  *poll.h*

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/poll.h.html

Gnulib module: poll-h

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This header file is missing on some platforms: mingw, MSVC 14, BeOS.

• This header file does not defined *nfds_t* on some platforms: IRIX 5.3.

8.35  *pthread.h*

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/pthread.h.html

Gnulib module: pthread

Portability problems fixed by Gnulib:

• This header pollutes the namespace with some broken macro implementations for various functions such as *strtok_r* and *gmtime_r*: mingw 3.0.

Portability problems not fixed by Gnulib:

• This header file is missing on some platforms; the replacement does not offer threads, so much as lightweight stubs that make conditional compilation easier for fallbacks to single-threaded programs. Minix 3.1.8, mingw 2.x, MSVC 14, BeOS.

• This header file lacks the declaration of *pthread_atfork* on some platforms: IRIX 6.5.
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8.36 pwd.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/pwd.h.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: mingw, MSVC 14.

8.37 regex.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/regex.h.html

Gnulib module: regex
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: mingw, MSVC 14.

• This header file is not self-contained on some platforms: it requires <sys/types.h> to be included first.

8.38 sched.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sched.h.html

Gnulib module: sched
Portability problems fixed by Gnulib:

• This header file is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS.

• This header file does not define the type pid_t on some platforms: glibc 2.11, Mac OS X 10.5.

• struct sched_param is not defined on some platforms: Haiku.

• SCHED_FIFO, SCHED_RR, SCHED_OTHER are not defined on some platforms: Haiku.

Portability problems not fixed by Gnulib:

8.39 search.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/search.h.html

Gnulib module: search
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: Minix 3.1.8, BeOS.
8.40 semaphore.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/semaphore.h.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS.

8.41 setjmp.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/setjmp.h.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

8.42 signal.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/signal.h.html
Gnulib module: signal-h
Portability problems fixed by Gnulib:
• volatile sig_atomic_t is rejected by older compilers on some platforms: AIX.
• sigset_t is missing on some platforms: MSVC 14.
• sigset_t is only declared in <sys/types.h> on some platforms: mingw.
• struct sigaction and siginfo_t are missing on some platforms: mingw, MSVC 14.
• struct sigaction lacks the sa_sigaction member on some platforms: Irix 5.3, Interix 3.5.
• The type pid_t is not defined on some platforms: MSVC 14.
• The signal SIGPIPE is not defined on some platforms: mingw, MSVC 14.
• The macro SA_NODEFER is not defined on some platforms: Interix 3.5.
• The macros SA_RESETHAND and SA_RESTART are not defined on some platforms: Non-Stop.
• The type sighandler_t (a GNU extension) is not defined on most non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.
Portability problems not fixed by Gnulib:
• Many signals are not defined on some platforms: mingw, MSVC 14.
• The macros SIGRTMIN and SIGRTMAX expand to an expression of type long instead of int on some platforms: OSF/1 5.1.
• The macro SIGBUS is set to the same value as SIGSEGV, rather than being a distinct signal, on some platforms: Haiku.
8.43 spawn.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/spawn.h.html

Gnulib module: spawn

Portability problems fixed by Gnulib:
- This header file is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

Portability problems not fixed by Gnulib:

8.44 stdalign.h

POSIX specification:
Not in POSIX yet, but we expect it will be. ISO C11 (latest free draft http://www.open-std.org/jtc1/sc22/wg14/www/docs/n1570.pdf) sections 6.5.3.4, 6.7.5, 7.15. C++11 (latest free draft http://www.open-std.org/jtc1/sc22/wg21/docs/papers/2011/n3242.pdf) section 18.10.

Gnulib module: stdalign

Portability problems fixed by Gnulib:
- This header file is missing on most circa-2011 platforms.
- Clang 3.0’s <stdalign.h> does not define alignof/_Alignof.
- The alignof and _Alignof macros return too large values for the types double and long long in GCC 4.7.0.

Portability problems not fixed by Gnulib:
- In ISO C11, the operand of alignof/_Alignof must be a parenthesized type. Recent versions of GCC support an extension in which the operand can also be a unary expression, as with sizeof. The Gnulib substitute does not support this extension.
- On most pre-C11 platforms, the operand of alignof/_Alignof cannot be a structure type containing a flexible array member.
- __Alignas and alignas are not always supported; on platforms lacking support, the macro __alignas_is_defined is not defined. Supported compilers include GCC, IBM C, Sun C 5.9 and later, and MSVC 7.0 and later.
- Some compilers do not support alignment via alignas/_Alignas of auto variables (i.e., variables on the stack). They diagnose and ignore the alignment: Sun C 5.11.
- Some linkers do not support operands of _Alignas/alignas that are greater than 8: mingw.
- Some compilers require the operand of _Alignas/alignas to be a single integer constant, not an expression: MSVC 7.0 through at least 10.0.
- The Sun C 5.11 compiler sometimes mishandles the alignment of multiple external variables that are declared close together with _Alignas/alignas. This compiler bug causes the Gnulib module stdalign-tests to fail. The Sun Studio Developer Bug Report Review Team assigned the internal review ID 2125432 (dated 2011-11-01) to this issue.
• `<stdalign.h>` must be #included before `_Alignas` and `_Alignof` can be used.
• You cannot assume that `_Alignas` and `_Alignof` are reserved words; they might be macros.

### 8.45 stdarg.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/stdio.h.html

Gnulib module: stdarg

Portability problems fixed by Gnulib:
• Some compilers (e.g., AIX 5.3 cc) need to be in c99 mode for the builtin `va_copy` to work.

Portability problems not fixed by Gnulib:

### 8.46 stdbool.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/stdbool.h.html

Gnulib module: stdbool

Portability problems fixed by Gnulib:
• This header file is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1.
• Some compilers have bugs relating to `bool`.
• This header file defines `true` incorrectly on some platforms: OpenBSD 4.7 with gcc 2.95.

Portability problems not fixed by Gnulib:
• `_Bool` cannot be used before `<stdbool.h>` is included, or if the program is intended to be compiled by a C++ compiler.
• You cannot assume that `_Bool` is a typedef; it might be a macro.
• Bit-fields of type ‘bool’ are not supported. Portable code should use ‘unsigned int foo : 1;’ rather than ‘bool foo : 1;’.
• Casts and automatic conversions to ‘bool’ don’t test against the zero value or the null pointer, as they should. Such casts should only be used if the value is known to be equal to 0 or 1.
• You cannot assume that casting a floating point literal to ‘bool’ will result in a constant expression.

### 8.47 stddef.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/stddef.h.html

Gnulib module: stddef

Portability problems fixed by Gnulib:
• Some platforms fail to provide `max_align_t`, which was added in C11: Solaris 11.0 and others.
• `max_align_t` does not have the expected alignment on some platforms: NetBSD 8.0/x86.
• Some old platforms fail to provide `wchar_t`.
• Some platforms provide a `NULL` macro that cannot be used in arbitrary expressions: NetBSD 5.0

Portability problems not fixed by GnuCib:
• Some platforms provide an `offsetof` macro that cannot be used in arbitrary expressions: Solaris 11.4. This problem can be worked around by parenthesizing the `offsetof` expression in the unlikely case you use it with `sizeof` or `[]`.

8.48 stdint.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/stdint.h.html

GnuCib module: stdint

Portability problems fixed by GnuCib:
• This header file is missing on some platforms: OpenBSD 3.8, AIX 5.1, HP-UX 11.11, IRIX 6.5, OSF/1 5.1, MSVC 14, Interix 3.5, BeOS.
• This header file is very incomplete on some platforms.
• The values of `SIG_ATOMIC_MIN` and `SIG_ATOMIC_MAX` are incorrect on some platforms: FreeBSD 6.2 / ia64.
• The value of `WINT_MAX` is incorrect on some platforms: mingw.
• The values of `INT8_MAX`, `UINT8_MAX` etc. are not usable in preprocessor expressions on some platforms: HP-UX 11.23.
• The values of `INTPTR_MAX` and `UINTPTR_MAX`, although correctly defined in `<stdint.h>`, are replaced by empty values when `<limits.h>` or `<inttypes.h>` gets included later on some platforms: Solaris 9 with GCC 4.5 or newer.
• The macros `WCHAR_MIN` and `WCHAR_MAX` are not defined in `<stdint.h>` (only in `<wchar.h>`) on some platforms: Dragonfly, BSDI.
• On some hosts that predate C++11, when using C++ one must define `__STDC_CONSTANT_MACROS` to make visible the definitions of constant macros such as `INTMAX_C`, and one must define `__STDC_LIMIT_MACROS` to make visible the definitions of limit macros such as `INTMAX_MAX`.
• The macro `SIZE_MAX` has the wrong type, albeit with the correct value: 32-bit glibc 2.24 (on s390 architecture), Mac OS X 10.7.
• Macros like `INTMAX_WIDTH` are not defined on some platforms: glibc 2.24, many others.

Portability problems not fixed by GnuCib:
• `{uint,int}_fast{8,16,32,64}_t` may not correspond to the fastest types available on the system. Other `<stdint.h>` substitutes may define these types differently, so public header files should avoid these types.
• Macros are used instead of typedefs.
• Some C preprocessors mishandle constants that do not fit in `long int`. For example, as of 2007, Sun C mishandles `#if LLONG_MIN < 0` on a platform with 32-bit `long int` and 64-bit `long long int`. Some older preprocessors mishandle constants ending in `LL`. To work around these problems, compute the value of expressions like `LONG_MAX < LLONG_MAX` at configure-time rather than at `#if`-time.

The `stdint` module uses `#include_next`. If you wish to install the generated `stdint.h` file under another name, typically in order to be able to use some of the types defined by `stdint.h` in your public header file, you could use the following Makefile.am-snippet:

```makefile
BUILT_SOURCES += idn-int.h
DISTCLEANFILES += idn-int.h
nodist_include_HEADERS += idn-int.h

idn-int.h:
  if test -n "$(STDINT_H)"; then \
    sed -e s/include_next/include/ gl/stdint.h > idn-int.h; \
  else \
    echo '#include <stdint.h>' > idn-int.h; \
  fi
```

### 8.49 stdio.h

POSIX specification:
[http://www.opengroup.org/onlinepubs/9699919799/basedefs/stdio.h.html](http://www.opengroup.org/onlinepubs/9699919799/basedefs/stdio.h.html)

Gnulib module: `stdio`

Portability problems fixed by Gnulib:

• The type `off_t` is missing on some platforms: glibc 2.8, eglibc 2.11.2 and others.

• The type `ssize_t` is missing on some platforms: glibc 2.8, Mac OS X 10.5, Solaris 10, MSVC 14, and others.

• The type `va_list` is missing on some platforms: glibc 2.8, OpenBSD 4.0, Solaris 11.4, and others.

• Some platforms provide a `NULL` macro that cannot be used in arbitrary expressions: NetBSD 5.0

Portability problems not fixed by Gnulib:

### 8.50 stdlib.h

POSIX specification:
[http://www.opengroup.org/onlinepubs/9699919799/basedefs/stdlib.h.html](http://www.opengroup.org/onlinepubs/9699919799/basedefs/stdlib.h.html)

Gnulib module: `stdlib`, `system-posix`

Portability problems fixed by the Gnulib module `stdlib`:

• The macros `EXIT_SUCCESS` and `EXIT_FAILURE` are not defined on some platforms.

• The macro `EXIT_FAILURE` is incorrectly defined on Tandem/NSK.
• Some platforms provide a NULL macro that cannot be used in arbitrary expressions:
  NetBSD 5.0
  Portability problems fixed by the Gnulib module system-posix:
  • The macros WIFSIGNALED, WIFEXITED, WIFSTOPPED, WTERMSIG, WEXITSTATUS, WNOHANG,
    WUNTRACED, WSTOPSIG are not defined in this header file (only in <sys/wait.h>) on
    some platforms: MirBSD 10.
  Portability problems not fixed by Gnulib:
  • System status macros such as WEXITSTATUS require an lvalue argument on some plat-
    forms. Mac OS X 10.5.

8.51 stdnoreturn.h

  POSIX specification:
  Not in POSIX yet, but we expect it will be. ISO C11 (latest free draft http://www.
  open-std.org/jtc1/sc22/wg14/www/docs/n1570.pdf) sections 7.23.
  Gnulib module: stdnoreturn
  Portability problems fixed by Gnulib:
  • This header file is missing on most circa-2012 platforms.
  Portability problems not fixed by Gnulib:
  • <stdnoreturn.h> should be #included before ‘_Noreturn’ is used.
  • You cannot assume that _Noreturn is a reserved word; it might be a macro.
  • When the macro lint is defined, standard headers define _Noreturn (and therefore
    noreturn) to be a macro that expands to the empty token sequence on some platforms:
    Cygwin 2.5.1, FreeBSD 10.3.
  • On Cygwin 1.7.30 and MSVC 14, noreturn expands to the empty token sequence,
    to avoid problems with standard headers that use noreturn in combination with _
    _attribute__ or __declspec. Although the resulting code operates correctly, the
    compiler is not informed whether noreturn functions do not return, so it may generate
    incorrect warnings at compile-time, or code that is slightly less optimized. This problem
    does not occur with _Noreturn.
  • Circa 2012 bleeding-edge GCC with -Werror=old-style-declaration requires
    _Noreturn or noreturn before the returned type in a declaration, and therefore
    rejects valid but unusually-worded declarations such as void _Noreturn foo (void);

8.52 string.h

  POSIX specification:
  http://www.opengroup.org/onlinepubs/9699919799/basedefs/string.h.html
  Gnulib module: string
  Portability problems fixed by Gnulib:
  • Some platforms provide a NULL macro that cannot be used in arbitrary expressions:
    NetBSD 5.0
  Portability problems not fixed by Gnulib:
8.53 strings.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/strings.h.html

Gnulib module: strings

Portability problems fixed by Gnulib:
• This header file is not self-contained on some platforms: Minix 3.1.8.

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: MSVC 14.
• This header file defines symbols, such as ‘index’, often used for variables, making debugging harder.

8.54 stropts.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/stropts.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

8.55 sys/ipc.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_ipc.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: mingw, MSVC 14, BeOS.

8.56 sys/mman.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_mman.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: mingw, MSVC 14, BeOS.
8.57 sys/msg.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_msg.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: Mac OS X 10.3, Minix 3.1.8, mingw, MSVC 14, BeOS.

8.58 sys/resource.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_resource.h.html

Gnulib module: sys_resource

Portability problems fixed by Gnulib:
• This header file is missing on some platforms: mingw, MSVC 14.
• On some platforms, this header file requires that <sys/types.h> and <sys/time.h> already be included: FreeBSD 5.0.
• On some platforms, this header file does not define the RUSAGE_SELF and RUSAGE_CHILDREN constants: OpenVMS.

Portability problems not fixed by Gnulib:
• On some platforms, this header does not define some or all of the symbolic constants required by POSIX. For example, OpenVMS and Android do not define RLIM_SAVED_CUR or RLIM_SAVED_MAX.

8.59 sys/select.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_select.h.html

Gnulib module: sys_select

Portability problems fixed by Gnulib:
• This header file is missing on some platforms: HP-UX 11.11, NonStop Kernel, mingw, MSVC 14, BeOS.
• This header file is not self-contained on some platforms: it requires <sys/types.h> to be included first.
• This header file does not define struct timeval on some platforms: OSF/1 4.0.
• This header file is not self-contained—it requires <string.h> before FD_ZERO can be used—on some platforms: AIX 7.1, Solaris 11.4.

Portability problems not fixed by Gnulib:
8.60 sys/sem.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_sem.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This header file is missing on some platforms: mingw, MSVC 14, BeOS.

8.61 sys/shm.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_shm.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This header file is missing on some platforms: mingw, MSVC 14, BeOS.

8.62 sys/socket.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_socket.h.html

Gnulib module: sys_socket

Portability problems fixed by Gnulib:

• This header file is missing on some platforms: mingw, MSVC 14.
• This header file is not self-contained on some platforms: it requires <sys/types.h> to be included first.
• This header file does not define the type socklen_t on some platforms: HP-UX 10.20, IRIX 6.5, OSF/1 4.0, Interix 3.5, BeOS.
• This header file does not define the type struct iovec on some platforms: OpenBSD 4.4.
• This header file is lacking the SHUT_RD, SHUT_WR, SHUT_RDWR macros on some platforms, despite having the shutdown functions: emx+gcc.
• The struct sockaddr_storage type does not have a member ss_family on some platforms: AIX 7.1.
• The CMSG_SPACE and CMSG_LEN macros are not provided on some platforms: OpenVMS.
• This header file does not define the SO_REUSEPORT macro on some platforms: Minix 3.1.8, Solaris 10, Cygwin, mingw, MSVC 14.

Portability problems not fixed by Gnulib:

• This header file does not declare the msg_control and msg_controllen members of struct msghdr on some platforms. This can be detected by the absence of the CMSG_FIRSTHDR macro: gnulib replacement header, old BSD
8.63 sys/stat.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_stat.h.html

Gnulib module: sys_stat

Portability problems fixed by Gnulib module sys_stat:

- The type mode_t is not defined on some platforms: MSVC 14.
- Some macros, such as S_IFMT or S_IFIFO, are missing on some platforms.
- The macros S_ISBLK, S_ISCHR, S_ISDIR, S_ISFIFO, S_ISLNK, S_ISREG, S_ISSOCK are broken on some platforms.
- Some platforms define macros, such as S_ISDOOR, that are not defined on other platforms.
- The functions lstat and mkdir are not declared on some platforms: mingw, MSVC 14.
- The macros UTIME_NOW and UTIME_OMIT are missing on some platforms.
- On some platforms, struct stat does not include st_atim, st_mtim, or st_ctim members. Use the gnulib module ‘stat-time’ for accessors to portably get at subsecond resolution.

Portability problems fixed by Gnulib module sys_stat, together with module windows-stat-inodes:

- On Windows platforms (excluding Cygwin), st_ino is always 0.

Portability problems not fixed by Gnulib:

- The macro S_IFBLK is missing on some platforms: MSVC 14.
- On OpenVMS, st_ino is an array of three ino_t values, not a single value.
- To partially work around the previous two problems, you can test for nonzero st_ino and use the Gnulib same_inode module to compare nonzero values. For example, SAME_INODE (a, b) is true if the struct stat values a and b are known to represent the same file, (a.st_ino && !SAME_INODE (a, b)) is true if they are known to represent different files, and !a.st_ino is true if it is not known whether they represent different files.
- On some platforms, two different files may have the same st_dev and st_ino values, even when st_ino is nonzero:
  - GNU/Linux NFS servers that export all local file systems as a single NFS file system, if a local st_dev exceeds 255, or if a local st_ino exceeds 16777215.
  - Network Appliance NFS servers in snapshot directories; see Network Appliance bug #195.
  - ClearCase MVFS; see bug id ATRia04618.

One partial workaround is to compare other file metadata such as st_mode and st_mtime to detect this bug, but this approach does not work on files whose metadata are being changed by other programs.

- On some file systems, st_size contains bogus information for symlinks; use the Gnulib module areadlink-with-size for a better way to get symlink contents.
8.64 sys/statvfs.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_statvfs.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This header file is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, mingw, MSVC 14.

8.65 sys/time.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_time.h.html

Gnulib module: sys_time

Portability problems fixed by Gnulib:
- This header file is missing on some platforms: MSVC 14.
- 'struct timeval' is not defined on some platforms.
- 'struct timeval' is defined with a tv_sec type that is narrower than time_t on some native Windows platforms: mingw64 in 64-bit mode, mingw64 in 32-bit mode when __MINGW_USE_VC2005_COMPAT is defined, MSVC 14 in 64-bit mode, MSVC 14 in 32-bit mode when _USE_32BIT_TIME_T is not defined.

Portability problems not fixed by Gnulib:
- 'struct timeval' is defined with a tv_sec type that is wider than time_t: OpenBSD 5.1 in 64-bit mode.

8.66 sys/timeb.h

POSIX specification:
http://www.opengroup.org/susv3xbd/sys/timeb.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This header file is missing on some platforms: Android 9.0.

8.67 sys/times.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_times.h.html

Gnulib module: sys_times

Portability problems fixed by Gnulib:
- This header file is missing on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
8.68 **sys/types.h**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_types.h.html

Gnulib module: sys_types

Portability problems fixed by Gnulib:
- The type `pid_t` is not defined on some platforms: MSVC 14.
- The type `size_t` is not defined in this file on some platforms: MSVC 14.
- The type `ssize_t` is not defined on some platforms: MSVC 14.
- The type `mode_t` is not defined on some platforms: MSVC 14.
- Some systems leak definitions of `major`, `minor`, and `makedev` through this header; however, when `sys/sysmacros.h` exists, that file should also be included to avoid deprecation warnings from the versions in this header: glibc 2.25.

Portability problems not fixed by Gnulib:
- On some platforms the types `blksize_t` and `suseconds_t` are signed integer types that are wider than `long`: glibc x32

This module, together with the module `largefile`, also defines the type `off_t` to a 64-bit integer type on some platforms: mingw, MSVC 14.

8.69 **sys/uio.h**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_uio.h.html

Gnulib module: sys_uio

Portability problems fixed by Gnulib:
- This header file is missing on some platforms: mingw, MSVC 14.
- This header file is not self-contained (it requires `<sys/types.h>` to be included first) on some platforms: OpenBSD 4.4.

Portability problems not fixed by Gnulib:

8.70 **sys/un.h**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_un.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This header file is missing on some platforms: mingw, MSVC 14, BeOS.
- This header requires `<code>sys/socket.h</code>` to be included first on some platforms: Cygwin 1.7.18.
8.71 sys/utsname.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_utsname.h.html

Gnulib module: sys_utsname

Portability problems fixed by Gnulib:
• This header file is missing on some platforms: mingw, MSVC 14.
• This header file is not self-contained on some platforms: Minix 3.1.8.

Portability problems not fixed by Gnulib:

8.72 sys/wait.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/sys_wait.h.html

Gnulib module: sys_wait

Portability problems fixed by Gnulib:
• This header file is missing on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
• System status macros such as WEXITSTATUS require an lvalue argument on some platforms. Mac OS X 10.5.

8.73 syslog.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/syslog.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: mingw, MSVC 14, BeOS.

8.74 tar.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/tar.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: Cygwin, mingw, MSVC 14, BeOS.
8.75 termios.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/termios.h.html

Gnulib module: termios

Portability problems fixed by Gnulib:
• This header file is missing on some platforms: mingw, MSVC 14.
• This header does not declare pid_t on all platforms: glibc on some architectures, FreeBSD 6.4, OpenBSD 4.9, Cygwin 1.7.11.

Portability problems not fixed by Gnulib:
• The types struct termios, cc_t, speed_t, tcflag_t are not defined on some platforms: mingw, MSVC 14.

8.76 tgmath.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/tgmath.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

8.77 time.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/time.h.html

Gnulib module: time

Portability problems fixed by Gnulib:
• ‘struct timespec’ is not defined on some platforms.
• Some platforms provide a NULL macro that cannot be used in arbitrary expressions: NetBSD 5.0

Portability problems not fixed by Gnulib:
• On some platforms the tv_nsec member of struct timespec is not of type long, but is of type long long instead: glibc x32

8.78 trace.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/trace.h.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

8.79 uchar.h

Defines the types char16_t, char32_t and declares the functions mbtocado16, c16rtomb, mbtocado32, c32rtomb.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on many non-glibc platforms: glibc 2.15, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS.

8.80 ucontext.h

POSIX specification:
http://www.opengroup.org/susv3xbd/ucontext.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: OpenBSD 3.8, Cygwin, mingw, MSVC 14, BeOS.

8.81 ulimit.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/ulimit.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

8.82 unistd.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/unistd.h.html

Gnulib module: unistd

Portability problems fixed by Gnulib:

- This header file is missing on some platforms: MSVC 14.
• The SEEK_* macros are not defined in this file on some platforms: mingw.
• The *_FILENO macros are not defined in this file on some platforms: OS/2 EMX, mingw.
• The _exit function is not declared in this file on some platforms: mingw.
• Some platforms provide a NULL macro that cannot be used in arbitrary expressions: NetBSD 5.0

Portability problems not fixed by Gnulib:

8.83 utime.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/utime.h.html

Gnulib module: utime-h
Portability problems fixed by Gnulib:
• This header file is missing on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

8.84 utmpx.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/utmpx.h.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.

8.85 wchar.h

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/basedefs/wchar.h.html

Gnulib module: wchar
Portability problems fixed by Gnulib:
• This header file cannot be included on some platforms: Linux uClibc built without wide character support.
• This header file is not self-contained on some platforms: OSF/1 with Desktop Toolkit C, BSD/OS 4.0.1.
• The type wint_t and macro WEOF are missing on some platforms: IRIX 5.3.
• The type wint_t is incorrect on some platforms: MSVC 14.
• Some platforms provide a NULL macro that cannot be used in arbitrary expressions: NetBSD 5.0
Portability problems not fixed by Gnulib:

- This header file leads to link errors and endless recursions or endless loops on some platforms: glibc version 2.5 or older, together with gcc version 4.3 or newer and the option ‘-std=c99’ or ‘-std=gnu99’.

### 8.86 wctype.h

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/basedefs/wctype.h.html

Gnulib module: wctype-h

Portability problems fixed by Gnulib:

- This header file is missing on some platforms: HP-UX 11.00, BeOS.
- This header file is not self-contained on some platforms: Solaris 2.5, OSF/1 with Desktop Toolkit C, BSD/OS 4.0.1.
- The type `wint_t` and macro `WEOF` are missing on some platforms: IRIX 5.3.
- The type `wint_t` is incorrect on some platforms: MSVC 14.
- The functions `isw*` are missing on some platforms: FreeBSD 4.11.
- The function `iswblank` is declared but not defined on some platforms: IRIX 6.5.30.
- The functions `isw*` are actually defined as macros that don’t work, on IRIX 5.3.
- This header file defines some identifiers, such as `multibyte`, as macros on some platforms: Solaris 2.6.

Portability problems not fixed by Gnulib:

### 8.87 wordexp.h

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/basedefs/wordexp.h.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9 ISO C and POSIX Function Substitutes

This chapter describes which functions and function-like macros specified by ISO C or POSIX are substituted by Gnulib, which portability pitfalls are fixed by Gnulib, and which (known) portability problems are not worked around by Gnulib.

The notation “Gnulib module: —” means that Gnulib does not provide a module providing a substitute for the function. When the list “Portability problems not fixed by Gnulib” is empty, such a module is not needed: No portability problems are known. Otherwise, it indicates that such a module would be useful but is not available: No one so far found this function important enough to contribute a substitute for it. If you need this particular function, you may write to <bug-gnulib at gnu dot org>.

9.1 FD_CLR

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/FD_CLR.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

9.2 FD_ISSET

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/FD_ISSET.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

9.3 FD_SET

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/FD_SET.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

9.4 FD_ZERO

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/FD_ZERO.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
9.5 _Exit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/_Exit.html
Gnulib module: _Exit

Portability problems fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, Interix 3.5, BeOS, Android 4.4.

Portability problems not fixed by Gnulib:

9.6 _exit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/_exit.html
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.7 _longjmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/_longjmp.html
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Solaris 2.5.1, mingw, MSVC 14.

Note: A future revision of POSIX later than the 2008/2009 one may drop the functions _setjmp and _longjmp. Still, in 2008, on all systems which have _setjmp, it is the fastest way to save the registers but not the signal mask (up to 30 times faster than setjmp on some systems).

9.8 _setjmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/_setjmp.html
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Solaris 2.5.1.

Note: A future revision of POSIX later than the 2008/2009 one may drop the functions _setjmp and _longjmp. Still, in 2008, on all systems which have _setjmp, it is the fastest way to save the registers but not the signal mask (up to 30 times faster than setjmp on some systems).
9.9 \_tolower

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/_tolower.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, Android 4.4.

9.10 \_toupper

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/_toupper.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, Android 4.4.

9.11 a64l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/a64l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.

• This function was not correctly implemented in glibc versions before 2.2.5.

9.12 abort

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/abort.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• Some platforms mistakenly close all stdio streams prior to raising SIGABRT: Cygwin 1.5.x.

• Some platforms always print a message to stderr, even if a SIGABRT handler uses longjmp to resume execution at a safe point: mingw, MSVC 14.
9.13 abs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/abs.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Android 4.3.

9.14 accept

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/accept.html

Gnulib module: accept

Portability problems fixed by Gnulib:

• On Windows platforms (excluding Cygwin), the descriptors returned by the accept function cannot be used in calls to read, write, and close; you have to use recv, send, closesocket in these cases instead.

• On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.

• On HP-UX 11, in 64-bit mode, when the macro _HPUX_ALT_XOPEN_SOCKET_API is not defined, this function behaves incorrectly because it is declared to take a pointer to a 64-bit wide socklen_t entity but in fact considers it as a pointer to a 32-bit wide unsigned int entity.

Portability problems not fixed by Gnulib:

• On BeOS, the descriptors returned by the accept function cannot be used in calls to read, write, and close; you have to use recv, send, closesocket in these cases instead.

• Some platforms don’t have a socklen_t type; in this case this function’s third argument type is ‘int *’.

• On some platforms, this function’s third argument type is ‘void *’, not ‘socklen_t *’:
  Solaris 10.

9.15 access

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/access.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function uses the effective id instead of the real id on some platforms: Cygwin 1.5.x.
Other problems of this function:

- There is an inherent race between calling this function and performing some action based on the results; you should think twice before trusting this function, especially in a set-uid or set-gid program.
- This function does not have an option for not following symbolic links (like stat versus lstat). If you need this option, use the Gnulib module faccessat with the AT_EACCESS flag.

### 9.16 acos

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/acos.html

Gnulib module: acos

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

### 9.17 acosf

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/acosf.html

Gnulib module: acosf

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

### 9.18 acosh

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/acosh.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 9.

### 9.19 acoshf

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/acoshf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, mingw, MSVC 9.
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9.20 acoshl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/acoshl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.21 acosl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/acosl.html

Gnulib module: acosl

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
- This function is not declared on some platforms: Mac OS X 10.3.

Portability problems not fixed by Gnulib:

9.22 aio_cancel

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/aio_cancel.html

Gnulib module: aio_cancel.html

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, OSF/1 5.1, Solaris 2.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

9.23 aio_error

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/aio_error.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, OSF/1 5.1, Solaris 2.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

• On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

9.24 aio_fsync

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/aio_fsync.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, OSF/1 5.1, Solaris 2.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

• On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

9.25 aio_read

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/aio_read.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, OSF/1 5.1, Solaris 2.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

• On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

9.26 aio_return

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/aio_return.html

Gnulib module: —

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, Minix 3.1.8, AIX 5.1, OSF/1 5.1, Solaris 2.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

• On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.
9.27 aio_suspend

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/aio_suspend.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, OSF/1 5.1, Solaris 2.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

9.28 aio_write

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/aio_write.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, OSF/1 5.1, Solaris 2.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

9.29 alarm

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/alarm.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function has no impact if <code>SIGALRM</code> is inherited as ignored; programs should use <code>signal (SIGALRM, SIG_DFL)</code> if it is important to ensure the alarm will fire.
- Use of this function in multi-threaded applications is not advised.
- This function is missing on some platforms: mingw (2011), MSVC 14.
- This function is conditionally declared in the non-standard <code>io.h</code> header on some platforms: mingw (2012 or newer).
9.30 aligned_alloc

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: glibc 2.15, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

9.31 alphasort

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/alphasort.html

Gnulib module: alphasort

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, Solaris 9, mingw, MSVC 14, BeOS.

• The parameters of this function are declared as const void * on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Interix 3.5.

• The parameters of this function are declared as void * on some platforms: AIX 5.1.

9.32 asctime

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/asctime.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function may overflow its internal buffer if an invalid year is passed.

9.33 asctime_r

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/asctime_r.html

Gnulib module: extensions

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function has an incompatible declaration on some platforms: Solaris 11.4 (when _POSIX_PTHREAD_SEMANTICS is not defined).

• This function is missing on some platforms: mingw, MSVC 14.

• This function may put more than 26 bytes into the argument buffer if an invalid year is passed.
9.34 asin

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/asin.html

Gnulib module: asin

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.35 asinf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/asinf.html

Gnulib module: asinf

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
• This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.36 asinh

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/asinh.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 9.

9.37 asinhf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/asinhf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, mingw, MSVC 9.
9.38 asinhl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/asinhl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.39 asinl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/asinl.html

Gnulib module: asinl

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.

- This function is only defined as a macro with arguments on some platforms: MSVC 14.

- This function is not declared on some platforms: Mac OS X 10.3.

Portability problems not fixed by Gnulib:

9.40 assert

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/assert.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

Extension: Gnulib offers a module ‘assert’ that allows the installer to disable assertions through a ‘configure’ option: ‘--disable-assert’.

9.41 atan

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atan.html

Gnulib module: atan

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
9.42 atan2

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atan2.html

Gnulib module: atan2

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.43 atan2f

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atan2f.html

Gnulib module: atan2f

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
• This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.44 atan2l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atan2l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
• This function is only defined as a macro with arguments on some platforms: MSVC 14.

9.45 atanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atanf.html

Gnulib module: atanf

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
• This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:
9.46 atanh

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atanh.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 9.

9.47 atanhf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atanhf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, mingw, MSVC 9.

9.48 atanhl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atanhl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.49 atanl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atanl.html

Gnulib module: atanl

Portability problems fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.

- This function is only defined as a macro with arguments on some platforms: MSVC 14.

- This function is not declared on some platforms: Mac OS X 10.3.

Portability problems not fixed by Gnulib:
9.50 atexit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atexit.html

Gnulib module: atexit

Portability problems fixed by Gnulib:
- This function is missing on some old platforms.

Portability problems not fixed by Gnulib:

9.51 atof

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atof.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Android 4.4.
- This function mis-parses strings with leading ‘+’ on some old platforms: Old versions of Linux.
- This function returns a positive value for negative underflow on some platforms: glibc 2.4, Mingw, Cygwin.
- This function fails to do a valid parse of ‘-0x’ on some platforms: glibc 2.4, Cygwin < 1.5.25-11.
- This function fails to parse Infinities and plain NaNs on some platforms: Solaris 8, Mingw, OpenBSD 4.0.
- This function fails to parse NaN() on some platforms: Solaris 8, Mingw, OpenBSD 4.0, Cygwin < 1.5.25-11.
- This function fails to parse NaN(n-char-sequence) on some platforms: Solaris 8, Mingw, OpenBSD 4.0.
- This function fails to parse C99 hexadecimal floating point on some platforms: Solaris 8, Mingw, OpenBSD 4.0.
- This function fails to correctly parse very long strings on some platforms: Mingw, Cygwin.

9.52 atoi

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atoi.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
9.53 atol

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atol.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.54 atoll

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/atoll.html

Gnulib module: atoll

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11.23, OSF/1 5.1, MSVC 9, Interix 3.5.

Portability problems not fixed by Gnulib:

9.55 basename

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/basename.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: IRIX 6.5, Solaris 2.5.1, mingw, MSVC 14, BeOS.

- glibc and Android have two different functions basename: the POSIX version and the GNU version.

- basename assumes file names in POSIX syntax; it does not work with file names in Windows syntax.

The Gnulib module dirname provides similar API, with function base_name, that also works with Windows file names.

9.56 bind

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/bind.html

Gnulib module: bind

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.
### 9.57 bsearch

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/bsearch.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

### 9.58 btowc

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/btowc.html

Gnulib module: btowc

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 5.3, Solaris 2.6, mingw, Interix 3.5.
- This function returns WEOF for a NUL argument on some platforms: Cygwin 1.7.2.
- This function does not return WEOF for an EOF argument on some platforms: IRIX 6.5.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
- In the C or POSIX locales, this function is not consistent with Gnulib's mbtowc and can return WEOF: glibc 2.23, MirOS BSD #10.

### 9.59 c16rtomb

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on most non-glibc platforms: glibc 2.15, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.

### 9.60 c32rtomb

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on most non-glibc platforms: glibc 2.15, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.
9.61 cabs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cabs.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 9.

9.62 cabsf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cabsf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, Solaris 9, mingw, MSVC 9.

9.63 cabsl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cabsl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 5.1.

9.64 cacos

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cacos.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.
9.65 cacosf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cacosf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.

9.66 cacosh

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cacosh.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.

9.67 cacoshf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cacoshf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.

9.68 cacoshl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cacoshl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.
Chapter 9: ISO C and POSIX Function Substitutes

9.69 cacosl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cacosl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.

9.70 calloc

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/calloc.html

Gnulib module: calloc-posix

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- Upon failure, the function does not set \texttt{errno} to \texttt{ENOMEM} on some platforms: mingw, MSVC 14.

Extension: Gnulib provides a module ‘calloc-gnu’ that substitutes a calloc implementation that behaves more like the glibc implementation.

9.71 carg

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/carg.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.72 cargf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cargf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.
9.73 cargl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cargl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 5.1.

9.74 casin

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/casin.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.

9.75 casinf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/casinf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.

9.76 casinh

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/casinh.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.
9.77 casinhf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/casinhf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.

9.78 casinhl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/casinhl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.

9.79 casinl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/casinl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.

9.80 catan

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/catan.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.
9.81 \texttt{catanf}

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/catanf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.

9.82 \texttt{catanh}

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/catanh.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.

9.83 \texttt{catanhf}

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/catanhf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 5.1.

9.84 \texttt{catanh1}

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/catanhl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.
9.85 catanl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/catanl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.

9.86 catclose

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/catclose.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 7.1.

9.87 catgets

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/catgets.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 7.1.

9.88 catopen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/catopen.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 7.1.
9.89 cbrt

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cbrt.html

Gnulib module: cbrt

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, MSVC 9.

Portability problems not fixed by Gnulib:

9.90 cbrtf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cbrtf.html

Gnulib module: cbrtf

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9, MSVC 9.
- This function is not declared on some platforms: IRIX 6.5.
- This function returns a wrong value for a minus zero on some platforms: IRIX 6.5.

Portability problems not fixed by Gnulib:

9.91 cbrtl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cbrtl.html

Gnulib module: cbrtl or cbrtl-ieee

Portability problems fixed by either Gnulib module cbrtl or cbrtl-ieee
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.4.
- This function is not declared on some platforms: IRIX 6.5.
- This function produces grossly wrong results on some platforms: OpenBSD 5.1/SPARC.

Portability problems fixed by Gnulib module cbrtl-ieee:
- This function returns a positive zero for a minus zero argument on some platforms: IRIX 6.5.

Portability problems not fixed by Gnulib:

9.92 ccos

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ccos.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.93 ccosf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ccosf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.94 ccosh

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ccosh.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.95 ccoshf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ccoshf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.
9.96  `ccoshl`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ccoshl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.

9.97  `ccosl`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ccosl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.

9.98  `ceil`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ceil.html

Gnulib module: `ceil` or `ceil-ieee`

Portability problems fixed by either Gnulib module `ceil` or `ceil-ieee`:

Portability problems fixed by Gnulib module `ceil-ieee`:

- This function returns a positive zero for an argument between −1 and 0 on some platforms: AIX 7.1, OSF/1 5.1.
- This function returns a positive zero for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.99  `ceilf`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ceilf.html

Gnulib module: `ceilf` or `ceilf-ieee`

Portability problems fixed by either Gnulib module `ceilf` or `ceilf-ieee`:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, Solaris 9.
This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems fixed by Gnulib module `ceilf-ieee`:

- This function returns a positive zero for an argument between \(-1\) and 0 on some platforms: Mac OS X 10.5, AIX 7.1, OSF/1 5.1.
- This function returns a positive zero for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

### 9.100 `ceill`

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/ceill.html

Gnulib module: `ceill` or `ceill-ieee`

Portability problems fixed by either Gnulib module `ceill` or `ceill-ieee`:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems fixed by Gnulib module `ceill-ieee`:

- This function returns a positive zero for an argument between \(-1\) and 0 on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

### 9.101 `cexp`

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/cexp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

### 9.102 `cexpf`

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/cexpf.html

Gnulib module: —
Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.103 cexpl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cexpl.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.

9.104 cfgetispeed

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cfgetispeed.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.

9.105 cfgetospeed

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cfgetospeed.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.

9.106 cfsetispeed

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cfsetispeed.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.
9.107 cfsetospeed

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cfsetospeed.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14, Android 4.4.

9.108 chdir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/chdir.html
Gnulib module: —
Portability problems fixed by Gnulib:
• This function is declared in different header files (namely, <io.h> or <direct.h>) on some platforms: mingw, MSVC 14.
Portability problems not fixed by Gnulib:

9.109 chmod

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/chmod.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

9.110 chown

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/chown.html
Gnulib module: chown
Portability problems fixed by Gnulib:
• Some platforms fail to detect trailing slash on non-directories, as in chown("link-to-file/", uid, gid): FreeBSD 7.2, AIX 7.1, Solaris 9.
• Some platforms fail to update the change time when at least one argument was not −1, but no ownership changes resulted: OpenBSD 4.0.
• When passed an argument of −1, some implementations really set the owner user/group id of the file to this value, rather than leaving that id of the file alone.
• When applied to a symbolic link, some implementations don’t dereference the symlink, i.e. they behave like lchown.
• This function is missing on some platforms; however, the replacement always fails with ENOSYS: mingw, MSVC 14.
Portability problems not fixed by Gnulib:
9.111 cimag

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cimag.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.1, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.112 cimagf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cimagf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.1, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.113 cimagl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cimagl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8. Minix 3.1.8, AIX 5.1, HP-UX 11.1, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 5.1.

9.114 clearerr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/clearerr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
9.115 clock

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/clock.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.116 clock_getcpuclockid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/clock_getcpuclockid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: OS X 10.11, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

9.117 clock_getres

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/clock_getres.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: OS X 10.11, Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS.

9.118 clock_gettime

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/clock_gettime.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: OS X 10.11, Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS. The Gnulib module gettime is a partial substitute; it implements the CLOCK_REALTIME functionality of clock_gettime.
9.119 clock_nanosleep

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/clock_nanosleep.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: OS X 10.11, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS.

9.120 clock_settime

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/clock_settime.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: OS X 10.11, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS.

9.121 clog

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/clog.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 7.1.

9.122 clogf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/clogf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 7.1.
9.123 clogl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/clogl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.

9.124 close

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/close.html

Gnulib module: close

Portability problems fixed by Gnulib:
- This function crashes when invoked with invalid arguments on some platforms: MSVC 14.
- On Windows platforms (excluding Cygwin), socket and accept do not return file descriptors that can be closed by close. Instead, closesocket must be used.

Portability problems not fixed by Gnulib:
- On BeOS, socket and accept do not return file descriptors that can be closed by close. Instead, closesocket must be used.

9.125 closedir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/closedir.html

Gnulib module: closedir

Portability problems fixed by Gnulib:
- This function is missing on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.126 closelog

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/closelog.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS.
Chapter 9: ISO C and POSIX Function Substitutes

9.127 **confstr**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/confstr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Cygwin 1.5.x, mingw, MSVC 14, Android 9.0.

9.128 **conj**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/conj.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.129 **conjf**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/conjf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.130 **conjl**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/conjl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 5.1.
9.131 connect

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/connect.html

Gnulib module: connect

Portability problems fixed by Gnulib:
• On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.

Portability problems not fixed by Gnulib:

9.132 copysign

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/copysign.html

Gnulib module: copysign

Portability problems fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, MSVC 9.

Portability problems not fixed by Gnulib:

9.133 copysignf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/copysignf.html

Gnulib module: copysignf

Portability problems fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, older IRIX 6.5, Solaris 9, MSVC 9.
• This function is not declared on some platforms: IRIX 6.5.

Portability problems not fixed by Gnulib:

9.134 copysignl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/copysignl.html

Gnulib module: copysignl

Portability problems fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, Solaris 9, Cygwin, MSVC 9, Interix 3.5.

Portability problems not fixed by Gnulib:
9.135 cos

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cos.html

Gnulib module: cos

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.136 cosf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cosf.html

Gnulib module: cosf

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
• This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.137 cosh

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cosh.html

Gnulib module: cosh

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.138 coshf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/coshf.html

Gnulib module: coshf

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
• This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:
9.139 coshl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/coshl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.

9.140 cosl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cosl.html

Gnulib module: cosl

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
- This function is not declared on some platforms: Mac OS X 10.3.

Portability problems not fixed by Gnulib:

9.141 cpow

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cpow.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 7.1.

9.142 cpowf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cpowf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5, Android 7.1.

9.143 cpowl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cpowl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.

9.144 cproj

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cproj.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5.
• The glibc implementation is or was broken.

9.145 cprojf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cprojf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.
• The glibc implementation is or was broken.
9.146 cprojl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/cprojl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 5.1.

• The glibc implementation is or was broken.

9.147 creal

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/creal.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.148 crealf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/crealf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.149 creall

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/creall.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 5.1.
9.150  **creat**

   POSIX specification:

   GnuLib module: —

   Portability problems fixed by GnuLib:

   Portability problems not fixed by GnuLib:
   - On Windows, this function returns a file handle in O_TEXT mode. If you need a file handle in O_BINARY mode, you need to use the function open instead.
   - On platforms where off_t is a 32-bit type, creat may not work correctly to create files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

9.151  **crypt**

   POSIX specification:

   GnuLib module: —

   Portability problems fixed by GnuLib:

   Portability problems not fixed by GnuLib:
   - This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, Cygwin, mingw, MSVC 14, Android 9.0.
   - This function is not declared in 〈unistd.h〉 (without -D_GNU_SOURCE) on some platforms: glibc (at least 2.11–2.13).

9.152  **csin**

   POSIX specification:

   GnuLib module: —

   Portability problems fixed by GnuLib:

   Portability problems not fixed by GnuLib:
   - This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.153  **csinf**

   POSIX specification:

   GnuLib module: —

   Portability problems fixed by GnuLib:

   Portability problems not fixed by GnuLib:
   - This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.
9.154 csinh

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/csinh.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.155 csinhf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/csinhf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.156 csinhl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/csinhl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.

9.157 csinl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/csinl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.
9.158 csqrt

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/csqrt.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.159 csqrtf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/csqrtf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.160 csqrtl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/csqrtl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 5.1.

9.161 ctan

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ctan.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.
9.162 ctanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ctanf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.163 ctanh

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ctanh.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.164 ctanhf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ctanhf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, mingw, MSVC 9, Interix 3.5.

9.165 ctanhl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ctanhl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.
Chapter 9: ISO C and POSIX Function Substitutes

9.166 ctanl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ctanl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 7.1.

9.167 ctermid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ctermid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14, Android 7.1.

9.168 ctime

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ctime.html

Gnulib module: ctime

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- On native Windows platforms (mingw, MSVC), this function works incorrectly when the environment variable TZ has been set by Cygwin.

- This function may overflow its internal buffer if an invalid year is passed.

- The ctime function need not be reentrant, and consequently is not required to be thread safe. Implementations of ctime typically write the timestamp into static buffer. If two threads call ctime at roughly the same time, you might end up with the wrong date in one of the threads, or some undefined string. There is a re-entrant interface ctime_r.

- Native Windows platforms (mingw, MSVC) support only a subset of time zones supported by GNU or specified by POSIX. See Section 9.1101 [tzset], page 398.

A more flexible function is strftime. However, note that it is locale dependent.
9.169 ctime_r

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ctime_r.html

Gnulib module: extensions

Portability problems fixed by Gnulib:

• This function has an incompatible declaration on some platforms: Solaris 11.4 (when
  _POSIX_PTHREAD_SEMANTICS is not defined).

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14.
• This function may put more than 26 bytes into the argument buffer if an invalid year
  is passed.

ctime_r takes a pre-allocated buffer and length of the buffer, and returns NULL on errors. The input buffer
should be at least 26 bytes in size. The output string is locale-independent. However, years can have more
than 4 digits if time_t is sufficiently wide, so the length of the required output buffer is not easy to determine.
Increasing the buffer size when ctime_r returns NULL is not necessarily sufficient. The NULL return value could
mean some other error condition, which will not go away by increasing the buffer size.

A more flexible function is strftime. However, note that it is locale dependent.

9.170 daylight

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/daylight.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This variable is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, OpenBSD
  3.8, IRIX 6.5, OSF/1 5.1.
• The address of this variable is not a compile-time constant on some platforms: Cygwin,
  mingw.
• Native Windows platforms (mingw, MSVC) support only a subset of time zones sup-
  ported by GNU or specified by POSIX. See Section 9.1101 [tzset], page 398.

A more portable way of getting the UTC offset is to use strftime with the %z format. See
Section 9.1011 [strftime], page 372.

9.171 dbm_clearerr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dbm_clearerr.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, HP-UX 11.11, IRIX 5.3, OSF/1 5.1, Solaris 2.5.1, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

9.172 dbm_close

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dbm_close.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

9.173 dbm_delete

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dbm_delete.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

9.174 dbm_error

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dbm_error.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, HP-UX 11.11, IRIX 5.3, OSF/1 4.0, Solaris 2.5.1, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

9.175 dbm_fetch

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dbm_fetch.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
9.176 dbm_firstkey

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dbm_firstkey.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: glibc 2.3.6, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

9.177 dbm_nextkey

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dbm_nextkey.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: glibc 2.3.6, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

9.178 dbm_open

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dbm_open.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: glibc 2.3.6, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

9.179 dbm_store

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dbm_store.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: glibc 2.3.6, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
9.180 difftime

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/difftime.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.181 dirfd

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dirfd.html

Gnulib module: dirfd

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 7.1, HP-UX 11, OSF/1 5.1, Solaris 10, mingw, MSVC 14.

Portability problems not fixed by Gnulib:

• This function always fails on some platforms: mingw.

With the dirfd module, this functions always sets errno when it fails. (POSIX does not require that dirfd sets errno when it fails.)

9.182 dirname

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dirname.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: IRIX 6.5, Solaris 2.5.1, mingw, MSVC 14, BeOS.

• dirname assumes file names in POSIX syntax; it does not work with file names in Windows syntax.

The Gnulib module dirname provides similar API, with functions dir_name and mdir_name, that also works with Windows file names.

9.183 div

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/div.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
9.184 dlclose

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dlclose.html

Gnulib module: —

Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS.

9.185 dlerror

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dlerror.html

Gnulib module: —

Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS.

9.186 dlopen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dlopen.html

Gnulib module: —

Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS.

• If the file name argument is not absolute, the file is searched for. The search algorithm is system specific.

9.187 dlsym

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dlsym.html

Gnulib module: —

Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS.

• The visibility of symbols loaded in dependent shared libraries or present in the main executable is system dependent.
9.188 dprintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dprintf.html

Gnulib module: dprintf or dprintf-posix

Portability problems fixed by either Gnulib module dprintf or dprintf-posix:
- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS.

Portability problems fixed by Gnulib module dprintf-posix:
- printf "%.f", "%e", "%g" of Infinity and NaN yields an incorrect result on some platforms: Solaris 11.4.
- This function does not support the ‘a’ and ‘A’ directives on some platforms: glibc-2.3.6.
- printf "%010f" of NaN and Infinity yields an incorrect result (padded with zeroes, or wrong capitalization) on some platforms: Solaris 11.4.
- This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: AIX 7.1.

Portability problems not fixed by Gnulib:
- The %m directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.
- Formatting noncanonical ‘long double’ numbers produces nonmeaningful results on some platforms: glibc and others, on x86, x86_64, IA-64 CPUs.
- When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: Solaris 5.1.
- On some platforms, this function does not set errno or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

9.189 drand48

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.190 dup

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dup.html

Gnulib module: dup

Portability problems fixed by Gnulib:
- This function crashes when invoked with invalid arguments on some platforms: MSVC 14.
Portability problems not fixed by Gnulib:

9.191 dup2

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/dup2.html

Gnulib module: dup2 or dup2-obsolete

Portability problems fixed by either Gnulib module dup2 or dup2-obsolete:
- This function always returns 0 for success on some platforms: mingw, MSVC 14.
- This function can hang when duplicating an fd to itself on some platforms: mingw, MSVC 14.
- This function crashes when invoked with invalid arguments on some platforms: Cygwin 1.7.17, MSVC 14.
- This function crashes when invoked with valid arguments on some platforms: Cygwin 1.7.25.
- This function fails with EINVAL when duplicating an fd to itself: Android.
- This function resets the FD_CLOEXEC flag when duplicating an fd to itself on some platforms: Haiku.
- This function returns 0 for dup2 (1, 1) on some platforms: Cygwin 1.5.x.
- This function may return -EBADF instead of -1 on some platforms: Linux releases between July 2008 and May 2009 (versions 2.6.27 to 2.6.29).
- This function returns EMFILE instead of E_BADF for large targets, which interferes with using dup2(fd,fd)==fd) as the minimal E_BADF filter: AIX 7.1, FreeBSD 6.1, Cygwin 1.5.

Portability problems fixed by Gnulib module dup2-obsolete:
- This function is missing on some older platforms.

Portability problems not fixed by Gnulib:

9.192 duplocale

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/duplocale.html

Gnulib module: duplocale

Portability problems fixed by Gnulib:
- The argument LC_GLOBAL_LOCALE is not supported on some platforms: glibc 2.11, AIX 7.1.
- With the argument LC_GLOBAL_LOCALE, this function returns a wrong result on some platforms: NetBSD 7.0.

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 9.0, NetBSD 5.0, OpenBSD 6.1, Minix 3.1.8, AIX 6.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 2.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
9.193 encrypt

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/encrypt.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
• This function is not declared in <unistd.h> (without -D_GNU_SOURCE) on some platforms: glibc (at least 2.11–2.13).

9.194 endgrent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/endgrent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, Android 7.1.

9.195 endhostent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/endhostent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 8.1.

9.196 endnetent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/endnetent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Cygwin, mingw, MSVC 14, BeOS, Android 8.1.
9.197 **endprotoent**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/endprotoent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 8.1.

9.198 **endpwent**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/endpwent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.

9.199 **endservent**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/endservent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.200 **endutxent**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/endutxent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.
9.201 environ

POSIX specification: http://www.opengroup.org/onlinepubs/9699919799/functions/environ.html

Gnulib module: environ

Portability problems fixed by Gnulib:

- POSIX does not require this variable to be declared, and it is indeed not declared on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, IRIX 6.5, Solaris 11.4.
- On Mac OS X 10, this variable is not declared. Up to Mac OS X 10.4, one can use
  
  ```c
  extern char **environ;
  ```

  to get the variable declared. This does not work any more, however, in shared libraries on Mac OS X 10.5. Here is a workaround: Instead, one can use

  ```c
  #include <crt_externs.h>
  #define environ (*_NSGetEnviron())
  ```

  This works at all versions of Mac OS X.
- On Cygwin in 64-bit mode, references to this variable cause a link error when the option `-Wl,--disable-auto-import` is in use.

Portability problems not fixed by Gnulib:

- The address of this variable is not a compile-time constant on some platforms: mingw.
- Assigning NULL to `environ` to clear all variables is not portable; better is to assign `environ` to one-element array containing a NULL pointer. That said, an empty environment is not portable either, as some systems may require particular environment variables (such as `PATH`) to be present in order to operate consistently.

9.202 erand48


Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.203 erf

POSIX specification: http://www.opengroup.org/onlinepubs/9699919799/functions/erf.html

Gnulib module: erf

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, MSVC 9.
9.204 erfc

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/erfc.html

Gnulib module: erfc

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, MSVC 9.

9.205 erfcf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/erfcf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, MSVC 9.

9.206 erfcl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/erfcl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.207 erff

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/erff.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, MSVC 9.
9.208 erfl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/erfl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.209 errno

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/errno.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- On Windows, the socket functions don’t set errno; their error code is available through WSAGetLastError() instead.

9.210 execl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/execl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- On some platforms, a script without executable permission is still run: Cygwin 1.5.x.
- On Windows platforms (excluding Cygwin), this function operates by spawning and then by exiting the current process, which means the current process’s parent may incorrectly proceed as if its child had exited.

9.211 execl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/execle.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- On some platforms, a script without executable permission is still run: Cygwin 1.5.x.
- On Windows platforms (excluding Cygwin), this function operates by spawning and then by exiting the current process, which means the current process’s parent may incorrectly proceed as if its child had exited.
### 9.212 execlp

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/execlp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- On some platforms, a script without executable permission is still run: Cygwin 1.5.x.
- On Windows platforms (excluding Cygwin), this function operates by spawning and then by exiting the current process, which means the current process's parent may incorrectly proceed as if its child had exited.

### 9.213 execv

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/execv.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- On some platforms, a script without executable permission is still run: Cygwin 1.5.x.
- On Windows platforms (excluding Cygwin), this function operates by spawning and then by exiting the current process, which means the current process's parent may incorrectly proceed as if its child had exited.

### 9.214 execve

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/execve.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- On some platforms, a script without executable permission is still run: Cygwin 1.5.x.
- On Windows platforms (excluding Cygwin), this function operates by spawning and then by exiting the current process, which means the current process's parent may incorrectly proceed as if its child had exited.

### 9.215 execvp

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/execvp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- On some platforms, a script without executable permission is still run: Cygwin 1.5.x.
• On Windows platforms (excluding Cygwin), this function operates by spawning and then by exiting the current process, which means the current process’s parent may incorrectly proceed as if its child had exited.

9.216 exit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/exit.html

Gnulib module: stdlib

Portability problems fixed by Gnulib:
• Some problems with the macros EXIT_SUCCESS and EXIT_FAILURE, see Section 8.50 [stdlib.h], page 60.

Portability problems not fixed by Gnulib:

9.217 exp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/exp.html

Gnulib module: exp

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.218 exp2

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/exp2.html

Gnulib module: exp

Portability problems fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, older IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.
• This function is not declared on some platforms: IRIX 6.5.
• This function returns grossly wrong results on some platforms: OpenBSD 4.9.

Portability problems not fixed by Gnulib:

9.219 exp2f

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/exp2f.html

Gnulib module: exp2f

Portability problems fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.
• This function is not declared on some platforms: IRIX 6.5.

Portability problems not fixed by Gnulib:
9.220 exp2l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/exp2l.html
Gnulib module: exp2l or exp2l-ieee
Portability problems fixed by either Gnulib module exp2l or exp2l-ieee:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.4.
- This function is not declared on some platforms: IRIX 6.5.
- This function produces results which are accurate to only 16 digits on some platforms: NetBSD 8.0.
Portability problems fixed by Gnulib module exp2l-ieee:
- This function returns a wrong value for a NaN argument on some platforms: OpenBSD 4.9.
- This function returns a wrong value for a negative infinity argument on some platforms: IRIX 6.5.
Portability problems not fixed by Gnulib:

9.221 expf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/expf.html
Gnulib module: expf
Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
Portability problems not fixed by Gnulib:

9.222 expl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/expl.html
Gnulib module: expl
Portability problems fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
- This function returns 0.0 for all arguments on some platforms: Haiku 2017.
- This function returns NaN for small operands on some platforms: OpenBSD 5.4.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
- This function is not declared on some platforms: Mac OS X 10.3.
• This function produces results which are accurate to only 16 digits on some platforms:
  NetBSD 8.0.

Portability problems not fixed by Gnulib:

9.223 expm1

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/expm1.html

Gnulib module: expm1 or expm1-ieee

Portability problems fixed by either Gnulib module expm1 or expm1-ieee:
• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 9.

Portability problems fixed by Gnulib module expm1-ieee:
• This function has problems when the argument is minus zero on some platforms: AIX 7.1.

Portability problems not fixed by Gnulib:

9.224 expm1f

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/expm1f.html

Gnulib module: expm1f

Portability problems fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, Solaris 9, mingw, MSVC 9.
• This function produces wrong results for arguments \( \leq -17.32868 \) on some platforms: IRIX 6.5.

Portability problems not fixed by Gnulib:

9.225 expm1l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/expm1l.html

Gnulib module: expm1l

Portability problems fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.
• This function is not declared on some platforms: IRIX 6.5.
• This function produces results which are accurate to only 16 digits on some platforms: NetBSD 8.0.

Portability problems not fixed by Gnulib:
9.226 fabs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fabs.html

Gnulib module: fabs

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.227 fabsf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fabsf.html

Gnulib module: fabsf

Portability problems fixed by Gnulib:

• This function is missing on some platforms: AIX 5.1, Solaris 9.

• This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.228 fabsl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fabsl.html

Gnulib module: fabsl

Portability problems fixed by Gnulib:

• This function is missing on some platforms: NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS.

• This function is only defined as a macro with arguments on some platforms: MSVC 14.

• This function returns a minus zero for a minus zero argument on some platforms: IRIX 6.5 with gcc 4.2.4.

Portability problems not fixed by Gnulib:

9.229 faccessat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/facessat.html

Gnulib module: facessat

Portability problems fixed by Gnulib:

• This function is missing on some platforms: glibc 2.3.6, macOS 10.12, FreeBSD 7.4, NetBSD 6.1.5, OpenBSD 4.9, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

• On some platforms, facessat (dfd, "file/", amode, flag) succeeds instead of failing when file is not a directory. macOS 10.13.
Portability problems not fixed by Gnulib:
• The replacement does not always take ACLs into account.
• The replacement is not safe to be used in libraries.
• The replacement is not multithread-safe.
• The replacement does not support the `AT_SYMLINK_NOFOLLOW` flag, which is supported by GNU `faccessat`.

Other problems of this function:
• There is an inherent race between calling this function and performing some action based on the results; you should think twice before trusting this function, especially in a set-uid or set-gid program.

9.230 fattach

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fattach.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.231 fchdir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fchdir.html

Gnulib module: fchdir

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Tandem/NSK, mingw, MSVC 14, BeOS. But the replacement function is not safe to be used in libraries and is not multithread-safe.
• This function is not declared on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.232 fchmod

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fchmod.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14, BeOS.
9.233 fchmodat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fchmodat.html
Gnulib module: fchmodat
Portability problems fixed by Gnulib:
- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS. But the replacement function is not safe to be used in libraries and is not multithread-safe.

Portability problems not fixed by Gnulib:
- Some platforms do not allow changing the access bits on symbolic links. POSIX states that `fchmodat(...,AT_SYMLINK_NOFOLLOW)` may fail with EOPNOTSUPP when called on a symlink, but some platforms, as well as the gnulib replacement, fail for any use of AT_SYMLINK_NOFOLLOW even if the target was not a symlink: glibc, Cygwin.

9.234 fchown

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fchown.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.

9.235 fchownat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fchownat.html
Gnulib module: fchownat
Portability problems fixed by Gnulib:
- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS. But the replacement function is not safe to be used in libraries and is not multithread-safe. Also, the replacement may fail to change symlinks if `lchown` is unsupported, or fail altogether if `chown` is unsupported.
- This function is declared in `<sys/stat.h>`, not in `<unistd.h>`, on some platforms: Android 4.3.
- Some platforms fail to detect trailing slash on non-directories, as in `fchown(dir,"link-to-file/",uid,gid,flag)`: Solaris 9.
- Some platforms mistakenly dereference symlinks when using AT_SYMLINK_NOFOLLOW: Linux kernel 2.6.17.
- This function does not fail for an empty filename on some platforms: Linux with glibc < 2.11.

Portability problems not fixed by Gnulib:
9.236 fclose

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fclose.html

Gnulib module: fclose

Portability problems fixed by Gnulib:
- On some platforms, this function fails to set the file position of a seekable input stream to the byte after the last one actually read: glibc 2.13, FreeBSD.
- This function crashes if the stream’s file descriptor has already been closed on some platforms: MSVC 14.
- On Windows platforms (excluding Cygwin), socket and accept followed by fdopen do not return streams that can be closed by fclose.

Portability problems not fixed by Gnulib:
- On Windows platforms (excluding Cygwin), this function does not set errno upon failure.

9.237 fcntl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fcntl.html

Gnulib module: fcntl

Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.
- This function does not support F_DUPFD_CLOEXEC on some platforms: glibc with Linux kernels before 2.6.24, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, AIX 7.1, HP-UX 11, IRIX 6.5, OF/1 5.1, Solaris 11 2010-11, Cygwin 1.7.1, Interix 3.5, BeOS. Note that the gnulib replacement code is functional but not atomic.
- The F_DUPFD_CLOEXEC action of this function sets the FD_CLOEXEC flag on the wrong file descriptor on some platforms: Haiku.
- The F_DUPFD action of this function does not reject out-of-range targets properly on some platforms: AIX 7.1, Cygwin 1.5.x, Haiku.
- The F_DUPFD action of this function mistakenly clears FD_CLOEXEC on the source descriptor on some platforms: Haiku.

Portability problems not fixed by Gnulib:
- The replacement function does not support F_SETFD, F_GETFL, F_SETFL, F_GETOWN, F_SETOWN, F_GETLK, F_SETLK, and F_SETLKW on some platforms: mingw, MSVC 14.

9.238 fdatasync

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fdatasync.html

Gnulib module: fdatasync

Portability problems fixed by Gnulib:
- This function is present but not declared on some platforms: Mac OS X 10.7.
This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 2.2.

Portability problems not fixed by Gnulib:

9.239 fdetach

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fdetach.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.240 fdim

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fdim.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.241 fdimf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fdimf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.242 fdiml

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fdiml.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS.

9.243 fdopen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fdopen.html

Gnulib module: fdopen

Portability problems fixed by Gnulib:

- This function crashes when invoked with invalid arguments on some platforms: MSVC 14.
- On Windows platforms (excluding Cygwin), this function does not set errno upon failure.

Portability problems not fixed by Gnulib:

9.244 fdopendir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fdopendir.html

Gnulib module: fdopendir

Portability problems fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS. But the replacement function is not safe to be used in libraries and is not multithread-safe. Also, the replacement does not guarantee that 'dirfd(fdopendir(n))==n' (dirfd might fail, or return a different file descriptor than n).
- This function exists but is not declared on some platforms: FreeBSD 7.3.
- This function does not reject non-directory file descriptors on some platforms: GNU/Hurd.
- This function mistakenly closes non-directory file descriptors on some platforms: FreeBSD 8.1.

Portability problems not fixed by Gnulib:

9.245 feclearexcept

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/feclearexcept.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.7, MSVC 9, Interix 3.5, Android 4.4.

9.246 fegetenv

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fegetenv.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.7, MSVC 9, Interix 3.5, Android 4.4.

9.247 fegetexceptflag

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fegetexceptflag.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.7, MSVC 9, Interix 3.5, Android 4.4.

9.248 fegetround

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fegetround.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, IRIX 6.5, Solaris 9, Cygwin 1.7.7, MSVC 9, Interix 3.5, Android 4.4.
9.249 feholdexcept

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/feholdexcept.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.7, MSVC 9, Interix 3.5, Android 4.4.

9.250 feof

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/feof.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.251 feraiseexcept

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/feraiseexcept.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.7, MSVC 14, Interix 3.5, Android 4.4.

9.252 ferror

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ferror.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
9.253 `fesetenv`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fesetenv.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.7, MSVC 9, Interix 3.5, Android 4.4.

9.254 `fesetexceptflag`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fesetexceptflag.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.7, MSVC 9, Interix 3.5, Android 4.4.

9.255 `fesetround`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fesetround.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, IRIX 6.5, Solaris 9, Cygwin 1.7.7, MSVC 9, Interix 3.5, Android 4.4.

9.256 `fetestexcept`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fetestexcept.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.7, MSVC 9, Interix 3.5, Android 4.4.
9.257 feupdateenv

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/feupdateenv.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.7, MSVC 14, Interix 3.5, Android 4.4.

9.258 fexecve

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fexecve.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11 2010-11, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

9.259 fflush

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fflush.html

Gnulib module: fflush

Portability problems fixed by Gnulib:

• fflush followed by fseek or fseeko, applied to an input stream, should have the effect of positioning the underlying file descriptor. It doesn’t do this on some platforms.

• fflush on an input stream changes the position of the stream to the end of the previous buffer, on some platforms: mingw, MSVC 14.

• fflush on an input stream right after ungetc does not discard the ungetc buffer, on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Cygwin 1.5.25-10.

Portability problems not fixed by Gnulib:

• fflush, ftell, ftello, fgetpos behave incorrectly on input streams that are opened in O_TEXT mode and whose contents contains Unix line terminators (LF), on some platforms: mingw, MSVC 14.

• On Windows platforms (excluding Cygwin), this function does not set errno upon failure.

• This function crashes if the stream’s file descriptor has already been closed, if MSVC_INVALID_PARAMETER_HANDLING is HAIRY_LIBRARY_HANDLING or SANE_LIBRARY_HANDLING, on some platforms: MSVC 14.
• `fflush` on an input stream right after `ungetc` does not discard the `ungetc` buffer, on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11 2010-11, mingw, MSVC 14.

9.260 `ffs`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ffs.html
Gnulib module: `ffs`
Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.
Portability problems not fixed by Gnulib:

9.261 `fgetc`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fgetc.html
Gnulib module: `stdio`, `nonblocking`
Portability problems fixed by Gnulib module `stdio`, together with module `nonblocking`:
- When reading from a non-blocking pipe whose buffer is empty, this function fails with `errno` being set to `EINVAL` instead of `EAGAIN` on some platforms: mingw, MSVC 14.
Portability problems not fixed by Gnulib:
- C99 and POSIX.1-2001 and later require end-of-file to be sticky, that is, they require this function to act as if it reads end-of-file if `feof` would return nonzero. However, on some systems this function attempts to read from the underlying file descriptor even if the stream’s end-of-file indicator is set. These systems include glibc and default Solaris.
- On Windows platforms (excluding Cygwin), this function does not set `errno` upon failure.
- This function crashes if the stream’s file descriptor has already been closed, if `MSVC_INVALID_PARAMETER_HANDLING` is `HAIRY_LIBRARY_HANDLING` or `SANE_LIBRARY_HANDLING`, on some platforms: MSVC 14.

9.262 `fgetpos`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fgetpos.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- `fflush`, `ftell`, `ftello`, `fgetpos` behave incorrectly on input streams that are opened in `O_TEXT` mode and whose contents contains Unix line terminators (LF), on some platforms: mingw, MSVC 14.
- On platforms where `off_t` is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the `AC_SYS_LARGEFILE` macro.
- On platforms where off_t is a 64-bit type, but fseeko is not present, stream operations on files larger than 2 GB silently do the wrong thing. This affects BSD/OS, which is mostly obsolete.

### 9.263 fgets

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/fgets.html

Gnulib module: stdio, nonblocking

Portability problems fixed by Gnulib module stdio, together with module nonblocking:

- When reading from a non-blocking pipe whose buffer is empty, this function fails with errno being set to EINVAL instead of EAGAIN on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

- C99 and POSIX.1-2001 and later require end-of-file to be sticky, that is, they require this function to act as if it reads end-of-file iffeof would return nonzero. However, on some systems this function attempts to read from the underlying file descriptor even if the stream’s end-of-file indicator is set. These systems include glibc and default Solaris.
- On Windows platforms (excluding Cygwin), this function does not set errno upon failure.

### 9.264 fgetwc

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/fgetwc.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x, BeOS.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

### 9.265 fgetws

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/fgetws.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x, BeOS.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.266 fileno

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fileno.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.267 flockfile

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/flockfile.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.268 floor

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/floor.html

Gnulib module: floor or floor-ieee

Portability problems fixed by either Gnulib module floor or floor-ieee:

Portability problems fixed by Gnulib module floor-ieee:

• This function returns a positive zero for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.269 floorf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/floorf.html

Gnulib module: floorf or floorf-ieee

Portability problems fixed by either Gnulib module floorf or floorf-ieee:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, Solaris 9.

• This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems fixed by Gnulib module floorf-ieee:

• This function returns a positive zero for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:
9.270 floorl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/floorl.html

Gnulib module: floorl or floorl-ieee

Portability problems fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.271 fma

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fma.html

Gnulib module: fma

Portability problems fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.
- This function produces wrong results on some platforms: glibc 2.11, Mac OS X 10.5, FreeBSD 6.4/x86, OSF/1 5.1, Cygwin 1.5, mingw.

Portability problems not fixed by Gnulib:

9.272 fmaf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fmaf.html

Gnulib module: fmaf

Portability problems fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.
- This function produces wrong results on some platforms: glibc 2.11, Mac OS X 10.5, FreeBSD 6.4/x86, OSF/1 5.1, Cygwin 1.5, mingw.

Portability problems not fixed by Gnulib:

9.273 fmal

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fmal.html

Gnulib module: fmal
Portability problems fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.4.
- This function produces wrong results on some platforms: glibc 2.11, Mac OS X 10.5, FreeBSD 6.4/x86, OSF/1 5.1, mingw.

Portability problems not fixed by Gnulib:

9.274 fmax

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fmax.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.275 fmaxf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fmaxf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.276 fmaxl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fmaxl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS.
9.277 fmemopen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fmemopen.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

9.278 fmin

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fmin.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.279 fminf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fminf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.280 fminl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fminl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS.
9.281 fmod

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fmod.html

Gnulib module: fmod or fmod-ieee

Portability problems fixed by either Gnulib module fmod or fmod-ieee:

- This function has problems when the second argument is zero on some platforms: OSF/1 5.1.
- This function has problems when the first argument is minus zero on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.282 fmodf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fmodf.html

Gnulib module: fmodf or fmodf-ieee

Portability problems fixed by either Gnulib module fmodf or fmodf-ieee:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems fixed by Gnulib module fmodf-ieee:

- This function has problems when the second argument is zero on some platforms: OSF/1 5.1.
- This function has problems when the first argument is minus zero on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.283 fmodl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fmodl.html

Gnulib module: fmodl or fmodl-ieee

Portability problems fixed by either Gnulib module fmodl or fmodl-ieee:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
- This function is not declared and does not work on some platforms: AIX 5.1.

Portability problems fixed by Gnulib module fmodl-ieee:

- This function has problems when the second argument is zero on some platforms: OSF/1 5.1.
• This function has problems when the first argument is minus zero on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.284 fmtmsg

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fmtmsg.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.285 fnmatch

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fnmatch.html

Gnulib module: fnmatch or fnmatch-gnu

Portability problems fixed by Gnulib:

• This function is missing on some platforms: IRIX 5.3, mingw, MSVC 14.
• This function is broken in some versions of Solaris and glibc.

Portability problems not fixed by Gnulib:

9.286 fopen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fopen.html

Gnulib module: fopen

Portability problems fixed by Gnulib:

• This function does not fail when the file name argument ends in a slash and (without the slash) names a nonexistent file or a file that is not a directory, on some platforms: HP-UX 11.00, AIX 7.1, Solaris 9, Irix 5.3.
• On platforms where off_t is a 32-bit type, fopen may not work correctly with files larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)
• On Windows platforms (excluding Cygwin), this function does usually not recognize the /dev/null filename.

Portability problems not fixed by Gnulib:

• On Windows platforms (excluding Cygwin), this function does not set errno upon failure.
• On Windows, this function returns a file stream in “text” mode by default; this means that it translates ‘\n’ to CR/LF by default. Use the "b" flag if you need reliable binary I/O.
• On Windows platforms (excluding Cygwin), this function fails to open directories for reading. Such streams have implementation-defined semantics on other platforms. To avoid directory streams with a consistent error message, use \texttt{fstat} after \texttt{open} and \texttt{fdopen}, rather than \texttt{fopen} and \texttt{fileno}.

9.287 \texttt{fork}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/fork.html}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.
• On some platforms, \texttt{fork} followed by a call of the \texttt{exec} family (\texttt{execl}, \texttt{execlp}, \texttt{execle}, \texttt{execv}, \texttt{execvp}, or \texttt{execve}) is less efficient than \texttt{vfork} followed by the same call. \texttt{vfork} is a variant of \texttt{fork} that has been introduced to optimize the \texttt{fork/exec} pattern.
• On Windows platforms (excluding Cygwin), this function is not implemented; use \texttt{spawnvp} instead.

9.288 \texttt{fpathconf}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/fpathconf.html}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.

9.289 \texttt{fpclassify}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/fpclassify.html}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Interix 3.5, Android 9.0.

9.290 \texttt{fprintf}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/fprintf.html}

Gnulib module: fprintf-posix or stdio, nonblocking, sigpipe
Portability problems fixed by Gnu\textbullet{}lib module \texttt{fprintf-posix}:

- This function does not support size specifiers as in C99 (hh, 11, j, t, z) on some platforms: AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.24, mingw, MSVC 14, BeOS.
- \texttt{printf} of \texttt{`long double'} numbers is unsupported on some platforms: mingw, MSVC 14, BeOS.
- \texttt{printf "%lf", "%e", "%g"} of Infinity and NaN yields an incorrect result on some platforms: AIX 5.2, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14.
- This function does not support the \texttt{`a'} and \texttt{`A'} directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
- This function does not support the \texttt{`f'} directive on some platforms: NetBSD 3.0, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
- This function does not support the \texttt{`n'} directive on some platforms: MSVC 14.
- This function does not support the \texttt{`ls'} directive on some platforms: OpenBSD 4.0, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Haiku.
- This function does not support precisions in the \texttt{`ls'} directive correctly on some platforms: Solaris 11.4.
- This function does not support format directives that access arguments in an arbitrary order, such as \texttt{"%2$s"}, on some platforms: NetBSD 3.0, mingw, MSVC 14, BeOS.
- This function doesn’t support the \texttt{'} flag on some platforms: NetBSD 3.0, Cygwin 1.5.24, mingw, MSVC 14.
- This function does not round the argument of the \texttt{`a'} directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.
- This function behaves incorrectly when a \texttt{'-'} flag and a negative width are specified together, on some platforms: HP-UX 10.20.
- \texttt{printf "%.010f"} of NaN and Infinity yields an incorrect result (padded with zeroes, or wrong capitalization) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, AIX 5.2, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14.
- This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: AIX 7.1, Solaris 10/x86, mingw, MSVC 14, BeOS.
- This function mishandles large floating point precisions (for example, formatting 1.0 with \texttt{"%.511f"}) on some platforms: Solaris 10.
- This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.

Portability problems fixed by Gnu\textbullet{}lib module \texttt{stdio} or \texttt{fprintf-posix}, together with module \texttt{nonblocking}:

- When writing to a non-blocking pipe whose buffer is full, this function fails with \texttt{errno} being set to \texttt{ENOSPC} instead of \texttt{EAGAIN} on some platforms: mingw, MSVC 14.
Portability problems fixed by GnuLib module `stdio` or `fprintf-posix`, together with module `sigpipe`:

- When writing to a pipe with no readers, this function fails, instead of obeying the current `SIGPIPE` handler, on some platforms: mingw, MSVC 14.

Portability problems not fixed by GnuLib:

- The `%m` directive is not portable, use `%s` mapped to an argument of `strerror(errno)` (or a version of `strerror_r`) instead.
- Formatting noncanonical ‘long double’ numbers produces nonmeaningful results on some platforms: glibc and others, on x86, x86_64, IA-64 CPUs.
- When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.
- Attempting to write to a read-only stream fails with `EOF` but does not set the error flag for `ferror` on some platforms: glibc 2.13, cygwin 1.7.9.

### 9.291 `fputc`

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/fputc.html

GnuLib module: `stdio`, nonblocking, `sigpipe`

Portability problems fixed by GnuLib module `stdio`, together with module `nonblocking`:

- When writing to a non-blocking pipe whose buffer is full, this function fails with `errno` being set to `ENOSPC` instead of `EAGAIN` on some platforms: mingw, MSVC 14.

Portability problems fixed by GnuLib module `stdio`, together with module `sigpipe`:

- When writing to a pipe with no readers, this function fails, instead of obeying the current `SIGPIPE` handler, on some platforms: mingw, MSVC 14.

Portability problems not fixed by GnuLib:

- On Windows platforms (excluding Cygwin), this function does not set `errno` upon failure.
- On some platforms, this function does not set `errno` or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.
- This function crashes if the stream’s file descriptor has already been closed, if `MSVC_INVALID_PARAMETER_HANDLING` is `Hairy_LIBRARY_HANDLING` or `Sane_LIBRARY_HANDLING`, on some platforms: MSVC 14.

### 9.292 `fputs`

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/fputs.html

GnuLib module: `stdio`, nonblocking, `sigpipe`

Portability problems fixed by GnuLib module `stdio`, together with module `nonblocking`:

- When writing to a non-blocking pipe whose buffer is full, this function fails with `errno` being set to `ENOSPC` instead of `EAGAIN` on some platforms: mingw, MSVC 14.
Portability problems fixed by GnuLib module `stdio`, together with module `sigpipe`:
- When writing to a pipe with no readers, this function fails, instead of obeying the current SIGPIPE handler, on some platforms: mingw, MSVC 14.

Portability problems not fixed by GnuLib:
- On Windows platforms (excluding Cygwin), this function does not set `errno` upon failure.
- On some platforms, this function does not set `errno` or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

### 9.293 `fputwc`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fputwc.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x, BeOS.
- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

### 9.294 `fputws`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fputws.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x, BeOS.
- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.
- On some platforms, this function does not set `errno` or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

### 9.295 `fread`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fread.html

GnuLib module: `stdio`, `nonblocking`

Portability problems fixed by GnuLib module `stdio`, together with module `nonblocking`:
- When reading from a non-blocking pipe whose buffer is empty, this function fails with `errno` being set to `EINVAL` instead of `EAGAIN` on some platforms: mingw, MSVC 14.
Portability problems not fixed by Gnulib:

- C99 and POSIX.1-2001 and later require end-of-file to be sticky, that is, they require this function to act as if it reads end-of-file if `feof` would return nonzero. However, on some systems this function attempts to read from the underlying file descriptor even if the stream's end-of-file indicator is set. These systems include glibc and default Solaris.
- On Windows platforms (excluding Cygwin), this function does not set `errno` upon failure.
- This function crashes if the stream's file descriptor has already been closed, if `MSVC_INVALID_PARAMETER_HANDLING` is `HAIRY_LIBRARY_HANDLING` or `SANE_LIBRARY_HANDLING`, on some platforms: MSVC 14.

9.296 free

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/free.html

Gnulib module: free

Portability problems fixed by Gnulib:
- On old platforms such as SunOS4, `free(NULL)` fails. However, since all such systems are so old as to no longer be considered “reasonable portability targets,” this module is no longer useful.

Portability problems not fixed by Gnulib:

9.297 freeaddrinfo

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/freeaddrinfo.html

Gnulib module: getaddrinfo

Portability problems fixed by Gnulib:
- This function is missing on some platforms: HP-UX 11.11, IRIX 6.5, OSF/1 4.0, Solaris 7, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS.

Portability problems not fixed by Gnulib:

9.298 freelocale

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/freelocale.html

Gnulib module: —

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 9.0, NetBSD 5.0, OpenBSD 6.1, Minix 3.1.8, AIX 6.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 2.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
9.299 `freopen`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/freopen.html

Gnulib module: freopen

Portability problems fixed by Gnulib:
- On some platforms, if `stream` does not already have an open file descriptor, `freopen` returns the stream without opening the file: glibc 2.24.
- On platforms where `off_t` is a 32-bit type, `freopen` may not work correctly with files larger than 2 GB. (Cf. `AC_SYS_LARGEFILE`.)
- On Windows platforms (excluding Cygwin), this function does usually not recognize the `/dev/null` filename.

Portability problems not fixed by Gnulib:
- On Windows platforms (excluding Cygwin), this function does not set `errno` upon failure.
- This function does not support a NULL file name argument on some platforms: OpenBSD 4.9, AIX 7.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14.
- This function does not fail when the file name argument ends in a slash and (without the slash) names a nonexistent file or a file that is not a directory, on some platforms: HP-UX 11.00, Solaris 9, Irix 5.3.
- Applications should not assume that `fileno(f)` will be the same before and after a call to `freopen(name,mode,f)`. However, the module `freopen-safer` can at least protect `stdin`, `stdout`, and `stderr`.

9.300 `frexp`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/frexp.html

Gnulib module: frexp

Portability problems fixed by Gnulib:
- This function does not work on denormalized numbers on some platforms: NetBSD 3.0.
- This function does not work on negative zero on some platforms: NetBSD 4.99, MSVC 14.
- This function does not work on infinite numbers on some platforms: IRIX 6.5, mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.301 `frexpf`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/frexpf.html

Gnulib module: frexpf
Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, Solaris 9.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
- This function does not work on negative zero on some platforms: mingw.
- This function does not work on infinite numbers on some platforms: IRIX 6.5, mingw.

Portability problems not fixed by Gnulib:

### 9.302 frexpl

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/frexpl.html

Gnulib module: frexpl

Portability problems fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, Android 4.4.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
- This function is not declared on some platforms: Mac OS X 10.3.
- This function does not work on finite numbers on some platforms: Mac OS X 10.4/PowerPC, AIX 5.1, MSVC 14, BeOS.
- This function does not work on denormalized numbers on some platforms: Mac OS X 10.5/i386.
- This function does not work on infinite numbers on some platforms: IRIX 6.5, mingw, MSVC 14.

Portability problems not fixed by Gnulib:

### 9.303 fscanf

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/fscanf.html

Gnulib module: stdio, nonblocking

Portability problems fixed by Gnulib module stdio, together with module nonblocking:

- When reading from a non-blocking pipe whose buffer is empty, this function fails with \texttt{errno} being set to \texttt{EINVAL} instead of \texttt{EAGAIN} on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

- C99 and POSIX.1-2001 and later require end-of-file to be sticky, that is, they require this function to act as if it reads end-of-file if \texttt{feof} would return nonzero. However, on some systems this function attempts to read from the underlying file descriptor even if the stream’s end-of-file indicator is set. These systems include glibc and default Solaris.
- On Windows platforms (excluding Cygwin), this function does not set \texttt{errno} upon failure.
- On Windows, this function doesn’t support the \texttt{hh}, \texttt{ll}, \texttt{j}, \texttt{t}, \texttt{z} size specifiers.
9.304 fseek

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fseek.html

Gnulib module: fseek

Portability problems fixed by Gnulib:
- This function mistakenly succeeds on pipes on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
- On Windows platforms (excluding Cygwin), this function does not set errno upon failure.
- On platforms where long is a 32-bit type, fseek does not work correctly with files larger than 2 GB, even when the AC_SYS_LARGEFILE macro is used. The fix is to use fseeko instead.

9.305 fseeko

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fseeko.html

Gnulib module: fseeko

Portability problems fixed by Gnulib:
- This function is missing on some platforms: IRIX 5.3, OSF/1 4.0, Solaris 2.5.1, mingw, MSVC 14.
- The declaration of fseeko in <stdio.h> is not enabled by default on some platforms: glibc 2.3.6, OSF/1 5.1.
- This function fails on seekable stdin, stdout, and stderr: cygwin <= 1.5.24.
- On platforms where off_t is a 32-bit type, fseeko does not work correctly with files larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)

Portability problems not fixed by Gnulib:
- On platforms where off_t is a 64-bit type, but fseeko is not present, stream operations on files larger than 2 GB silently do the wrong thing. This affects BSD/OS, which is mostly obsolete.

9.306 fsetpos

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fsetpos.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.
9.307  fstat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fstat.html

Gnulib module: fstat

Portability problems fixed by Gnulib:
- This function crashes when invoked with invalid arguments on some platforms: MSVC 14.
- On platforms where off_t is a 32-bit type, fstat may not correctly report the size of files or block devices larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)
- On Solaris 11.4, when this function yields a timestamp with a nonpositive tv_sec value, tv_nsec might be in the range $-1000000000..-1$, representing a negative nanoseconds offset from tv_sec.
- The st_atime, st_ctime, st_mtime fields are affected by the current time zone and by the DST flag of the current time zone on some platforms: mingw, MSVC 14 (when the environment variable TZ is set).

Portability problems not fixed by Gnulib:
- See Section 8.63 [sys/stat.h], page 65, for general portability problems with struct stat.
- On Cygwin, fstat applied to the file descriptors 0 and 1, returns different st_ino values, even if standard input and standard output are not redirected and refer to the same terminal.

9.308  fstatat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fstatat.html

Gnulib module: fstatat

Portability problems fixed by Gnulib:
- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS. But the replacement function is not safe to be used in libraries and is not multithread-safe.
- On platforms where off_t is a 32-bit type, fstatat may not correctly report the size of files or block devices larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)
- On some platforms, fstatat(fd,"file/",buf,flag) succeeds instead of failing with ENOTDIR. Solaris 9.
- For symlinks, when the argument ends in a slash, some platforms don’t dereference the argument: Solaris 9.
- On Solaris 11.4, when this function yields a timestamp with a nonpositive tv_sec value, tv_nsec might be in the range $-1000000000..-1$, representing a negative nanoseconds offset from tv_sec.

Portability problems not fixed by Gnulib:
- See Section 8.63 [sys/stat.h], page 65, for general portability problems with struct stat.
9.309  **fstatvfs**

POSIX specification:  
http://www.opengroup.org/onlinepubs/9699919799/functions/fstatvfs.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, mingw, MSVC 14, Android 4.3.
- On platforms where `f_blocks` in `struct statvfs` is a 32-bit value, this function may not work correctly on files systems larger than 4 TiB. The fix is to use the `AC_SYS_LARGEFILE` macro. This affects glibc/Hurd, HP-UX 11, Solaris.

9.310  **fsync**

POSIX specification:  
http://www.opengroup.org/onlinepubs/9699919799/functions/fsync.html

Gnulib module: fsync

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.

- If the argument is a read-only file descriptor, this function fails with `EBADF` on some platforms: AIX 7.1.

9.311  **ftell**

POSIX specification:  
http://www.opengroup.org/onlinepubs/9699919799/functions/ftell.html

Gnulib module: ftell

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function mistakenly succeeds on pipes on some platforms: mingw, MSVC 14.

- This function produces incorrect results after `putc` that followed a `getc` call that reached EOF on some platforms: Solaris 11 2010-11.

- This function produces incorrect results immediately after `fseek` on some platforms: HP-UX 11.

- `fflush`, `ftell`, `fgetpos` behave incorrectly on input streams that are opened in `O_TEXT` mode and whose contents contains Unix line terminators (LF), on some platforms: mingw, MSVC 14.

- On platforms where `long` is a 32-bit type, `ftell` does not work correctly with files larger than 2 GB, even when the `AC_SYS_LARGEFILE` macro is used. The fix is to use `ftello` instead.
9.312 ftello

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ftello.html

Gnulib module: ftello

Portability problems fixed by Gnulib:
- This function is missing on some platforms: IRIX 5.3, OSF/1 4.0, Solaris 2.5.1, mingw, MSVC 14.
- The declaration of ftello in <stdio.h> is not enabled by default on some platforms: glibc 2.3.6, OSF/1 5.1.
- This function produces incorrect results after putc that followed a getc call that reached EOF on some platforms: Solaris 11 2010-11.
- This function fails on seekable stdin, stdout, and stderr: cygwin <= 1.5.24.
- On platforms where off_t is a 32-bit type, ftello does not work correctly with files larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)

Portability problems not fixed by Gnulib:
- This function produces incorrect results immediately after fseek on some platforms: HP-UX 11.
- fflush, ftell, ftello, fgetpos behave incorrectly on input streams that are opened in O_TEXT mode and whose contents contains Unix line terminators (LF), on some platforms: mingw, MSVC 14.
- On platforms where off_t is a 64-bit type, but fseeko is not present, stream operations on files larger than 2 GB silently do the wrong thing. This affects BSD/OS, which is mostly obsolete.

9.313 ftok

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ftok.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.314 ftruncate

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ftruncate.html

Gnulib module: ftruncate

Portability problems fixed by Gnulib:
- This function is missing on some platforms: MSVC 14.
- On platforms where off_t is a 32-bit type, this function is not applicable to arbitrary lengths for files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

Portability problems not fixed by Gnulib:
9.315 ftrylockfile

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ftrylockfile.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14.

9.316 ftw

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ftw.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.3, FreeBSD 5.2.1, NetBSD 3.0, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 4.1.

• On platforms where off_t is a 32-bit type, this function may not correctly report the size of files or block devices larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

9.317 funlockfile

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/funlockfile.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.318 futimens

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/futimens.html

Gnulib module: futimens

Portability problems fixed by Gnulib:

• This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.3. However, the replacement function may end up truncating timestamps to worse resolution than supported by the file system.

• This function returns a bogus value instead of failing with ENOSYS on some platforms: Linux kernel 2.6.21.
• When using `UTIME_OMIT` or `UTIME_NOW`, some systems require the `tv_sec` argument to be 0, and don’t necessarily handle all file permissions in the manner required by POSIX: Linux kernel 2.6.25.

• When using `UTIME_OMIT` for the modification time, but specifying an access time, some systems fail to update the change time: Linux kernel 2.6.32, Solaris 11.1.

• Passing `AT_FDCWD` as the `fd` argument does not properly fail with `EBADF` on some systems: glibc 2.11, Solaris 11.

Portability problems not fixed by Gnulib:

• Some platforms lack the ability to change the timestamps of a file descriptor, so the replacement can fail with `ENOSYS`; the gnulib module ‘utimens’ provides a more reliable interface `fdutimens`.

• The mere act of using `stat` modifies the access time of directories on some platforms, so `utimensat` can only effectively change directory modification time: Cygwin 1.5.x.

9.319 `fwide`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fwide.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, MSVC 14, Interix 3.5, BeOS.

• On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

• `fwide` is not guaranteed to be able to change a file stream’s mode to a different mode than the current one.

9.320 `fwprintf`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fwprintf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• The `%m` directive is not portable, use `%s` mapped to an argument of `strerror(errno)` (or a version of `strerror_r`) instead.

• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Interix 3.5, BeOS.

• On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

• When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.
• On some platforms, this function does not set `errno` or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

### 9.321 fwrite

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fwrite.html

Gnulib module: `stdio`, `nonblocking`, `sigpipe`

Portability problems fixed by Gnulib module `stdio`, together with module `nonblocking`:

• When writing to a non-blocking pipe whose buffer is full, this function fails with `errno` being set to `ENOSPC` instead of `EAGAIN` on some platforms: mingw, MSVC 14.

Portability problems fixed by Gnulib module `stdio`, together with module `sigpipe`:

• When writing to a pipe with no readers, this function fails, instead of obeying the current `SIGPIPE` handler, on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

• On Windows platforms (excluding Cygwin), this function does not set `errno` upon failure.

• On some platforms, this function does not set `errno` or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

• This function crashes if the stream’s file descriptor has already been closed, if `MSVC_INVALID_PARAMETER_HANDLING` is `HAIRY_LIBRARY_HANDLING` or `SANE_LIBRARY_HANDLING`, on some platforms: MSVC 14.

### 9.322 fwscanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/fwscanf.html

Gnulib module: —

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Interix 3.5, BeOS.

• On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

### 9.323 gai_strerror

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/gai_strerror.html

Gnulib module: `getaddrinfo`

Portability problems fixed by Gnulib:

• This function is missing on some platforms: HP-UX 11.11, IRIX 6.5, OSF/1 4.0, Solaris 7, Cygwin 1.5.x, Interix 3.5, BeOS.
• This function is only available in `<ws2tcpip.h>` on some platforms: mingw, MSVC 14.
• This function’s return type is `char *` instead of `const char *` on some platforms: AIX 7.1, HP-UX 11, OSF/1 5.1, Solaris 9, mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.324 getaddrinfo

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getaddrinfo.html

Gnulib module: getaddrinfo

Portability problems fixed by Gnulib:
• This function is missing on some platforms: HP-UX 11.11, IRIX 6.5, OSF/1 5.1, Solaris 7, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS.
• On Windows, this function is declared in `<ws2tcpip.h>` rather than in `<netdb.h>`.

Portability problems not fixed by Gnulib:

9.325 getc

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getc.html

Gnulib module: stdio, nonblocking

Portability problems fixed by Gnulib module stdio, together with module nonblocking:
• When reading from a non-blocking pipe whose buffer is empty, this function fails with `errno` being set to `EINVAL` instead of `EAGAIN` on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
• C99 and POSIX.1-2001 and later require end-of-file to be sticky, that is, they require this function to act as if it reads end-of-file if `feof` would return nonzero. However, on some systems this function attempts to read from the underlying file descriptor even if the stream’s end-of-file indicator is set. These systems include glibc and default Solaris.
• On Windows platforms (excluding Cygwin), this function does not set `errno` upon failure.

9.326 getc_unlocked

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getc_unlocked.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.
9.327 getchar

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/getchar.html

Gnulib module: stdio, nonblocking

Portability problems fixed by Gnulib module stdio, together with module nonblocking:
- When reading from a non-blocking pipe whose buffer is empty, this function fails with errno being set to EINVAL instead of EAGAIN on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
- C99 and POSIX.1-2001 and later require end-of-file to be sticky, that is, they require this function to act as if it reads end-of-file if feof would return nonzero. However, on some systems this function attempts to read from the underlying file descriptor even if the stream’s end-of-file indicator is set. These systems include glibc and default Solaris.
- On Windows platforms (excluding Cygwin), this function does not set errno upon failure.

9.328 getchar_unlocked

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/getchar_unlocked.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.329 getcwd

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/getcwd.html

Gnulib module: getcwd or getcwd-lgpl

Portability problems fixed by either Gnulib module getcwd or getcwd-lgpl:
- This function is declared in different header files (namely, <io.h> or <direc.h>) on some platforms: mingw, MSVC 14.
- On glibc and Solaris 11.4 platforms, getcwd (NULL, n) allocates memory for the result. On some other platforms, this call is not allowed.
- On some platforms, the prototype for getcwd uses int instead of size_t for the size argument when using non-standard headers, and the declaration is missing from <unistd.h>: mingw, MSVC 14.
- On some platforms, getcwd (buf, 0) fails with ERANGE instead of the required EINVAL: mingw, MSVC 14.

Portability problems fixed by Gnulib module getcwd:
- This function is missing on some older platforms.
• This function does not handle long file names (greater than \texttt{PATH\_MAX}) correctly on some platforms: glibc on Linux 2.4.20, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.1, OpenBSD 4.9, AIX 7.1.

Portability problems not fixed by GnuLib:
• When using \texttt{getcwd(NULL, nonzero)}, some platforms, such as glibc or cygwin, allocate exactly \texttt{nonzero} bytes and fail with \texttt{ERANGE} if it was not big enough, while other platforms, such as FreeBSD, mingw, or MSVC 14, ignore the size argument and allocate whatever size is necessary. If this call succeeds, an application cannot portably access beyond the string length of the result.

9.330 \texttt{getdate}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/getdate.html}

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
• This function is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

GnuLib provides a module \texttt{parse-datetime} that contains a function \texttt{parse\_datetime} that has similar functionality as the \texttt{getdate} function.

9.331 \texttt{getdate\_err}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/getdate\_err.html}

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
• This variable is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

9.332 \texttt{getdelim}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/getdelim.html}

GnuLib module: getdelim

Portability problems fixed by GnuLib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, Interix 3.5, Android 4.2.
• This function is missing a declaration on some platforms: BeOS.
• This function crashes when passed a pointer to a NULL buffer together with a pointer
to a non-zero buffer size on some platforms: FreeBSD 8.0.

Portability problems not fixed by Gnulib:
• This function has quadratic running time for long lines on some platforms: uClibc
  0.9.31.

9.333 getegid

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.

9.334 getenv

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getenv.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

9.335 geteuid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/geteuid.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.

9.336 getgid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getgid.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.
9.337 getgrent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getgrent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, Android 7.1.

9.338 getgrgid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getgrgid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14.

9.339 getgrgid_r

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getgrgid_r.html

Gnulib module: extensions

Portability problems fixed by Gnulib:

• This function has an incompatible declaration on some platforms: Solaris 11.3 (when
  _POSIX_PTHREAD_SEMANTICS is not defined).

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS,
  Android 6.0.

9.340 getgrnam

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getgrnam.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14.
9.341 getgrnam_r

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getgrnam_r.html

Gnulib module: extensions

Portability problems fixed by Gnulib:
• This function has an incompatible declaration on some platforms: Solaris 11.3 (when _POSIX_PTHREAD_SEMANTICS is not defined).

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 6.0.

9.342 getgroups

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getgroups.html

Gnulib module: getgroups

Portability problems fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.
• On some platforms, this function fails to reject a negative count, even though that is less than the size that would be returned: FreeBSD 7.2.
• On NeXTstep 3.2, getgroups (0, NULL) always fails. See macro ‘AC_FUNC_GETGROUPS’.
• On very old systems, this function operated on an array of ‘int’, even though that was a different size than an array of ‘gid_t’.

Portability problems not fixed by Gnulib:
• This function is unsafe to call between fork and exec if the parent process is multi-threaded.
• It is unspecified whether the effective group id will be included in the returned list, nor whether the list will be sorted in any particular order. For that matter, some platforms include the effective group id twice, if it is also a member of the current supplemental group ids.

The Gnulib module mgetgroups provides a similar API.

9.343 gethostent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/gethostent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS.
9.344 gethostid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/gethostid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.345 gethostname

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/gethostname.html

Gnulib module: gethostname

Portability problems fixed by Gnulib:
- On mingw and MSVC 14, this function has a prototype that differs from that specified by POSIX, and it is defined only in the ws2_32 library.

Portability problems not fixed by Gnulib:
- This function’s second argument type is int instead of size_t on some platforms: OSF/1 5.1, Solaris 10.
- If the given buffer is too small for the host name, some implementations fail with EINVAL, instead of returning a truncated host name.

9.346 getitimer

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getitimer.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.347 getline

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getline.html

Gnulib module: getline

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, Interix 3.5, Android 4.2.
- This function is missing a declaration on some platforms: AIX 7.1, BeOS.
• Some platforms provide a function by this name but with the wrong signature, for example in -linet.
• This function crashes when passed a pointer to a NULL buffer together with a pointer to a non-zero buffer size on some platforms: FreeBSD 8.0.

Portability problems not fixed by Gnulib:
• This function has quadratic running time for long lines on some platforms: uClibc 0.9.31.

9.348 getlogin

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getlogin.html

Gnulib module: getlogin

Portability problems fixed by Gnulib:
• This function is missing on some platforms: older mingw, MSVC 14.
• This function is not declared unless _POSIX is defined on some platforms: mingw.

Portability problems not fixed by Gnulib:
• This function returns an empty string even when standard input is a tty on some platforms: HP-UX 11.11.

9.349 getlogin_r

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getlogin_r.html

Gnulib module: getlogin_r

Portability problems fixed by Gnulib:
• This function is missing on some platforms: NetBSD 3.0, Minix 3.1.8, mingw, MSVC 14, Android 8.1.
• This function is not declared unless _REENTRANT is defined, on some platforms: HP-UX 11.
• This function returns a truncated result, instead of failing with error code ERANGE, when the buffer is not large enough, on some platforms: Mac OS X 10.12, OSF/1 5.1.

Portability problems not fixed by Gnulib:
• This function has an incompatible declaration on some platforms: Solaris 11.4 (when _POSIX_PTHREAD_SEMANTICS is not defined).
• This function fails even when standard input is a tty on some platforms: HP-UX 11.11.
• This function fails with error code EINVAL instead of ERANGE when the second argument is zero on some platforms: HP-UX 11.31.
9.350 getmsg

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getmsg.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.351 getnameinfo

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getnameinfo.html

Gnulib module: getaddrinfo

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: HP-UX 11.11, IRIX 6.5, OSF/1 4.0, Solaris 7, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS.

9.352 getnetbyaddr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getnetbyaddr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Cygwin, mingw, MSVC 14, BeOS.

9.353 getnetbyname

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getnetbyname.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Cygwin, mingw, MSVC 14, BeOS.
9.354 getnetent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getnetent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Cygwin, mingw, MSVC 14, BeOS, Android 8.1.

9.355 getopt

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getopt.html

Gnulib module: getopt-posix or getopt-gnu

The module getopt-gnu has support for “long options” and for “options that take optional arguments”. Compared to the API defined by POSIX, it adds a header file <getopt.h> and a function getopt_long.

Portability problems fixed by either Gnulib module getopt-posix or getopt-gnu:

• This function is missing on some platforms: MSVC 14.

• The value of optind after a missing required argument is wrong on some platforms: Mac OS X 10.5, AIX 7.1, mingw.

Portability problems fixed by Gnulib module getopt-gnu:

• The function getopt does not support the ‘+’ flag in the options string on some platforms: Mac OS X 10.5, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11 2010-11.

• The function getopt does not obey the combination of ‘+’ and ‘:’ flags in the options string on some platforms: glibc 2.11.

• The function getopt does not obey the ‘-’ flag in the options string when POSIXLY_CORRECT is set on some platforms: Cygwin 1.7.0.

• The function getopt does not support options with optional arguments on some platforms: Mac OS X 10.5, OpenBSD 4.0, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11 2010-11, Cygwin 1.5.x.

• The function getopt_long is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, MSVC 14, Interix 3.5.

• The function getopt_long does not support abbreviated long options where all disambiguations are equivalent on some platforms: OpenBSD 5.0.

• The function getopt_long_only is missing on some platforms: Mac OS X 10.3, FreeBSD 5.2.1, NetBSD 5.0, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, mingw, MSVC 14, Interix 3.5.

• This function crashes if the option string includes W; on some platforms: glibc 2.14.

Portability problems not fixed by Gnulib:

• The default behavior of the glibc implementation of getopt allows mixing option and non-option arguments on the command line in any order. Other implementations, such
as the one in Cygwin, enforce strict POSIX compliance: they require that the option arguments precede the non-option arguments. This is something to watch out in your program’s testsuite.

- The glibc implementation allows a complete reset of the environment, including re-checking for POSIXLY_CORRECT, by setting optind to 0. Several BSD implementations provide optreset, causing a reset by setting it non-zero, although it does not necessarily re-read POSIXLY_CORRECT. Solaris getopt does not support either reset method, but does not maintain state that needs the extra level of reset.
- On some platforms, this function does not set the stream error indicator on attempts to write to a read-only stream: glibc 2.13, Cygwin 1.7.9.

9.356 getpeername

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getpeername.html
Gnulib module: getpeername

Portability problems fixed by Gnulib:
- On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.
- On HP-UX 11, in 64-bit mode, when the macro _HPUX_ALT_XOPEN_SOCKET_API is not defined, this function behaves incorrectly because it is declared to take a pointer to a 64-bit wide socklen_t entity but in fact considers it as a pointer to a 32-bit wide unsigned int entity.

Portability problems not fixed by Gnulib:
- Some platforms don’t have a socklen_t type; in this case this function’s third argument type is ‘int *’.

9.357 getpgid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getpgid.html
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS.

9.358 getpgrp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getpgrp.html
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.
9.359 getpid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getpid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.360 getpmsg

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getpmsg.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.361 getppid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getppid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14.

9.362 getpriority

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getpriority.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, BeOS.

9.363 getprotobyname

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getprotobyname.html

Gnulib module: —
Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.364 getprotobynumber

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getprotobynumber.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.365 getprotoent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getprotoent.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 8.1.

9.366 getpwent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getpwent.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

• This function is missing on some platforms: mingw, MSVC 14, Android 7.1.

9.367 getpwnam

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getpwnam.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

• This function is missing on some platforms: mingw, MSVC 14.
### 9.368 getpwnam_r

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/getpwnam_r.html

**Gnulib module:** extensions

**Portability problems fixed by Gnulib:**
- This function has an incompatible declaration on some platforms: Solaris 11.3 (when
  `_POSIX_PTHREAD_SEMANTICS` is not defined).

**Portability problems not fixed by Gnulib:**
- This function has an incompatible declaration, with fewer than five arguments, on some
  platforms: IRIX 5.3.

### 9.369 getpwuid

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/getpwuid.html

**Gnulib module:** —

**Portability problems fixed by Gnulib:**

**Portability problems not fixed by Gnulib:**
- This function is unsafe to call between `fork` and `exec` if the parent process is multi-
  threaded. Instead, use `getpwuid_r` prior to forking.
- This function is missing on some platforms: mingw, MSVC 14.

### 9.370 getpwuid_r

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/getpwuid_r.html

**Gnulib module:** extensions

**Portability problems fixed by Gnulib:**
- This function has an incompatible declaration on some platforms: Solaris 11.3 (when
  `_POSIX_PTHREAD_SEMANTICS` is not defined).

**Portability problems not fixed by Gnulib:**
- This function is unsafe to call between `fork` and `exec` if the parent process is multi-
  threaded. Use it prior to forking.
- This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 3.0.
9.371 getrlimit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getrlimit.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS.
- On platforms where rlim_t is a 32-bit type, this function does not allow to retrieve limits larger than 4 GB, such as for RLIMITFSIZE. The fix is to use the AC_SYS_LLONG macro.

9.372 getrusage

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getrusage.html

Gnulib module: getrusage
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14.
- Many platforms don’t fill in all the fields of struct rusage with meaningful values.

9.373 gets

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/gets.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function should never be used, because it can overflow any given buffer.
- This function is missing on some platforms: Solaris 11.4.
- When reading from a non-blocking pipe whose buffer is empty, this function fails with errno being set to EINVAL instead of EAGAIN on some platforms: mingw, MSVC 14.
- On Windows platforms (excluding Cygwin), this function does not set errno upon failure.

9.374 getservbyname

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getservbyname.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.
9.375 getservbyport

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getservbyport.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.376 getservent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getservent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.377 getsid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getsid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.1.

9.378 getsockname

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getsockname.html

Gnulib module: getsockname

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.
- On HP-UX 11, in 64-bit mode, when the macro _HPUX_ALT_XOPEN_SOCKET_API is not defined, this function behaves incorrectly because it is declared to take a pointer to a 64-bit wide socklen_t entity but in fact considers it as a pointer to a 32-bit wide unsigned int entity.

Portability problems not fixed by Gnulib:
- Some platforms don’t have a socklen_t type; in this case this function’s third argument type is ‘int *’. 
9.379 getsockopt

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getsockopt.html
Gnulib module: getsockopt
Portability problems fixed by Gnulib:
- On Windows platforms (excluding Cygwin), error codes from this function are not placed in \texttt{errno}, and \texttt{WSAGetLastError} must be used instead.
- On HP-UX 11, in 64-bit mode, when the macro \_HPUX\_ALT\_XOPEN\_SOCKET\_API is not defined, this function behaves incorrectly because it is declared to take a pointer to a 64-bit wide \texttt{socklen\_t} entity but in fact considers it as a pointer to a 32-bit wide \texttt{unsigned int} entity.

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: BeOS.
- Some platforms don't have a \texttt{socklen\_t} type; in this case this function's fifth argument type is \texttt{int \*}.
- Many socket options are not available on all platforms.
- BeOS has the \texttt{setsockopt} function, but not the \texttt{getsockopt} function.

9.380 getsubopt

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getsubopt.html
Gnulib module: getsubopt
Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 7.1.
- This function is declared in \texttt{unistd.h} instead of \texttt{stdlib.h} on some platforms: Cygwin 1.7.1.

Portability problems not fixed by Gnulib:

9.381 gettimeofday

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/gettimeofday.html
Gnulib module: gettimeofday
Portability problems fixed by Gnulib:
- This function is missing on some platforms: MSVC 14.
- This function is declared with a nonstandard function prototype (only one argument, or \texttt{...} after the first argument) on some platforms.
- On some platforms, the second argument has type \texttt{struct timezone\*} rather than \texttt{void \*}, making it an error to redefine the function with the POSIX signature: glibc. However, rather than penalize these systems with a replacement function, gnulib defines \texttt{GETTIMEOFDAY\_TIMEZONE} to the appropriate type for use in avoiding a compiler warning if assigning \texttt{gettimeofday} to a function pointer.
• On some platforms, `gettimeofday` clobbers the buffer in which `localtime` returns its result: Mac OS X 10.0.
• This function has only a precision of 15.6 milliseconds on some platforms: mingw.
  Portability problems not fixed by Gnulib:
• Behavior is non-portable if the second argument to `gettimeofday` is not `NULL`.

### 9.382 getuid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getuid.html
  Gnulib module: —
  Portability problems fixed by Gnulib:
  Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.

### 9.383 getutxent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getutxent.html
  Gnulib module: —
  Portability problems fixed by Gnulib:
  Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.

### 9.384 getutxid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getutxid.html
  Gnulib module: —
  Portability problems fixed by Gnulib:
  Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.

### 9.385 getutxline

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getutxline.html
  Gnulib module: —
  Portability problems fixed by Gnulib:
  Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.
9.386 getwc

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getwc.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x, BeOS.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.387 getwchar

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/getwchar.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x, BeOS.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.388 glob

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/glob.html

Gnulib module: glob

Portability problems fixed by Gnulib:
- This function is missing on some platforms: IRIX 5.3, mingw, MSVC 14, BeOS, Android 8.1.
- This function does not list symbolic links to nonexistent files among the results, on some platforms: glibc 2.26, AIX 7.2, HP-UX 11, Solaris 11.4.
- On platforms where off_t is a 32-bit type, this function may not work correctly on huge directories larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)

Portability problems not fixed by Gnulib:
- Some platforms may store additional flags in the gl_flags field.
9.389 **globfree**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/globfree.html

Gnulib module: glob

Portability problems fixed by Gnulib:

- This function is missing on some platforms: IRIX 5.3, mingw, MSVC 14, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.390 **gmtime**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/gmtime.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.391 **gmtime_r**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/gmtime_r.html

Gnulib module: time_r

Portability problems fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.
- This function is not declared unless _REENTRANT is defined, on some platforms: HP-UX 11.
- Some platforms define a function of this name that is incompatible to POSIX: HP-UX 10.

Portability problems not fixed by Gnulib:

9.392 **grantpt**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/grantpt.html

Gnulib module: grantpt

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 4.4.

Portability problems not fixed by Gnulib:

- This function is not declared on some platforms: IRIX 5.3.
- This function reports success for invalid file descriptors on some platforms: OpenBSD, Cygwin 1.7.9, musl libc.
9.393 hcreate

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/hcreate.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 8.1.

9.394 hdestroy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/hdestroy.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 8.1.

9.395 hsearch

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/hsearch.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 8.1.

9.396 htonl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/htonl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: HP-UX 11, mingw, MSVC 14, BeOS, Android 4.4.
9.397 **htons**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/htons.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: HP-UX 11, mingw, MSVC 14, BeOS, Android 4.4.

9.398 **hypot**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/hypot.html

Gnulib module: hypot or hypot-ieee

Portability problems fixed by either Gnulib module hypot or hypot-ieee:

Portability problems fixed by Gnulib module hypot-ieee:

- When the arguments are mixed NaN and Infinity, this function returns a wrong value on some platforms: OSF/1 5.1, mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.399 **hypotf**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/hypotf.html

Gnulib module: hypotf or hypotf-ieee

Portability problems fixed by either Gnulib module hypotf or hypotf-ieee:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, Solaris 9, MSVC 14.
- This function produces wrong values on some platforms: NetBSD 5.1, OpenBSD 4.9.

Portability problems fixed by Gnulib module hypot-ieee:

- When the arguments are mixed NaN and Infinity, this function returns a wrong value on some platforms: OSF/1 5.1, mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.400 **hypotl**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/hypotl.html

Gnulib module: hypotl or hypotl-ieee

Portability problems fixed by either Gnulib module hypotl or hypotl-ieee:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• This function produces very imprecise results on some platforms: OpenBSD 5.1/SPARC.

Portability problems fixed by Gnulib module hypotl-ieee:
• When the arguments are mixed NaN and Infinity, this function returns a wrong value on some platforms: OSF/1 5.1, mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.401 iconv

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iconv.html

Gnulib module: iconv

Portability problems fixed by Gnulib:
• GNU libiconv is not found if installed in $PREFIX/lib.
• Failures are not distinguishable from successful returns on some platforms: AIX 5.1, Solaris 10.
• A buffer overrun can occur on some platforms: AIX 6.1..7.1.

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Cygwin, mingw, MSVC 14, BeOS, Android 8.1, when GNU libiconv is not installed.
• This function was not correctly implemented in glibc versions before 2.2.
• When iconv encounters an input character that is valid but that cannot be converted to the output character set, glibc's and GNU libiconv's iconv stop the conversion. Some other implementations put an implementation-defined character into the output buffer. Gnulib provides higher-level facilities striconv and striconveh (wrappers around iconv) that deal with conversion errors in a platform independent way.
• This function returns a positive return value, instead of zero, when converting from ISO-8859-1 to UTF-8 on HP-UX 11.

9.402 iconv_close

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iconv_close.html

Gnulib module: iconv

Portability problems fixed by Gnulib:
• GNU libiconv is not found if installed in $PREFIX/lib.

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Cygwin, mingw, MSVC 14, BeOS, Android 8.1, when GNU libiconv is not installed.
9.403 iconv_open

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iconv_open.html

Gnulib module: iconv, iconv_open, iconv_open-utf

Portability problems fixed by either Gnulib module iconv or iconv_open:
- GNU libiconv is not found if installed in $PREFIX/lib.
- No converter from EUC-JP to UTF-8 is provided on some platforms: HP-UX 11.

Portability problems fixed by Gnulib module iconv_open:
- This function recognizes only non-standard aliases for many encodings (not the IANA registered encoding names) on many platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11 2010-11.

Portability problems fixed by Gnulib module iconv_open-utf:
- This function does not support the encodings UTF-16BE, UTF-16LE, UTF-32BE, UTF-32LE on many platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 8.

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Cygwin, mingw, MSVC 14, BeOS, Android 8.1, when GNU libiconv is not installed.
- For some encodings A and B, this function cannot convert directly from A to B, although an indirect conversion from A through UTF-8 to B is possible. This occurs on some platforms: Solaris 11 2010-11. Gnulib provides a higher-level facility striconveh (a wrapper around iconv) that deals with this problem.
- The set of supported encodings and conversions is system dependent.

9.404 if_freenameindex

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/if.freenameindex.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, HP-UX 11.23, IRIX 6.5, OSF/1 4.0, Solaris 7, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.
- This is available only as a macro, rather than a function, on some platforms: OpenBSD 4.6, MirBSD 10.
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9.405 if_indextoname

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/if_indextoname.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11.23, IRIX 6.5, OSF/1 4.0, Solaris 7, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS.

9.406 if_nameindex

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/if_nameindex.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11.23, IRIX 6.5, OSF/1 4.0, Solaris 7, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

9.407 if_nametoindex

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/if_nametoindex.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11.23, IRIX 6.5, OSF/1 4.0, Solaris 7, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS.

9.408 ilogb

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ilogb.html

Gnulib module: ilogb

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, MSVC 9.

• This function returns a wrong result for a zero argument on some platforms: OpenBSD 4.9, AIX 5.1.

• This function returns a wrong result for an infinite argument on some platforms: NetBSD 5.1, OpenBSD 4.9.
• This function returns a wrong result for a NaN argument on some platforms: OpenBSD 4.9.

Portability problems not fixed by Gnulib:

9.409 ilogbf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/logbf.html

Gnulib module: ilogbf

Portability problems fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, MSVC 9.
• This function returns a wrong result for a zero argument on some platforms: OpenBSD 4.9.
• This function returns a wrong result for an infinite argument on some platforms: NetBSD 5.1, OpenBSD 4.9.

Portability problems not fixed by Gnulib:

9.410 ilogbl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/logbl.html

Gnulib module: ilogbl

Portability problems fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS.
• This function returns a wrong result for denormalized arguments on some platforms: Haiku 2017.

Portability problems not fixed by Gnulib:

9.411 imaxabs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/imaxabs.html

Gnulib module: imaxabs

Portability problems fixed by Gnulib:
• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, MSVC 9, Interix 3.5, BeOS, Android 4.3.

Portability problems not fixed by Gnulib:
9.412 imaxdiv

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/imaxdiv.html

Gnulib module: imaxdiv

Portability problems fixed by Gnulib:

- This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, MSVC 9, Interix 3.5, BeOS, Android 4.3.

Portability problems not fixed by Gnulib:

9.413 inet_addr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/inet_addr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.
- On some old platforms, this function returns a 'struct in_addr' rather than a scalar type such as 'unsigned int' or 'unsigned long'.

9.414 inet_ntoa

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/inet_ntoa.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.
- The inet_ntoa function need not be reentrant, and consequently is not required to be thread safe. Implementations of inet_ntoa typically write the timestamp into static buffer. If two threads call inet_ntoa at roughly the same time, you might end up with the wrong date in one of the threads, or some undefined string.

Note: inet_ntoa is specific for IPv4 addresses. A protocol independent function is inet_ntop.

9.415 inet_ntop

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/inet_ntop.html

Gnulib module: inet_ntop
Portability problems fixed by GnuLib:

- This function is missing on some platforms: HP-UX 11.00, OSF/1 4.0, Solaris 2.5.1, mingw, MSVC 14, Interix 3.5, BeOS.
- This function is declared in `<netdb.h>` instead of `<arpa/inet.h>` on some platforms: NonStop Kernel.
- This function is declared in `<ws2tcpip.h>`, with a POSIX incompatible declaration, on some platforms: MSVC 14 on Windows >= Vista.

Portability problems not fixed by GnuLib:

- This function’s fourth argument type is `size_t` instead of `socklen_t` on some platforms: OSF/1 5.1, Solaris 10.

9.416 `inet_pton`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/inet_pton.html

GnuLib module: inet_pton

Portability problems fixed by GnuLib:

- This function is missing on some platforms: HP-UX 11.00, OSF/1 4.0, Solaris 2.5.1, mingw, MSVC 14, Interix 3.5, BeOS.
- This function is declared in `<netdb.h>` instead of `<arpa/inet.h>` on some platforms: NonStop Kernel.
- This function is declared in `<ws2tcpip.h>`, with a POSIX incompatible declaration, on some platforms: MSVC 14 on Windows >= Vista.

Portability problems not fixed by GnuLib:

9.417 `initstate`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/initstate.html

GnuLib module: random

Portability problems fixed by GnuLib:

- This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, Android 4.4.
- This function is not declared on some platforms: Cygwin 1.5.25.

Portability problems not fixed by GnuLib:

9.418 `insque`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/insque.html

GnuLib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.419 ioctl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ioctl.html

Gnulib module: ioctl

Portability problems fixed by Gnulib:

- On Windows platforms (excluding Cygwin), ioctl is called ioctlsocket, and error codes from this function are not placed in errno, and WSAGetLastError must be used instead.
- The second parameter is of type unsigned long rather than int on some platforms: glibc 2.26, Mac OS X 10.5, FreeBSD 11.0, NetBSD 7.0, OpenBSD 6.0, BeOS, Haiku 2017.

Portability problems not fixed by Gnulib:

- Most ioctl requests are platform and hardware specific.

9.420 isalnum

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isalnum.html

Gnulib module: ctype

Portability problems fixed by Gnulib:

- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

Note: This function’s behaviour depends on the locale, but does not support the multibyte characters that occur in strings in locales with MB_CUR_MAX > 1 (this includes all the common UTF-8 locales). There are four alternative APIs:

c_isalnum
This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module ‘c-ctype’.

iswalnum
This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the mbtowc function. It is provided by the Gnulib module ‘wctype’.

mb_isalnum
This function operates in a locale dependent way, on multibyte characters. It is provided by the Gnulib module ‘mbchar’.

uc_is_alnum
This function operates in a locale independent way, on Unicode characters. It is provided by the Gnulib module ‘unictype/ctype-alnum’.
9.421 isalnum_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isalnum_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.422 isalpha

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isalpha.html

Gnulib module: ctype

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Note: This function’s behaviour depends on the locale, but does not support the multibyte characters that occur in strings in locales with MB_CUR_MAX > 1 (this includes all the common UTF-8 locales). There are four alternative APIs:

c_isalpha
This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module ‘c-ctype’.

iswalpha
This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the mbtowc function. It is provided by the Gnulib module ‘wctype’.

mb_isalpha
This function operates in a locale dependent way, on multibyte characters. It is provided by the Gnulib module ‘mbchar’.

uc_is_alpha
This function operates in a locale independent way, on Unicode characters. It is provided by the Gnulib module ‘unictype/ctype-alpha’.

9.423 isalpha_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isalpha_l.html

Gnulib module: —
Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

### 9.424 isascii

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/isascii.html

GnuLib module: ctype

Portability problems fixed by GnuLib:

- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by GnuLib:

Note: This function’s behaviour depends on the locale, but requires special handling for the multibyte characters that occur in strings in locales with MB_CUR_MAX > 1 (this includes all the common UTF-8 locales). There are two alternative APIs:

- **c_isascii**
  - This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the GnuLib module ‘c-ctype’.

- **mb_isascii**
  - This function operates in a locale dependent way, on multibyte characters. It is provided by the GnuLib module ‘mbchar’.

### 9.425 isastream

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/isastream.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

### 9.426 isatty

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/isatty.html

GnuLib module: isatty

Portability problems fixed by GnuLib:

- On native Windows, this function also returns true for character devices such as NUL.
• This function crashes when invoked with invalid arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.427 isblank

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isblank.html

Gnulib module: isblank

Portability problems fixed by Gnulib:
• This function is missing on some platforms: AIX 4.3.2, IRIX 6.5, OSF/1 5.1, Solaris 9, mingw, MSVC 9.
• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

Note: This function’s behaviour depends on the locale, but does not support the multibyte characters that occur in strings in locales with MB_CUR_MAX > 1 (this includes all the common UTF-8 locales). There are four alternative APIs:

c_isblank
This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module ‘c-ctype’.

iswblank
This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the mbtowc function. It is provided by the Gnulib module ‘wctype’.

mb_isblank
This function operates in a locale dependent way, on multibyte characters. It is provided by the Gnulib module ‘mbchar’.

uc_is_blank
This function operates in a locale independent way, on Unicode characters. It is provided by the Gnulib module ‘unictype/ctype-blank’.

9.428 isblank_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isblank_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
Chapter 9: ISO C and POSIX Function Substitutes

9.429 iscntrl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iscntrl.html

Gnulib module: ctype

Portability problems fixed by Gnulib:
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

Note: This function’s behaviour depends on the locale, but does not support the multibyte characters that occur in strings in locales with MB_CUR_MAX > 1 (this includes all the common UTF-8 locales). There are four alternative APIs:

c_iscntrl
This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module ‘c-ctype’.

iswcntrl
This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the mbtowc function. It is provided by the Gnulib module ‘wctype’.

mb_iscntrl
This function operates in a locale dependent way, on multibyte characters. It is provided by the Gnulib module ‘mbchar’.

uc_is_cntrl
This function operates in a locale independent way, on Unicode characters. It is provided by the Gnulib module ‘unictype/ctype-cntrl’.

9.430 iscntrl_1

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iscntrl_1.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.431 isdigit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isdigit.html

Gnulib module: ctype

Portability problems fixed by Gnulib:

- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.
Portability problems not fixed by Gnulib:

Note: This function’s behaviour depends on the locale, but does not support the multibyte characters that occur in strings in locales with \texttt{MB\_CUR\_MAX} > 1 (this includes all the common UTF-8 locales). There are four alternative APIs:

\texttt{c_isdigit}

This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module ‘c-ctype’.

\texttt{iswdigit}

This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the \texttt{mbtowc} function. It is provided by the Gnulib module ‘wctype’.

\texttt{mb_isdigit}

This function operates in a locale dependent way, on multibyte characters. It is provided by the Gnulib module ‘mbchar’.

\texttt{uc_is_digit}

This function operates in a locale independent way, on Unicode characters. It is provided by the Gnulib module ‘unictype/ctype-digit’.

\textbf{9.432 isdigit\_l}

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/isdigit\_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

\textbf{9.433 isfinite}

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/isfinite.html

Gnulib module: isfinite

Portability problems fixed by Gnulib:

- This macro is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Interix 3.5.
- This macro incorrectly yields true for some ‘\texttt{double}’ arguments, on some platforms: Linux/ia64 (signalling NaNs).

Portability problems not fixed by Gnulib:

- It is implementation-dependent whether \texttt{isfinite} raises an exception given a signaling NaN operand.
- This macro returns an unspecified result when given noncanonical values such as unnormalized numbers, pseudo-denormals, pseudo-NaNs, pseudo-Infinities, and pseudo-zeroes.
9.434 isgraph

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isgraph.html

Gnulib module: ctype

Portability problems fixed by Gnulib:
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

Note: This function’s behaviour depends on the locale, but does not support the multi-byte characters that occur in strings in locales with MB_CUR_MAX > 1 (this includes all the common UTF-8 locales). There are four alternative APIs:

- c_isgraph
  This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module ‘c-ctype’.

- iswgraph
  This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the mbrtowc function. It is provided by the Gnulib module ‘wctype’.

- mb_isgraph
  This function operates in a locale dependent way, on multibyte characters. It is provided by the Gnulib module ‘mbchar’.

- uc_is_graph
  This function operates in a locale independent way, on Unicode characters. It is provided by the Gnulib module ‘unictype/ctype-graph’.

9.435 isgraph_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isgraph_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.436 isgreater

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isgreater.html

Gnulib module: —
Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

* This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Interix 3.5, BeOS, Android 9.0.

### 9.437 `isgreaterequal`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isgreaterequal.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

* This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Interix 3.5, BeOS, Android 9.0.

### 9.438 `isinfn`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isinf.html

GnuLib module: isinf

Portability problems fixed by GnuLib:

* This macro is missing on some platforms: AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4.

Portability problems not fixed by GnuLib:

* This macro returns an unspecified result when given noncanonical values such as un-normalized numbers, pseudo-denormals, pseudo-NaNs, pseudo-Infinities, and pseudo-zeroes.

### 9.439 `isless`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isless.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

* This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Interix 3.5, BeOS, Android 9.0.
9.440 islessequal

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/islessequal.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Interix 3.5, BeOS, Android 9.0.

9.441 islessgreater

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/islessgreater.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Interix 3.5, BeOS, Android 9.0.

9.442 islower

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/islower.html

Gnulib module: c-type

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Note: This function’s behaviour depends on the locale, but does not support the multibyte characters that occur in strings in locales with $\text{MB\_CUR\_MAX} > 1$ (this includes all the common UTF-8 locales). There are four alternative APIs:

- **c_islower**
  - This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module ‘c-c-type’.

- **iswlower**
  - This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the `mbtowc` function. It is provided by the Gnulib module ‘wctype’.

- **mb_islower**
  - This function operates in a locale dependent way, on multibyte characters. It is provided by the Gnulib module ‘mbchar’.

- **uc_is_lower**
  - This function operates in a locale independent way, on Unicode characters. It is provided by the Gnulib module ‘unictype/c_type-lower’.
9.443 islower_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/islower_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.444 isnan

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isnan.html

Gnulib module: isnan

Portability problems fixed by Gnulib:
- This macro is missing on some platforms: MSVC 9.
- isnan was introduced with C99 and is thus commonly not present on pre-C99 systems.
- isnan is not a macro on some platforms: IRIX 6.5, OSF/1 5.1 with gcc, Solaris 11.4.
- This macro does not work on some platforms: MSVC 14.
- On IRIX 6.5 with cc, isnan does not recognize some NaNs.

Portability problems not fixed by Gnulib:
- This macro returns an unspecified result when given noncanonical values such as un-normalized numbers, pseudo-denormals, pseudo-NaNs, pseudo-Infinities, and pseudo-zeroes.

9.445 isnormal

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isnormal.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Interix 3.5, Android 4.4.

9.446 isprint

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isprint.html

Gnulib module: ctype

Portability problems fixed by Gnulib:
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.
Portability problems not fixed by Gnulib:

Note: This function’s behaviour depends on the locale, but does not support the multibyte characters that occur in strings in locales with MB_CUR_MAX > 1 (this includes all the common UTF-8 locales). There are four alternative APIs:

**c_isprint**

This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module ‘c-ctype’.

**iswprint**

This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the `mbtowc` function. It is provided by the Gnulib module ‘wctype’.

**mb_isprint**

This function operates in a locale dependent way, on multibyte characters. It is provided by the Gnulib module ‘mbchar’.

**uc_is_print**

This function operates in a locale independent way, on Unicode characters. It is provided by the Gnulib module ‘unictype/ctype-print’.

### 9.447 isprint_l

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/isprint_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

### 9.448 ispunct

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/ispunct.html

Gnulib module: ctype

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Note: This function’s behaviour depends on the locale, but does not support the multibyte characters that occur in strings in locales with MB_CUR_MAX > 1 (this includes all the common UTF-8 locales). There are four alternative APIs:

**c_ispunct**

This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module ‘c-ctype’.
**iswpunct**  This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the `mbtowc` function. It is provided by the Gnulib module `wctype`.

**mb_ispunct**  This function operates in a locale dependent way, on multibyte characters. It is provided by the Gnulib module `mbchar`.

**uc_is_punct**  This function operates in a locale independent way, on Unicode characters. It is provided by the Gnulib module `unictype/ctype-punct`.

### 9.449 ispunct_l

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/ispunct_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

### 9.450 isspace

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/isspace.html

Gnulib module: `ctype`

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Note: This function’s behaviour depends on the locale, but does not support the multibyte characters that occur in strings in locales with `MB_CUR_MAX > 1` (this includes all the common UTF-8 locales). There are four alternative APIs:

**c_isspace**  This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module `c-ctype`.

**iswspace**  This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the `mbtowc` function. It is provided by the Gnulib module `wctype`.

**mb_isspace**  This function operates in a locale dependent way, on multibyte characters. It is provided by the Gnulib module `mbchar`.
uc_is_space
This function operates in a locale independent way, on Unicode characters. It is provided by the Gnulib module ‘unictype/ctype-space’.

9.451 isspace_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isspace_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.452 isunordered

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isunordered.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Interix 3.5, BeOS, Android 9.0.

9.453 isupper

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isupper.html

Gnulib module: ctype

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

Note: This function’s behaviour depends on the locale, but does not support the multi-byte characters that occur in strings in locales with MB_CUR_MAX > 1 (this includes all the common UTF-8 locales). There are four alternative APIs:

c_isupper
This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module ‘c-ctype’.

iswupper
This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the mbtowc function. It is provided by the Gnulib module ‘wctype’.
mb_isupper
This function operates in a locale dependent way, on multibyte characters. It
is provided by the Gnulib module ‘mbchar’.

uc_is_upper
This function operates in a locale independent way, on Unicode characters. It
is provided by the Gnulib module ‘unictype/ctype-upper’.

9.454 isupper_l
POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isupper_l.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD
  5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3,
  Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.455 iswalnum
POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswalnum.html
Gnulib module: wctype-h
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
• This function returns 0 for all possible arguments on some platforms: Linux libc5.
• This function cannot be called from plain inline or extern inline functions on some
  platforms: OS X 10.8.
Portability problems not fixed by Gnulib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot ac-
  commodate all Unicode characters.

9.456 iswalnum_l
POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswalnum_l.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD
  5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3,
  Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot ac-
  commodate all Unicode characters.
9.457 iswalph

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswalpha.html

Gnulib module: wctype-h

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
- This function returns 0 for all possible arguments on some platforms: Linux libc5.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.458 iswalpha_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswalpha_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.459 iswblank

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswblank.html

Gnulib module: iswblank

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 4.3.2, IRIX 6.5, OSF/1 5.1, Solaris 9, mingw, MSVC 9, Android 4.4.
- This function is declared but not defined on some platforms: IRIX 6.5.30.
- This function is not declared (without -D_GNU_SOURCE) on some platforms: glibc 2.8.
- This function returns 0 for all possible arguments on some platforms: Linux libc5.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.460 iswblank_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswblank_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD
  5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3,
  Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot ac-
  commodate all Unicode characters.

9.461 iswcntrl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswcntrl.html

Gnulib module: wctype-h

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
• This function returns 0 for all possible arguments on some platforms: Linux libc5.
• This function cannot be called from plain inline or extern inline functions on some
  platforms: OS X 10.8.

Portability problems not fixed by Gnulib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot ac-
  commodate all Unicode characters.
• This function returns 0 for U+2028 (LINE SEPARATOR) and U+2029 (PARAGRAPH
  SEPARATOR) on some platforms: Mac OS X 10.13.

9.462 iswcntrl_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswcntrl_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD
  5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3,
  Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot ac-
  commodate all Unicode characters.
9.463 iswctype

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswctype.html

Gnulib module: iswctype

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
- This function is declared in <wchar.h>, not in <wctype.h>, on some platforms: HP-UX 11.00.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.464 iswctype_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswctype_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.465 iswdigit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswdigit.html

Gnulib module: wctype-h

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
- This function returns 0 for all possible arguments on some platforms: Linux libc5.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.466 iswdigit_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswdigit_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.467 iswgraph

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswgraph.html

Gnulib module: wctype-h

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
- This function returns 0 for all possible arguments on some platforms: Linux libc5.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.468 iswgraph_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswgraph_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.469 iswlower

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswlower.html

Gnulib module: wctype.h

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
- This function returns 0 for all possible arguments on some platforms: Linux libc5.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.470 iswlower_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswlower_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.471 iswprint

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswprint.html

Gnulib module: wctype.h

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
- This function returns 0 for all possible arguments on some platforms: Linux libc5.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.472 iswprint_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswprint_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.473 iswpunct

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswpunct.html

Gnulib module: wctype-h

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
- This function returns 0 for all possible arguments on some platforms: Linux libc5.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.474 iswpunct_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswpunct_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.475 iswspace

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswspace.html

Gnulib module: wctype-h

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
• This function returns 0 for all possible arguments on some platforms: Linux libc5.
• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.476 iswspace_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswspace_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.477 iswupper

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswupper.html

Gnulib module: wctype-h

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
• This function returns 0 for all possible arguments on some platforms: Linux libc5.
• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.478 iswupper_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswupper_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.479 iswxdigit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswxdigit.html

Gnulib module: wctype-h

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
- This function returns 0 for all possible arguments on some platforms: Linux libc5.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.480 iswxdigit_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/iswxdigit_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.481 isxdigit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isxdigit.html

Gnulib module: ctype

Portability problems fixed by Gnulib:
• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

Note: This function's behaviour depends on the locale, but does not support the multi-byte characters that occur in strings in locales with MB_CUR_MAX > 1 (this includes all the common UTF-8 locales). There are four alternative APIs:

c_isxdigit
This function operates in a locale independent way and returns true only for ASCII characters. It is provided by the Gnulib module ‘c-ctype’.

iswxdigit
This function operates in a locale dependent way, on wide characters. In order to use it, you first have to convert from multibyte to wide characters, using the mbrtowc function. It is provided by the Gnulib module ‘wctype’.

mb_isxdigit
This function operates in a locale dependent way, on multibyte characters. It is provided by the Gnulib module ‘mbchar’.

uc_is_xdigit
This function operates in a locale independent way, on Unicode characters. It is provided by the Gnulib module ‘unictype/ctype-xdigit’.

9.482 isxdigit_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/isxdigit_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.483 j0

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/j0.html

Gnulib module: j0
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8.

9.484 j1

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/j1.html

Gnulib module: j1

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8.

9.485 jn

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/jn.html

Gnulib module: jn

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8.

9.486 jrand48

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.487 kill

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/kill.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14.
9.488 killpg

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/killpg.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, BeOS.

9.489 l64a

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/l64a.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.

• This function was not correctly implemented in glibc versions before 2.2.5.

9.490 labs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/labs.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Android 4.3.

9.491 lchown

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lchown.html

Gnulib module: lchown

Portability problems fixed by Gnulib:

• Some platforms fail to detect trailing slash on non-directories, as in lchown("link-to-file/",uid,gid): FreeBSD 7.2, Solaris 9.

• Some platforms fail to update the change time when at least one argument was not -1, but no ownership changes resulted. However, without lchmod, the replacement only fixes this for non-symlinks: OpenBSD 4.0.

• This function is missing on some platforms; however, the replacement fails on symlinks if chown is supported, and fails altogether with ENOSYS otherwise: Mac OS X 10.3, Minix 3.1.8, mingw, MSVC 14, BeOS.

Portability problems not fixed by Gnulib:
9.492 **lcong48**

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Android 5.1.

9.493 **ldexp**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ldexp.html

Gnulib module: ldexp

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.494 **ldexpf**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ldexpf.html

Gnulib module: ldexpf

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, Solaris 9.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.495 **ldexpl**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ldexpl.html

Gnulib module: ldexpl

Portability problems fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
- This function has no prototype in `<math.h>` on some platforms: Mac OS X.
- This function does not work on finite numbers on some platforms: AIX 5.1.

Portability problems not fixed by Gnulib:
9.496 ldiv

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ldiv.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.497 lfind

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lfind.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: BeOS, Android 4.4.

9.498 lgamma

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lgamma.html

Gnulib module: lgamma

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, MSVC 9.
• This function is not declared on some platforms: IRIX 5.3.

9.499 lgammaf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lgammaf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, MSVC 9.
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9.500 lgammal

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lgammal.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.501 link

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/link.html

Gnulib module: link

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.
- This function fails to reject trailing slashes on non-directories on some platforms: FreeBSD 7.2, Solaris 11.3, Cygwin 1.5.x.
- When the second argument is a dangling symlink, some platforms follow that link and create the destination rather than failing: IRIX 6.5.

Portability problems not fixed by Gnulib:

- When the first argument is a symlink, some platforms create a hard-link to what the symlink referenced, rather than to the symlink itself. Use ‘linkat’ to force a particular behavior.

9.502 linkat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/linkat.html

Gnulib module: linkat

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X < 10.10, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4. But the replacement function is not safe to be used in libraries and is not multithread-safe.
- This function fails to directly hardlink symlinks on some platforms: Mac OS X 10.10.
- This function fails to reject trailing slashes on non-directories on some platforms: AIX 7.1, Solaris 11.3, Mac OS X 10.10.
- This functions does not support AT_SYMLINK_FOLLOW on some platforms: Linux kernel 2.6.17.

Portability problems not fixed by Gnulib:
9.503 lio_listio

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lio_listio.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, OSF/1 5.1, Solaris 2.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

• On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

9.504 listen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/listen.html

Gnulib module: listen

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.

9.505 llabs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/llabs.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11.23, OSF/1 5.1, MSVC 9, Interix 3.5, Android 4.3.

9.506 lldiv

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lldiv.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, HP-UX 11.23, OSF/1 5.1, MSVC 9, Interix 3.5.
9.507 **llrint**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/llrint.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.5.x, MSVC 9, Interix 3.5.

9.508 **llrintf**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/llrintf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.5.x, MSVC 9, Interix 3.5.

9.509 **llrintl**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/llrintl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.5.x, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.510 **llround**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/llround.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, MSVC 9, Interix 3.5.
9.511 llroundf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/llroundf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.7.7, MSVC 9, Interix 3.5.

9.512 llroundl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/llroundl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS.

9.513 localeconv

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/localeconv.html

Gnulib module: localeconv

Portability problems fixed by Gnulib:

• The struct lconv type does not contain any members on some platforms: Android up to 2014.

• The struct lconv type does not contain the members int_p_cs_precedes, int_p_sign_posn, int_p_sep_by_space, int_n_cs_precedes, int_n_sign_posn, int_n_sep_by_space on some platforms: glibc, OpenBSD 4.9, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.514 localtime

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/localtime.html

Gnulib module: localtime

Portability problems fixed by Gnulib:

• On native Windows platforms (mingw, MSVC), this function works incorrectly when the environment variable TZ has been set by Cygwin.
Portability problems not fixed by Gnulib:

- On some platforms, this function loops forever for values near extrema (such as the year \(-2 \times 2^{31}\): Mac OS X 10.6. You can use the `time_rz` module to work around the problem.
- On some platforms, this function returns nonsense values for unsupported arguments (like \(2^56\)), rather than failing: FreeBSD 10.
- Native Windows platforms (mingw, MSVC) support only a subset of time zones supported by GNU or specified by POSIX. See Section 9.1101 [tzset], page 398.

9.515 localtime_r

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/localtime_r.html

Gnulib module: time_r

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- On some platforms, this function loops forever for values near extrema (such as the year \(-2 \times 2^{31}\): Mac OS X 10.6. You can use the `time_rz` module to work around the problem.
- On some platforms, this function returns nonsense values for unsupported arguments (like \(2^56\)), rather than failing: FreeBSD 10.

9.516 lockf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lockf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin 1.5.x, mingw, MSVC 14, BeOS, Android 6.0.
- On platforms where `off_t` is a 32-bit type, this function may not work correctly across the entire data range of files larger than 2 GB. The fix is to use the `AC_SYS_LARGEFILE` macro.
9.517 log

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/log.html

Gnulib module: log or log-ieee

Portability problems fixed by either Gnulib module log or log-ieee:

- This function returns a wrong value for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems fixed by Gnulib module log-ieee:

- This function returns a wrong value for a negative argument on some platforms: NetBSD 5.1, Solaris 11.4.

Portability problems not fixed by Gnulib:

9.518 log10

POSIX specification:

Gnulib module: log10 or log10-ieee

Portability problems fixed by either Gnulib module log10 or log10-ieee:

- This function returns a wrong value for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems fixed by Gnulib module log10-ieee:

- This function returns a wrong value for a negative argument on some platforms: NetBSD 5.1, Solaris 11.4.

Portability problems not fixed by Gnulib:

9.519 log10f

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/log10f.html

Gnulib module: log10f or log10f-ieee

Portability problems fixed by either Gnulib module log10f or log10f-ieee:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
- This function returns a wrong value for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems fixed by Gnulib module log10f-ieee:

- This function returns a wrong value for a negative argument on some platforms: NetBSD 5.1.

Portability problems not fixed by Gnulib:
9.520 log10l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/log10l.html

Gnulib module: log10l

Portability problems fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, older IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
- This function is not declared and does not work on some platforms: AIX 5.1.
- This function returns a wrong value for a minus zero argument on some platforms: OSF/1 5.1.
- This function returns an unnormalized negative infinity for a minus zero argument on some platforms: IRIX 6.5.
- This function returns an unnormalized positive infinity for a positive infinite argument on some platforms: IRIX 6.5.
- This function produces results which are accurate to only 16 digits on some platforms: NetBSD 8.0.

Portability problems not fixed by Gnulib:

9.521 log1p

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/log1p.html

Gnulib module: log1p or log1p-ieee

Portability problems fixed by either Gnulib module log1p or log1p-ieee:
- This function is missing on some platforms: Minix 3.1.8, MSVC 9.

Portability problems fixed by Gnulib module log1p-ieee:
- This function has problems when the argument is minus zero on some platforms: AIX 7.1, HP-UX 11.

Portability problems not fixed by Gnulib:

9.522 log1pf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/log1pf.html

Gnulib module: log1pf or log1pf-ieee

Portability problems fixed by either Gnulib module log1pf or log1pf-ieee:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, Solaris 9, MSVC 9.
• This function returns a wrong value for the argument \(-1.0f\) on some platforms: IRIX 6.5.

Portability problems fixed by Gnulib module `log1pf-ieee`:

• This function has problems when the argument is minus zero on some platforms: OpenBSD 4.9, AIX 7.1.

Portability problems not fixed by Gnulib:

9.523 \textbf{log1pl}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/log1pl.html}

Gnulib module: `log1pl` or `log1pl-ieee`

Portability problems fixed by either Gnulib module `log1pl` or `log1pl-ieee`:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.4.

Portability problems fixed by Gnulib module `log1pl-ieee`:

• This function has problems when the argument is minus zero on some platforms: AIX 7.1, IRIX 6.5.

Portability problems not fixed by Gnulib:

9.524 \textbf{log2}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/log2.html}

Gnulib module: `log2` or `log2-ieee`

Portability problems fixed by either Gnulib module `log2` or `log2-ieee`:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, older IRIX 6.5, Solaris 9, MSVC 9, Interix 3.5, Android 4.2.

• This function is not declared on some platforms: IRIX 6.5.

• This function is only provided as a macro on some platforms: Cygwin 1.5.x.

• This function returns a wrong value for a minus zero argument on some platforms: OSF/1 5.1.

• This function returns slightly wrong values for exact powers of 2 on some platforms: Cygwin 1.7.9.

Portability problems fixed by Gnulib module `log2-ieee`:

• This function returns a wrong value for a negative argument on some platforms: NetBSD 5.1, Solaris 10/x86_64.

Portability problems not fixed by Gnulib:
9.525  log2f

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/log2f.html
Gnulib module: log2f or log2f-ieee

Portability problems fixed by either Gnulib module log2f or log2f-ieee:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, older IRIX 6.5, Solaris 9, MSVC 9, Interix 3.5, Android 4.2.
- This function is not declared on some platforms: IRIX 6.5.
- This function is only provided as a macro on some platforms: Cygwin 1.5.x.
- This function returns a wrong value for a minus zero argument on some platforms: OSF/1 5.1.
- This function returns slightly wrong values for exact powers of 2 on some platforms: Cygwin 1.7.9.

Portability problems fixed by Gnulib module log2f-ieee:
- This function returns a wrong value for a negative argument on some platforms: NetBSD 5.1, Solaris 10/x86_64.

Portability problems not fixed by Gnulib:

9.526  log2l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/log2l.html
Gnulib module: log2l

Portability problems fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.2.
- This function is not declared on some platforms: IRIX 6.5.
- This function returns a wrong value for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.527  logb

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/logb.html
Gnulib module: logb

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, MSVC 9.
- This function is missing a declaration on some platforms: Cygwin 1.5.x.
- This function produces wrong results for subnormal numbers on some platforms: glibc 2.11/ppc, glibc 2.7/sparc, glibc 2.7/hppa, Solaris 11.4, Cygwin 1.5.x.

Portability problems not fixed by Gnulib:
9.528 logbf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/logbf.html

Gnulib module: logbf

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, MSVC 9.
- This function produces wrong results for subnormal numbers on some platforms: glibc 2.11/ppc, glibc 2.7/sparc, glibc 2.7/hppa, Solaris 11.4.

Portability problems not fixed by Gnulib:

9.529 logbl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/logbl.html

Gnulib module: logbl

Portability problems fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.2.
- This function produces wrong results for subnormal numbers on some platforms: glibc 2.11/powerpc, glibc 2.7/sparc, glibc 2.7/hppa, Solaris 11.4, glibc 2.23/powerpc64le.

Portability problems not fixed by Gnulib:

9.530 logf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/logf.html

Gnulib module: logf or logf-ieee

Portability problems fixed by either Gnulib module logf or logf-ieee:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
- This function returns a wrong value for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems fixed by Gnulib module logf-ieee:
- This function returns a wrong value for a negative argument on some platforms: NetBSD 5.1.

Portability problems not fixed by Gnulib:
9.531 logl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/logl.html

Gnulib module: logl

Portability problems fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
• This function is only defined as a macro with arguments on some platforms: MSVC 14.
• This function is not declared on some platforms: Mac OS X 10.3.
• This function returns wrong results on some platforms: glibc 2.7 on Linux/SPARC64.
• This function returns a wrong value for a minus zero argument on some platforms: OSF/1 5.1.
• This function produces results which are accurate to only 16 digits on some platforms: NetBSD 8.0.

Portability problems not fixed by Gnulib:

9.532 longjmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/longjmp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• The effects of this call are system and compiler optimization dependent, since it re-
stores the contents of register-allocated variables but not the contents of stack-allocated
variables.
• When longjumping out of a signal handler that was being executed on an alternate
stack (installed through sigaltstack), on FreeBSD, NetBSD, OpenBSD, you need to
clear the SS_ONSTACK flag in the stack_t structure managed by the kernel.

9.533 lrand48

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.
9.534 lrint

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lrint.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.535 lrintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lrintf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.536 lrintl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lrintl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin 1.5.x, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.537 lround

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lround.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.
9.538 lroundf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lroundf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.539 lroundl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lroundl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS.

9.540 lsearch

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lsearch.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: BeOS, Android 4.4.

9.541 lseek

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lseek.html

Gnulib module: lseek

Portability problems fixed by Gnulib:

• On platforms where off_t is a 32-bit type, lseek does not work correctly with files larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)

• This function mistakenly succeeds on pipes on some platforms: mingw, MSVC 14, BeOS.

Portability problems not fixed by Gnulib:

• POSIX does not specify which file descriptors support seeking and which don’t. In practice, regular files and block devices support seeking, and ttys, pipes, and most character devices don’t support it.
• When the third argument is invalid, POSIX says that `lseek` should set `errno` to `EINVAL` and return −1, but in this situation a `SIGSYS` signal is raised on some platforms: IRIX 6.5.
• When the `lseek` function fails, POSIX says that the file offset remains unchanged. But on some platforms, attempting to set a negative file offset fails and sets the file offset to 0: BeOS.

9.542 `lstat`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/lstat.html

Gnulib module: `lstat`

Portability problems fixed by Gnulib:
• On platforms where `off_t` is a 32-bit type, `lstat` may not correctly report the size of files or block devices larger than 2 GB. (Cf. `AC_SYS_LARGEFILE`.)
• For symlinks, when the argument ends in a slash, some platforms don’t dereference the argument: Solaris 9.
• On some platforms, `lstat("file/",buf)` succeeds instead of failing with `ENOTDIR`. Solaris 9.
• On Solaris 11.4, when this function yields a timestamp with a nonpositive `tv_sec` value, `tv_nsec` might be in the range \(-1000000000..−1\), representing a negative nanoseconds offset from `tv_sec`.
• On Windows platforms (excluding Cygwin), symlinks are not supported, so `lstat` does not exist.

Portability problems not fixed by Gnulib:
• See Section 8.63 [sys/stat.h], page 65, for general portability problems with `struct stat`.

9.543 `malloc`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/malloc.html

Gnulib module: `malloc-posix`

Portability problems fixed by Gnulib:
• Upon failure, the function does not set `errno` to `ENOMEM` on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
• `malloc (0)` always returns a NULL pointer on some platforms: AIX 5.1, OSF/1 5.1.

Extension: Gnulib provides a module `malloc-gnu` that substitutes a `malloc` implementation that behaves more like the glibc implementation, regarding the result of `malloc (0)`. 
9.544 mblen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mblen.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Android 7.1.

9.545 mbrlen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mbrlen.html

Gnulib module: mbrlen

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, mingw, Interix 3.5.
- In the C or POSIX locales, this function can return (size_t) -1 and set errno to EILSEQ: glibc 2.23.
- This function returns 0 instead of (size_t) -2 when the input is empty: glibc 2.19.
- This function returns (size_t) -1 instead of (size_t) -2 when the input is empty: AIX 5.1.
- This function does not put the state into non-initial state when parsing an incomplete multibyte character on some platforms: AIX 5.1, OSF/1 5.1.
- This function returns the total number of bytes that make up the multibyte character, not the number of bytes that were needed to complete the multibyte character, on some platforms: HP-UX 11.11, Solaris 11 2010-11.
- This function may not return 0 when parsing the NUL character on some platforms: Solaris 9.

Portability problems not fixed by Gnulib:

9.546 mbtoc16

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on most non-glibc platforms: glibc 2.15, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.
9.547 mbtocc32

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on most non-glibc platforms: glibc 2.15, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.548 mbtowc

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mbtowc.html

Gnulib module: mbtowc

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, mingw, Interix 3.5.
- In the C or POSIX locales, this function can return (size_t) -1 and set errno to EILSEQ: glibc 2.23.
- This function returns 0 instead of (size_t) -2 when the input is empty: glibc 2.19.
- This function returns (size_t) -1 instead of (size_t) -2 when the input is empty: AIX 5.1.
- This function does not put the state into non-initial state when parsing an incomplete multibyte character on some platforms: AIX 5.1, OSF/1 5.1.
- This function does not produce correct results in the zh_CN.GB18030 locale on some platforms: Solaris 8.
- This function fails if the pwc argument is NULL on some platforms: Solaris 7.
- This function does not ignore the pwc argument if the string argument is NULL on some platforms: OSF/1 5.1.
- This function returns the total number of bytes that make up the multibyte character, not the number of bytes that were needed to complete the multibyte character, on some platforms: HP-UX 11.11, Solaris 11 2010-11, mingw, possibly MSVC 14.
- This function may not return 0 when parsing the NUL character on some platforms: Solaris 9.

Portability problems not fixed by Gnulib:

- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.549 mbsinit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mbsinit.html

Gnulib module: mbsinit
Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, MSVC 14, Interix 3.5.
- This function always returns 1, even in multibyte locales, on some platforms: mingw.

Portability problems not fixed by Gnulib:

9.550 mbsnrtowcs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mbsnrtowcs.html

Gnulib module: mbsnrtowcs

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.3, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- This function produces invalid wide characters on some platforms: Solaris 11.4.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
- The specification is not clear about whether this function should update the conversion state when the first argument (the destination pointer) is NULL. The glibc, Mac OS X, FreeBSD implementations do update the state in this case. For portability, when passing a NULL destination argument, it is best to pass a pointer to a temporary copy of the conversion state.

9.551 mbsrtowcs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mbsrtowcs.html

Gnulib module: mbsrtowcs

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, mingw, Interix 3.5.
- This function does not work on some platforms: HP-UX 11, Solaris 11 2010-11.
- This function does not work when the first argument is NULL on some platforms: mingw.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
- The specification is not clear about whether this function should update the conversion state when the first argument (the destination pointer) is NULL. The glibc implementation does not update the state in this case; the Mac OS X and FreeBSD implementations do. For portability, when passing a NULL destination argument, it is best to pass a pointer to a temporary copy of the conversion state.
9.552 mbstowcs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mbstowcs.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.553 mbtowc

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mbtowc.html
Gnulib module: mbtowc
Portability problems fixed by Gnulib:
• This function is missing on some platforms: Android 4.4.
Portability problems not fixed by Gnulib:
• This function accumulates hidden state on some platforms: glibc 2.8 (see https://sourceware.org/bugzilla/show_bug.cgi?id=9674).
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.554 memccpy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/memccpy.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: BeOS.

9.555 memchr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/memchr.html
Gnulib module: memchr or memchr-obsolete
Portability problems fixed by either Gnulib module memchr or memchr-obsolete:
• This function dereferences too much memory on some platforms: glibc 2.10 on x86_64, IA-64; glibc 2.11 on Alpha.
• This function returns NULL if the character argument is not in the range of an unsigned char on some platforms: Android 5.0.
Portability problems fixed by Gnulib module memchr-obsolete:
• This function is missing on some older platforms.
Portability problems not fixed by Gnulib:

9.556 memcmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/memcmp.html

Gnulib module: memcmp

Portability problems fixed by Gnulib:
- This function is missing on some older platforms.
- This function does not work on 8-bit data on some older platforms: SunOS 4.1.3.
- This function fails when comparing 16 bytes or more and with at least one buffer not starting on a 4-byte boundary on some older platforms: NeXTstep/x86.

Portability problems not fixed by Gnulib:
- This function produces wrong results when the arguments are constant strings and the compiler is clang 6.0.1.

9.557 memcpy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/memcpy.html

Gnulib module: memcpy

Portability problems fixed by Gnulib:
- This function is missing on some older platforms.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

9.558 memmove

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/memmove.html

Gnulib module: memmove

Portability problems fixed by Gnulib:
- This function is missing on some older platforms.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:
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9.559 memset

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/memset.html

Gnulib module: memset

Portability problems fixed by Gnulib:
- This function is missing on some older platforms.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

9.560 mkdir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mkdir.html

Gnulib module: mkdir

Portability problems fixed by Gnulib:
- This function is declared in different header files (namely, <io.h> or <direct.h>) on some platforms: mingw, MSVC 14.
- When the argument ends in a slash, the function call fails on some platforms.
- This function mistakenly succeeds on `mkdir("d/./",mode)` on some platforms: Cygwin 1.5.x, mingw, MSVC 14.
- On Windows platforms (excluding Cygwin), this function is called _mkdir and takes only one argument. The fix (without Gnulib) is to define a macro like this:
  
  ```
  #define mkdir ((int (*)(())) _mkdir)
  
  or
  
  #define mkdir(path,mode) _mkdir (path)
  ```

Portability problems not fixed by Gnulib:

9.561 mkdirat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mkdirat.html

Gnulib module: mkdirat

Portability problems fixed by Gnulib:
- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS. But the replacement function is not safe to be used in libraries and is not multithread-safe.

Portability problems not fixed by Gnulib:
9.562 mkdtemp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mkdtemp.html

Gnulib module: mkdtemp

Portability problems fixed by Gnulib:
• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, Interix 3.5, BeOS.

Portability problems not fixed by Gnulib:

9.563 mkfifo

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mkfifo.html

Gnulib module: mkfifo

Portability problems fixed by Gnulib:
• This function mishandles trailing slash on some platforms: FreeBSD 7.2, Solaris 9.
• This function is missing on some platforms; however, the replacement always fails with ENOSYS: mingw, MSVC 14, Android 4.4.

Portability problems not fixed by Gnulib:
• If the argument exists and is a directory, this function fails with EISDIR instead of the correct EEXIST: HP-UX 11.11.

9.564 mkfifoat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mkfifoat.html

Gnulib module: mkfifoat

Portability problems fixed by Gnulib:
• This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1. But the replacement function is not safe to be used in libraries and is not multithread-safe.

Portability problems not fixed by Gnulib:
• The gnulib replacement function always fails with ‘ENOSYS’ on some platforms: mingw, MSVC 14.
• If the argument exists and is a directory, the gnulib replacement function fails with EISDIR instead of the correct EEXIST: HP-UX 11.11.
9.565 mknod

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mknod.html

Gnulib module: mknod

Portability problems fixed by Gnulib:

- This function requires super-user privileges to create a fifo: FreeBSD 7.2, OpenBSD 3.8.
- This function mishandles trailing slash on some platforms: FreeBSD 7.2, Solaris 9.
- This function is missing on some platforms; however, the replacement always fails with ENOSYS: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

- Use of this function for anything except fifos is not portable, generally requiring super-user privileges and knowledge of supported device numbers.
- If the argument exists and is a directory, this function fails with EISDIR instead of the correct EEXIST: HP-UX 11.11.

9.566 mknodat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mknodat.html

Gnulib module: mkfifoat

Portability problems fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4. But the replacement function is not safe to be used in libraries and is not multithread-safe.

Portability problems not fixed by Gnulib:

- The gnulib replacement function always fails with ‘ENOSYS’ on some platforms: mingw, MSVC 14.
- If the argument exists and is a directory, the gnulib replacement function fails with EISDIR instead of the correct EEXIST: HP-UX 11.11.

9.567 mkstemp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mkstemp.html

Gnulib module: mkstemp

Portability problems fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.
- This function is declared in <unistd.h> instead of <stdlib.h> on some platforms: Mac OS X 10.3.
• On some platforms (HP-UX 10.20, SunOS 4.1.4, Solaris 2.5.1), mkstemp has a silly limit that it can create no more than 26 files from a given template. On OSF/1 4.0f, it can create only 32 files per process.
• On platforms where off_t is a 32-bit type, mkstemp may not work correctly to create files larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)
• On some older platforms, mkstemp can create a world or group writable or readable file, if you haven’t set the process umask to 077. This is a security risk.

Portability problems not fixed by GnuLib:

The gnuLib module clean-temp can create temporary files that will not be left behind after signals such as SIGINT.

9.568 mktime

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mktime.html

GnuLib module: mktime

Portability problems fixed by GnuLib:
• On native Windows platforms (mingw, MSVC), this function works incorrectly when the environment variable TZ has been set by Cygwin.
• mktime may go into an endless loop on some platforms.
• mktime may occasionally return wrong results on some platforms.

Portability problems not fixed by GnuLib:
• Native Windows platforms (mingw, MSVC) support only a subset of time zones supported by GNU or specified by POSIX. See Section 9.1101 [tzset], page 398.

9.569 mlock

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mlock.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
• This function is missing on some platforms: Minix 3.1.8, OSF/1 4.0, mingw, MSVC 14, Interix 3.5, BeOS.

9.570 mlockall

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mlockall.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
• This function is missing on some platforms: Minix 3.1.8, OSF/1 4.0, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.1.
9.571 mmap

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mmap.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS.
- On platforms where off_t is a 32-bit type, this function may not work correctly across the entire data range of files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.
- To get anonymous memory, on some platforms, you can use the flags MAP_ANONYMOUS | MAP_PRIVATE and -1 instead of a file descriptor; on others you have to use a read-only file descriptor of /dev/zero.
- On HP-UX, passing a non-NULL first argument, as a hint for the address (even without MAP_FIXED, often causes mmap to fail. Better pass NULL in this case.
- On HP-UX, MAP_FIXED basically never works. On other platforms, it depends on the circumstances whether memory can be returned at a given address.

9.572 modf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/modf.html

Gnulib module: modf or modf-ieee

Portability problems fixed by either Gnulib module modf or modf-ieee:

Portability problems fixed by Gnulib module modf-ieee:
- This function has problems with a NaN argument on some platforms: NetBSD 5.1, Cygwin.
- This function has problems with infinite arguments on some platforms: FreeBSD 6.4, OpenBSD 4.9, IRIX 6.5, OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.573 modff

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/modff.html

Gnulib module: modff or modff-ieee

Portability problems fixed by either Gnulib module modff or modff-ieee:

Portability problems fixed by Gnulib module modff-ieee:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11.
- This function is only defined as a buggy macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib module modff-ieee:
- This function has problems with a NaN argument on some platforms: NetBSD 5.1, OpenBSD 4.9, Solaris 9, Cygwin.
• This function has problems with infinite arguments on some platforms: IRIX 6.5, OSF/1 5.1, mingw.

Portability problems not fixed by Gnulib:

9.574 modfl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/modfl.html

Gnulib module: modfl or modfl-ieee

Portability problems fixed by either Gnulib module modfl or modfl-ieee:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, Android 4.4.
• This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems fixed by Gnulib module modfl-ieee:
• This function has problems with infinite arguments on some platforms: IRIX 6.5, OSF/1 5.1, mingw.

Portability problems not fixed by Gnulib:

9.575 mprotect

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mprotect.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS.
• This function does not set \texttt{errno} on some platforms: mingw.
• On AIX, it is not possible to use \texttt{mprotect} on memory regions allocated with \texttt{malloc}.

9.576 mq_close

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mq_close.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.577 mq_getattr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mq_getattr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.578 mq_notify

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mq_notify.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.579 mq_open

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mq_open.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.580 mq_receive

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mq_receive.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.581 mq_send

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mq_send.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.582 mq_setattr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mq_setattr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.583 mq_timedreceive

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mq_timedreceive.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.584 mq_timedsend

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mq_timedsend.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.585 mq_unlink

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/mq_unlink.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.586 mrand48

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.587 msgctl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/msgctl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 7.1.

9.588 msgget

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/msgget.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 7.1.
9.589 **msgrcv**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/msgrcv.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 7.1.

9.590 **msgsnd**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/msgsnd.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 7.1.

9.591 **msync**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/msync.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS.

• On NetBSD, msync takes only two arguments.

9.592 **munlock**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/munlock.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, OSF/1 4.0, mingw, MSVC 14, Interix 3.5, BeOS.
9.593 munlockall

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/munlockall.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, OSF/1 4.0, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.1.

9.594 munmap

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/munmap.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.595 nan

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nan.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.596 nanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nanf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.
9.597 **nanl**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nanl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 3.1.

9.598 **nanosleep**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nanosleep.html

Gnulib module: nanosleep

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS.
- This function reports failure when called with small arguments such as 1 ns on some platforms: AIX 4.3.2.
- This function mishandles large arguments when interrupted by a signal on some platforms: Linux 64-bit, Solaris 64-bit.
- This function cannot sleep longer than 49.7 days on some platforms: Cygwin 1.5.x.

Portability problems not fixed by Gnulib:

9.599 **nearbyint**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nearbyint.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.600 **nearbyintf**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nearbyintf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.601 nearbyintl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nearbyintl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.602 newlocale

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/newlocale.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 9.0, NetBSD 5.0, OpenBSD 6.1, Minix 3.1.8, AIX 6.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 2.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• This function is useless because the locale_t type contains basically no information on some platforms: OpenBSD 6.3.

9.603 nextafter

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nextafter.html

Gnulib module: nextafter

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, MSVC 9.
• This function is not declared on some platforms: IRIX 5.3.

9.604 nextafterf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nextafterf.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, IRIX 6.5, Solaris 9, MSVC 9.

9.605 nextafterl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nextafterl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.606 nexttoward

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nexttoward.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.2.

9.607 nexttowardf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nexttowardf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS.
9.608 nexttowardl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nexttowardl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.2.

9.609 nftw

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nftw.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.3, FreeBSD 5.2.1, NetBSD 3.0, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 4.1.
- On platforms where off_t is a 32-bit type, this function may not correctly report the size of files or block devices larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

9.610 nice

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nice.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14, BeOS.
- In glibc before glibc 2.2.4, nice returned 0 upon success.

9.611 nl_langinfo

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nl_langinfo.html

Gnulib module: nl_langinfo

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 7.1.
- The constant CODESET is not supported on some platforms: glibc 2.0.6, OpenBSD 3.8.
• The constants ALTMON_1 to ALTMON_12 are not defined on some platforms: glibc 2.26 and many others.
• The constants ERA, ERA_D_FMT, ERA_D_T_FMT, ERA_T_FMT, ALT_DIGITS are not supported on some platforms: OpenBSD 3.8.
• The constants T_FMT_AMPM, YESEXPR, NOEXPR are not supported on some platforms: IRIX 5.3.
• The constants YESEXPR and NOEXPR do not return a valid string on some platforms: Irix 6.5.

Portability problems not fixed by Gnulib:
• On Cygwin 1.5.x, which doesn’t have locales, nl_langinfo(CODESET) always returns "US-ASCII".
• On Cygwin 1.7.0, only the charset portion of a locale designation is honored.
• On NetBSD 5.0, in some locales, nl_langinfo(CRNCYSTR) returns the empty string, although the local currency symbol, as returned by localeconv()->currency_symbol, is non-empty.
• On NetBSD 5.1, in the "C" locale, the results of nl_langinfo(ABMON_1) ... nl_langinfo(ABMON_12) are full month names, not abbreviated month names.

9.612 nl_langinfo_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/nl_langinfo_l.html
Gnulib module: —

Portability problems not fixed by Gnulib:

Portability problems fixed by Gnulib:

• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.

9.613 nrnd48

POSIX specification:
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.614 ntohl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ntohl.html
Gnulib module: —
Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

• This function is missing on some platforms: HP-UX 11, mingw, MSVC 14, BeOS, Android 4.4.

9.615 ntohs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ntohs.html

GnuLib module: —

Portability problems not fixed by GnuLib:

• This function is missing on some platforms: HP-UX 11, mingw, MSVC 14, BeOS, Android 4.4.

9.616 open

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/open.html

GnuLib module: open, fchdir

Portability problems fixed by the GnuLib module open:

• Some platforms do not support _O_CLOEXEC: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5.

• On platforms where off_t is a 32-bit type, open may not work correctly with files larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)

• This function does not fail when the file name argument ends in a slash and (without the slash) names a nonexistent file or a file that is not a directory, on some platforms: FreeBSD 7.2, AIX 7.1, HP-UX 11.00, Solaris 9, Irix 5.3.

• This function does not support the _O_NONBLOCK flag when it is defined by the gnuLib module nonblocking on some platforms: mingw, MSVC 14.

• On Windows platforms (excluding Cygwin), this function does usually not recognize the /dev/null filename.

Portability problems fixed by the GnuLib module fchdir:

• On Windows platforms (excluding Cygwin), this function fails to open a read-only descriptor for directories.

Portability problems not fixed by GnuLib:

• The GnuLib replacement for _O_CLOEXEC is not atomic, and so is not safe in the presence of multiple threads or signal handlers.

• open ("symlink", _O_NOFOLLOW ...) fails with errno set to EMLINK instead of the POSIX-required ELOOP on some platforms: FreeBSD 10.1.

• open ("symlink", _O_NOFOLLOW ...) fails with errno set to EFTYPE instead of the POSIX-required ELOOP on some platforms: NetBSD 6.1.
• On Windows, this function returns a file handle in 0_TEXT mode by default; this means that it translates ‘\n’ to CR/LF by default. Use the 0_BINARY flag if you need reliable binary I/O.

9.617 openat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/openat.html

Gnulib module: openat

Portability problems fixed by Gnulib:
• This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS. But the replacement function is not safe to be used in libraries and is not multithread-safe.
• Some platforms do not support 0_CLOEXEC: AIX 7.1, Solaris 10.
• On platforms where off_t is a 32-bit type, open may not work correctly with files larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)
• This function does not fail when the file name argument ends in a slash and (without the slash) names a nonexistent file or a file that is not a directory, on some platforms: Solaris 9.

Portability problems not fixed by Gnulib:
• The Gnulib replacement for 0_CLOEXEC is not atomic, and so is not safe in the presence of multiple threads or signal handlers.
• openat (fd, "symlink", 0_NOFOLLOW ...) fails with errno set to EMLINK instead of the POSIX-required ELOOP on some platforms: FreeBSD 10.1.
• openat (fd, "symlink", 0_NOFOLLOW ...) fails with errno set to EFTYPE instead of the POSIX-required ELOOP on some platforms: NetBSD 6.1.

9.618 opendir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/opendir.html

Gnulib module: opendir

Portability problems fixed by Gnulib:
• This function is missing on some platforms: MSVC 14.
• On platforms where off_t is a 32-bit type, this function may not work correctly on huge directories larger than 2 GB. Also, on platforms where ino_t is a 32-bit type, this function may report inode numbers incorrectly. (Cf. AC_SYS_LARGEFILE.)

Portability problems not fixed by Gnulib:
9.619 openlog

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/openlog.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.620 open_memstream

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/open_memstream.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

9.621 open_wmemstream

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/open_wmemstream.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.622 optarg

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/optarg.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This variable is missing on some platforms: Mac OS X 10.5, IRIX 6.5, OSF/1 5.1, MSVC 14.
9.623 *opterr*

POSIX specification:  
http://www.opengroup.org/onlinepubs/9699919799/functions/opterr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This variable is missing on some platforms: IRIX 6.5, OSF/1 5.1, MSVC 14.

9.624 *optind*

POSIX specification:  
http://www.opengroup.org/onlinepubs/9699919799/functions/optind.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This variable is missing on some platforms: IRIX 6.5, OSF/1 5.1, MSVC 14.

9.625 *optopt*

POSIX specification:  
http://www.opengroup.org/onlinepubs/9699919799/functions/optopt.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This variable is missing on some platforms: Mac OS X 10.5, IRIX 6.5, OSF/1 5.1, MSVC 14.

9.626 *pathconf*

POSIX specification:  
http://www.opengroup.org/onlinepubs/9699919799/functions/pathconf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.

9.627 *pause*

POSIX specification:  
http://www.opengroup.org/onlinepubs/9699919799/functions/pause.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.
9.628 pclose

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pclose.html

Gnulib module: pclose

Portability problems fixed by Gnulib:
- This function is missing on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.629 perror

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/perror.html

Gnulib module: perror

Portability problems fixed by Gnulib:
- This function does not support the error values that are specified by POSIX but not defined by the system, on some platforms: OpenBSD 4.0, OSF/1 5.1, Cygwin 1.5.x, mingw, MSVC 14.
- This function treats \texttt{errno} of 0 like failure, although POSIX requires that the message declare it as a success, on some platforms: FreeBSD 8.2, OpenBSD 4.7, Mac OS X 10.5.
- This function clobbers the \texttt{strerror} buffer on some platforms: Cygwin 1.7.9.
- This function fails to print a useful a string for out-of-range integers on some platforms: HP-UX 11, IRIX 6.5, Solaris 8.

Portability problems not fixed by Gnulib:
- POSIX requires that this function set the stream error bit (detected by \texttt{ferror}) on write failure, but not all platforms do this: glibc 2.13, cygwin 1.7.9.
- POSIX requires that this function not alter stream orientation, but the gnulib replacement locks in byte orientation and fails on wide character streams.

9.630 pipe

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pipe.html

Gnulib module: pipe-posix

Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
- This function crashes rather than failing with \texttt{EMFILE} if no resources are left on some platforms: Cygwin 1.7.9.
9.631 poll

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/poll.html

Gnulib module: poll

Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS, HP NonStop.
- This function doesn’t work on special files like /dev/null and ttys like /dev/tty on some platforms: Mac OS X 10.4.0, AIX 5.3.

Portability problems not fixed by Gnulib:
- Under BeOS, Gnulib’s poll replacement can only be called on descriptors created by the socket function, not on regular file descriptors.
- Under Windows, when passing a pipe, Gnulib’s poll replacement might return 0 even before the timeout has passed. Programs using it with pipes can thus busy wait.
- Under HP NonStop, file descriptors other than sockets do not support POLLHUP; they will return a "readable" status instead.

9.632 popen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/popen.html

Gnulib module: popen

Portability problems fixed by Gnulib:
- This function is missing on some platforms: MSVC 14.
- Some platforms start the child with closed stdin or stdout if the standard descriptors were closed in the parent: Cygwin 1.5.x.

Portability problems not fixed by Gnulib:
- On native Windows platforms, this functions terminates the current process with exit code 127 if the environment variable COMSPEC is not set.
- Some platforms mistakenly set the close-on-exec bit, then if it is cleared by the application, the platform then leaks file descriptors from earlier popen calls into subsequent popen children: Cygwin 1.5.x.

9.633 posix_fadvise

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_fadvise.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• On platforms where `off_t` is a 32-bit type, this function may not work correctly across the entire data range of files larger than 2 GB. The fix is to use the `AC_SYS_LARGEFILE` macro.

9.634 `posix_fallocate`

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_fallocate.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

• POSIX specifies that EINVAL should be returned when the file system doesn’t support the allocation operation directly. glibc however emulates the file system allocation with writes where unsupported, and apps have depended on that long term implementation. This is both inefficient, and as of glibc 2.21 at least, buggy on certain NFS setups.

• On platforms where `off_t` is a 32-bit type, this function may not work correctly across the entire data range of files larger than 2 GB. The fix is to use the `AC_SYS_LARGEFILE` macro.

9.635 `posix_madvise`

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_madvise.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

9.636 `posix_mem_offset`

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_mem_offset.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.637 posix_memalign

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_memalign.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.1.

The Gnulib module pagealign_alloc provides a similar API that returns memory aligned on a system page boundary.

9.638 posix_openpt

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_openpt.html

Gnulib module: posix_openpt

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4. However, the replacement may fail with ENOSYS or ENOENT on some platforms.

Note that when using this function to open the master side of a pseudo-terminal, you still need platform dependent code to open the corresponding slave side. The Gnulib module openpty provides an easy-to-use API that does both at once.

9.639 posix_spawn

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_spawn.html

Gnulib module: posix_spawn

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

- When this function fails, it causes the stdin buffer contents to be output twice on some platforms: AIX 6.1.

Portability problems not fixed by Gnulib:
- This function does not work on some platforms: AIX 6.1 (under particular circumstances), mingw.
The Gnulib module `posix_spawn_file_actions_addchdir` provides an additional action, that consists in changing the current directory of the child process before starting the specified program.

### 9.640 posix_spawn_file_actions_addclose

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/posix_spawn_file_actions_addclose.html

Gnulib module: posix_spawn_file_actions_addclose

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.
- This function does not reject a too large file descriptor on some platforms: Solaris 11.4.

Portability problems not fixed by Gnulib:

### 9.641 posix_spawn_file_actions_adddup2

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/posix_spawn_file_actions_adddup2.html

Gnulib module: posix_spawn_file_actions_adddup2

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.
- This function does not reject a too large file descriptor on some platforms: Solaris 11.4.

Portability problems not fixed by Gnulib:

### 9.642 posix_spawn_file_actions_addopen

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/posix_spawn_file_actions_addopen.html

Gnulib module: posix_spawn_file_actions_addopen

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.
- This function does not reject a too large file descriptor on some platforms: Solaris 11.4.

Portability problems not fixed by Gnulib:
9.643 posix_spawn_file_actions_destroy

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_spawn_file_actions_destroy.html

Gnulib module: posix.spawn_file_actions.destroy

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.644 posix_spawn_file_actions_init

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_spawn_file_actions_init.html

Gnulib module: posix.spawn_file_actions.init

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.645 posix_spawnattr_destroy

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_spawnattr_destroy.html

Gnulib module: posix.spawnattr.destroy

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.646 posix_spawnattr_getflags

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_spawnattr_getflags.html

Gnulib module: posix.spawnattr.getflags

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.
Portability problems not fixed by Gnulib:

9.647  \texttt{posix_spawnattr_getpgroup}

POSIX specification:
http://www.opengroup.org/onlinespecs/9699919799/functions/posix_spawnattr_getpgroup.html

Gnulib module: posix_spawnattr_getpgroup

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.648  \texttt{posix_spawnattr_getschedparam}

POSIX specification:
http://www.opengroup.org/onlinespecs/9699919799/functions/posix_spawnattr_getschedparam.html

Gnulib module: posix_spawnattr_getschedparam

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.649  \texttt{posix_spawnattr_getschedpolicy}

POSIX specification:
http://www.opengroup.org/onlinespecs/9699919799/functions/posix_spawnattr_getschedpolicy.html

Gnulib module: posix_spawnattr_getschedpolicy

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.650  \texttt{posix_spawnattr_getsigdefault}

POSIX specification:
http://www.opengroup.org/onlinespecs/9699919799/functions/posix_spawnattr_getsigdefault.html

Gnulib module: posix_spawnattr_getsigdefault
Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.651 posix_spawnattr_getsigmask

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_spawnattr_getsigmask.html

Gnulib module: posix_spawnattr_getsigmask

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.652 posix_spawnattr_init

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_spawnattr_init.html

Gnulib module: posix_spawnattr_init

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.653 posix_spawnattr_setflags

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_spawnattr_setflags.html

Gnulib module: posix_spawnattr_setflags

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:
9.654 posix_spawnattr_setpgroup

POSIX specification:
http://www.opengroup.org/onlinespecs/9699919799/functions/posix_spawnattr_setpgroup.html
Gnulib module: posix_spawnattr_setpgroup
Portability problems fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.655 posix_spawnattr_setschedparam

POSIX specification:
http://www.opengroup.org/onlinespecs/9699919799/functions/posix_spawnattr_setschedparam.html
Gnulib module: posix_spawnattr_setschedparam
Portability problems fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.656 posix_spawnattr_setschedpolicy

POSIX specification:
http://www.opengroup.org/onlinespecs/9699919799/functions/posix_spawnattr_setschedpolicy.html
Gnulib module: posix_spawnattr_setschedpolicy
Portability problems fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.657 posix_spawnattr_setsigdefault

POSIX specification:
http://www.opengroup.org/onlinespecs/9699919799/functions/posix_spawnattr_setsigdefault.html
Gnulib module: posix_spawnattr_setsigdefault
Portability problems fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.
Portability problems not fixed by Gnulib:

9.658 posix_spawnattr_setsigmask

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_spawnattr_setsigmask.html
Gnulib module: posix_spawnattr_setsigmask

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

Portability problems not fixed by Gnulib:

9.659 posix_spawnp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_spawnp.html
Gnulib module: posix_spawnp

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.
- When this function fails, it causes the stdio buffer contents to be output twice on some platforms: AIX 6.1.

Portability problems not fixed by Gnulib:
- This function does not work on some platforms: AIX 6.1 (under particular circumstances), mingw.

The Gnulib module posix_spawn_file_actions_addchdir provides an additional action, that consists in changing the current directory of the child process before starting the specified program.

9.660 posix_trace_attr_destroy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_attr_destroy.html
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.661  posix_trace_attr_getclockres

POSIX specification:
http://www.opengroup.org/onlinelpubs/9699919799/functions/posix_trace_attr_getclockres.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.662  posix_trace_attr_getcreatetime

POSIX specification:
http://www.opengroup.org/onlinelpubs/9699919799/functions/posix_trace_attr_getcreatetime.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.663  posix_trace_attr_getgenversion

POSIX specification:
http://www.opengroup.org/onlinelpubs/9699919799/functions/posix_trace_attr_getgenversion.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.664  posix_trace_attr_getinherited

POSIX specification:
http://www.opengroup.org/onlinelpubs/9699919799/functions/posix_trace_attr_getinherited.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.665 **posix_trace_attr_getlogfullpolicy**

POSIX specification:
http://www.opengroup.org/onlinelpubs/9699919799/functions/posix_trace_attr_getlogfullpolicy.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.666 **posix_trace_attr_getlogsize**

POSIX specification:
http://www.opengroup.org/onlinelpubs/9699919799/functions/posix_trace_attr_getlogsize.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.667 **posix_trace_attr_getmaxdatasize**

POSIX specification:
http://www.opengroup.org/onlinelpubs/9699919799/functions/posix_trace_attr_getmaxdatasize.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.668 **posix_trace_attr_getmaxsystemeventsizer**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_attr_getmaxsystemeventsizer.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.669 **posix_trace_attr_getmaxusereventsizer**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_attr_getmaxusereventsizer.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.670 **posix_trace_attr_getname**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_attr_getname.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.671 **posix_trace_attr_getstreamfullpolicy**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_attr_getstreamfullpolicy.html

Gnulib module: —
Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.672 **posix_trace_attr_getstreamsize**

POSIX specification:

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.673 **posix_trace_attr_init**

POSIX specification:
http: / / www . opengroup . org / onlinepubs / 9699919799 / functions / posix_trace_attr_init.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.674 **posix_trace_attr_setinherited**

POSIX specification:

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.675  **posix_trace_attr_setlogfullpolicy**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_attr_setlogfullpolicy.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.676  **posix_trace_attr_setlogsize**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_attr_setlogsize.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.677  **posix_trace_attr_setmaxdatasize**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_attr_setmaxdatasize.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.678  **posix_trace_attr_setname**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_attr_setname.html

Gnulib module: —
Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

**9.679 posix_trace_attr_setstreamfullpolicy**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_attr_setstreamfullpolicy.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

**9.680 posix_trace_attr_setstreamsize**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_attr_setstreamsize.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

**9.681 posix_trace_clear**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_clear.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.682  **posix_trace_close**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_close.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.683  **posix_trace_create**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_create.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.684  **posix_trace_create_withlog**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_create_withlog.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.685  **posix_trace_event**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_event.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OFS/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

**9.686 posix_trace_eventid_equal**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_eventid_equal.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OFS/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

**9.687 posix_trace_eventid_get_name**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_eventid_get_name.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OFS/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

**9.688 posix_trace_eventid_open**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_eventid_open.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OFS/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.689  **posix_trace_eventset_add**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_eventset_add.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.690  **posix_trace_eventset_del**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_eventset_del.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.691  **posix_trace_eventset_empty**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_eventset_empty.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.692  **posix_trace_eventset_fill**

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/posix_trace_eventset_fill.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.693 `posix_trace_eventset_ismember`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_eventset_ismember.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.694 `posix_trace_eventtypelist_getnext_id`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_eventtypelist_getnext_id.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.695 `posix_trace_eventtypelist_rewind`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_eventtypelist_rewind.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.696 posix_trace_flush

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_flush.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.697 posix_trace_get_attr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_get_attr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.698 posix_trace_get_filter

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_get_filter.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.699 posix_trace_get_status

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_get_status.html

Gnulib module: —
Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.700 posix_trace_getnext_event

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_getnext_event.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.701 posix_trace_open

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_open.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.702 posix_trace_rewind

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_rewind.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.703 posix_trace_set_filter

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_set_filter.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.704 posix_trace_shutdown

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_shutdown.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.705 posix_trace_start

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_start.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.706 posix_trace_stop

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_trace_stop.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.707 posix_trace_timedgetnext_event

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions posix_trace_timedgetnext_event.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.708 posix_trace_trid_eventid_open

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions posix_trace_trid_eventid_open.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.709 posix_trace_trygetnext_event

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions posix_trace_trygetnext_event.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.710 posix_typed_mem_get_info

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_typed_mem_get_info.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.711 posix_typed_mem_open

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/posix_typed_mem_open.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.712 pow

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pow.html

Gnulib module: pow

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.713 powf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/powf.html

Gnulib module: powf

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
- This function is only defined as a macro with arguments on some platforms: MSVC 9.
9.714 powl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/powl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.

9.715 pread

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pread.html

Gnulib module: pread

Portability problems fixed by Gnulib:
- This function is missing on some platforms: HP-UX 10, mingw, MSVC 14, BeOS.
- On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)
- This function returns zero instead of positive values when large file support is enabled on some platforms: HP-UX 11.11.
- This function does not fail on pipes on some platforms: HP-UX 11.31.

Portability problems not fixed by Gnulib:

9.716 printf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/printf.html

Gnulib module: printf-posix or stdio, nonblocking, sigpipe

Portability problems fixed by Gnulib module printf-posix:
- This function does not support size specifiers as in C99 (hh, ll, j, t, z) on some platforms: AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.24, mingw, MSVC 14, BeOS.
- printf of ‘long double’ numbers is unsupported on some platforms: mingw, MSVC 14, BeOS.
- printf "%f", "%e", "%g" of Infinity and NaN yields an incorrect result on some platforms: AIX 5.2, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14.
- This function does not support the ‘a’ and ‘A’ directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
• This function does not support the ‘F’ directive on some platforms: NetBSD 3.0, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
• This function does not support the ‘n’ directive on some platforms: MSVC 14.
• This function does not support the ‘ls’ directive on some platforms: OpenBSD 4.0, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Haiku.
• This function does not support precisions in the ‘ls’ directive correctly on some platforms: Solaris 11.4.
• This function does not support format directives that access arguments in an arbitrary order, such as "%2$s", on some platforms: NetBSD 3.0, mingw, MSVC 14, BeOS.
• This function doesn’t support the ’ flag on some platforms: NetBSD 3.0, Cygwin 1.5.24, mingw, MSVC 14.
• This function does not round the argument of the ‘a’ directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.
• This function behaves incorrectly when a ‘-’ flag and a negative width are specified together, on some platforms: HP-UX 10.20.
• printf "%010f" of NaN and Infinity yields an incorrect result (padded with zeroes, or wrong capitalization) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, AIX 5.2, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14.
• This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: AIX 7.1, Solaris 10/x86, mingw, MSVC 14, BeOS.
• This function mishandles large floating point precisions (for example, formatting 1.0 with “%.511f””) on some platforms: Solaris 10.
• This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.

Portability problems fixed by Gnulib module stdio or printf-posix, together with module nonblocking:
• When writing to a non-blocking pipe whose buffer is full, this function fails with errno being set to ENOSPC instead of EAGAIN on some platforms: mingw, MSVC 14.

Portability problems fixed by Gnulib module stdio or printf-posix, together with module sigpipe:
• When writing to a pipe with no readers, this function fails, instead of obeying the current SIGPIPE handler, on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
• The %m directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.
• Formatting noncanonical ‘long double’ numbers produces nonmeaningful results on some platforms: glibc and others, on x86, x86_64, IA-64 CPUs.
• When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.
• Attempting to write to a read-only stream fails with EOF but does not set the error flag for ferror on some platforms: glibc 2.13, cygwin 1.7.9.
9.717 pselect

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pselect.html

Gnulib module: —

Portability problems fixed by Gnulib:

- This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, mingw, MSVC 14, Interix 3.5, BeOS.
- On some platforms, this function fails to detect invalid fds with EBADF, but only if they lie beyond the current maximum open fd: FreeBSD 8.2.

Portability problems not fixed by Gnulib:

- When the sigmask argument is nonnull on platforms that do not natively support this function, race conditions are possible when its gnulib implementation temporarily modifies the signal mask, and the behavior is unspecified in a multi-threaded process.

9.718 psiginfo

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/psiginfo.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.1.

9.719 psignal

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/psignal.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.1.

9.720 pthread_atfork

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_atfork.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.3, FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS, Android 3.0.

9.721 pthread_attr_destroy

POSIX specification:
http://www.opengroup.org/onlinedpubs/9699919799/functions/pthread_attr_destroy.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.722 pthread_attr_getdetachstate

POSIX specification:
http://www.opengroup.org/onlinedpubs/9699919799/functions/pthread_attr_getdetachstate.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.

9.723 pthread_attr_getguardsize

POSIX specification:
http://www.opengroup.org/onlinedpubs/9699919799/functions/pthread_attr_getguardsize.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.6, Cygwin 1.7.9, mingw, MSVC 14, BeOS.
9.724 `pthread_attr_getinheritsched`

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS, Android 9.0.

9.725 `pthread_attr_getschedparam`

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.

9.726 `pthread_attr_getschedpolicy`

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.

9.727 `pthread_attr_getscope`

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.
9.728 pthread_attr_getstack

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_attr_getstack.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11.11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.9, mingw, MSVC 14, BeOS.

9.729 pthread_attr_getstacksize

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_attr_getstacksize.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.

9.730 pthread_attr_init

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_attr_init.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11.11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.731 pthread_attr_setdetachstate

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_attr_setdetachstate.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.
9.732 `pthread_attr_setguardsize`

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/pthread_attr_setguardsize.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.6, Cygwin 1.7.9, mingw, MSVC 14, BeOS.

9.733 `pthread_attr_setinheritsched`

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/pthread_attr_setinheritsched.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS, Android 9.0.

9.734 `pthread_attr_setschedparam`

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/pthread_attr_setschedparam.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.

9.735 `pthread_attr_setschedpolicy`

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/pthread_attr_setschedpolicy.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.
9.736  pthread_attr_setscope

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.

9.737  pthread_attr_setstack

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11.11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.9, mingw, MSVC 14, BeOS.

9.738  pthread_attr_setstacksize

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.739  pthread_barrier_destroy

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.
9.740 pthread_barrier_init

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_barrier_init.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

9.741 pthread_barrier_wait

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_barrier_wait.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

9.742 pthread_barrierattr_destroy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_barrierattr_destroy.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

9.743 pthread_barrierattr_getpshared

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_barrierattr_getpshared.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

9.744 `pthread_barrierattr_init`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_barrierattr_init.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

9.745 `pthread_barrierattr_setpshared`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_barrierattr_setpshared.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

9.746 `pthread_cancel`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_cancel.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS, Android 9.0.
9.747 pthread_cleanup_pop

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, NetBSD 5.0, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.748 pthread_cleanup_push

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, NetBSD 5.0, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.749 pthread_cond_broadcast

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.750 pthread_cond_destroy

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.
9.751 pthread_cond_init

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_cond_init.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.752 pthread_cond_signal

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_cond_signal.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.753 pthread_cond_timedwait

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_cond_timedwait.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.754 pthread_cond_wait

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_cond_wait.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.
9.755 *pthread_condattr_destroy*

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.

9.756 *pthread_condattr_getclock*

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.757 *pthread_condattr_getpshared*

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.4, mingw, MSVC 14, BeOS.

9.758 *pthread_condattr_init*

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.
9.759  pthread_condattr_setclock

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_condattr_setclock.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.760  pthread_condattr_setpshared

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_condattr_setpshared.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.4, mingw, MSVC 14, BeOS.

9.761  pthread_create

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_create.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11.11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

• On Linux/glibc platforms before the advent of NPTL, signals could only be sent to one particular thread. In POSIX, signals are sent to the entire process and executed by any thread of the process that happens to have the particular signal currently unblocked.

9.762  pthread_detach

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_detach.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.

9.763 pthread_equal

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_equal.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.

9.764 pthread_exit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_exit.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.765 pthread_getconcurrency

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_getconcurrency.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, HP-UX 11, Solaris 2.6, mingw, MSVC 14, BeOS, Android 9.0.

9.766 pthread_getcpuclockid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_getcpuclockid.html
Gnulib module: —
Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS.

9.767 `pthread_getschedparam`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_getschedparam.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.

9.768 `pthread_getspecific`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_getspecific.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.

9.769 `pthread_join`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_join.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.
9.770  pthread_key_create

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
•  This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.

9.771  pthread_key_delete

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
•  This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.

9.772  pthread_kill

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_kill.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
•  This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.

9.773  pthread_mutex_consistent

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
•  This function is missing on some platforms: glibc 2.11, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.774  **pthread_mutex_destroy**

POSIX specification:
http://www.opengroup.org/onlinelibs/9699919799/functions/pthread_mutex_destroy.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.775  **pthread_mutex_getprioceiling**

POSIX specification:
http://www.opengroup.org/onlinelibs/9699919799/functions/pthread_mutex_getprioceiling.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: glibc 2.3.6, NetBSD 5.0, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.776  **pthread_mutex_init**

POSIX specification:
http://www.opengroup.org/onlinelibs/9699919799/functions/pthread_mutex_init.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.777  **pthread_mutex_lock**

POSIX specification:
http://www.opengroup.org/onlinelibs/9699919799/functions/pthread_mutex_lock.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.
9.778  pthread_mutex_setprioceiling

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_mutex_setprioceiling.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: glibc 2.3.6, NetBSD 5.0, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.779  pthread_mutex_timedlock

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_mutex_timedlock.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, BeOS, Android 4.4.

9.780  pthread_mutex_trylock

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_mutex_trylock.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.781  pthread_mutex_unlock

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_mutex_unlock.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.
9.782 **pthread_mutexattr_destroy**

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.

9.783 **pthread_mutexattr_getprioceiling**

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, NetBSD 5.0, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.784 **pthread_mutexattr_getprotocol**

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, NetBSD 5.0, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

9.785 **pthread_mutexattr_getpshared**

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.4, mingw, MSVC 14, BeOS.
9.786 pthread_mutexattr_getrobust

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.11, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.787 pthread_mutexattr_gettype

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.6, mingw, MSVC 14, BeOS.

9.788 pthread_mutexattr_init

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.

9.789 pthread_mutexattr_setprioceiling

POSIX specification:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, NetBSD 5.0, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.790 pthread_mutexattr_setprotocol

POSIX specification:
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: glibc 2.3.6, NetBSD 5.0, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

9.791 pthread_mutexattr_setpshared

POSIX specification:
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.4, mingw, MSVC 14, BeOS.

9.792 pthread_mutexattr_setrobust

POSIX specification:
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: glibc 2.11, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.793 pthread_mutexattr_settype

POSIX specification:
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.6, mingw, MSVC 14, BeOS.
9.794 pthread_once

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_once.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.

9.795 pthread_rwlock_destroy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_rwlock_destroy.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.6, mingw, MSVC 14, BeOS.

9.796 pthread_rwlock_init

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_rwlock_init.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, OSF/1 4.0, Solaris 2.6, mingw, MSVC 14, BeOS.

9.797 pthread_rwlock_rdlock

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_rwlock_rdlock.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.6, mingw, MSVC 14, BeOS.
• This function prefers readers to writers (meaning, when this function is called on an rwlock that is already taken by one or more readers, and another writer is already waiting to take it, this function may return successfully immediately) – a behaviour that may lead to writer starvation – on some platforms: glibc 2.28. As a workaround, you can use the `gl_rwlock_t` type from the Gnulib module ‘lock’.

9.798 pthread_rwlock_timedrdlock

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, BeOS.

9.799 pthread_rwlock_timedwrlock

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, BeOS.

9.800 pthread_rwlock_tryrdlock

POSIX specification:

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.6, mingw, MSVC 14, BeOS.
This function prefers readers to writers (meaning, when this function is called on an
rwlock that is already taken by one or more readers, and another writer is already
waiting to take it, this function may return successfully immediately) – a behaviour
that may lead to writer starvation – on some platforms: glibc 2.28.

9.801 pthread_rwlock_trywrlock

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/pthread_rwlock_trywrlock.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris
2.6, mingw, MSVC 14, BeOS.

9.802 pthread_rwlock_unlock

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/pthread_rwlock_unlock.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris
2.6, mingw, MSVC 14, BeOS.

9.803 pthread_rwlock_wrlock

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/pthread_rwlock_wrlock.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris
2.6, mingw, MSVC 14, BeOS.

9.804 pthread_rwlockattr_destroy

POSIX specification:
http://www.opengroup.org/onlinedocs/9699919799/functions/pthread_rwlockattr_destroy.html
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.6, mingw, MSVC 14, BeOS.

**9.805 pthread_rwlockattr_getpshared**

POSIX specification:

http://www.opengroup.org/onlinelpubs/9699919799/functions/pthread_rwlockattr_getpshared.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.6, mingw, MSVC 14, BeOS.

**9.806 pthread_rwlockattr_init**

POSIX specification:

http://www.opengroup.org/onlinelpubs/9699919799/functions/pthread_rwlockattr_init.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.6, mingw, MSVC 14, BeOS.

**9.807 pthread_rwlockattr_setpshared**

POSIX specification:

http://www.opengroup.org/onlinelpubs/9699919799/functions/pthread_rwlockattr_setpshared.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, HP-UX 11, OSF/1 4.0, Solaris 2.6, mingw, MSVC 14, BeOS.
9.808 *pthread_self*

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_self.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.809 *pthread_setcancelstate*

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_setcancelstate.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS, Android 9.0.

9.810 *pthread_setcanceltype*

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_setcanceltype.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS, Android 9.0.

9.811 *pthread_setconcurrency*

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_setconcurrency.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, HP-UX 11, Solaris 2.6, mingw, MSVC 14, BeOS, Android 9.0.
9.812 **pthread_setschedparam**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_setschedparam.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 2.4, mingw, MSVC 14, BeOS.

9.813 **pthread_setschedprio**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_setschedprio.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.9, mingw, MSVC 14, BeOS, Android 8.1.

9.814 **pthread_setspecific**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_setspecific.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.

9.815 **pthread_sigmask**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_sigmask.html

Gnulib module: pthread_sigmask

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.

- This function is declared in `<pthread.h>` instead of `<signal.h>` on some platforms: Mac OS X 10.3, FreeBSD 6.4, OpenBSD 3.8, OSF/1 4.0, Solaris 2.6.
• This function does nothing and always returns 0 in programs that are not linked with
• When it fails, this function returns −1 instead of the error number on some platforms:
Cygwin 1.7.5.
• This function does not immediately raise signals that were pending before the call and
unblocked by the call on some platforms: IRIX 6.5.
Portability problems not fixed by Gnulib:
• On platforms that do not natively support this function, it has unspecified behavior in
a multi-threaded process.

9.816 pthread_spin_destroy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_spin_destroy.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD
3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.9,
mnw, MSVC 14, BeOS, Android 6.0.

9.817 pthread_spin_init

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_spin_init.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD
3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.9,
mnw, MSVC 14, BeOS, Android 6.0.

9.818 pthread_spin_lock

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_spin_lock.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD
3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.9,
mnw, MSVC 14, BeOS, Android 6.0.
Chapter 9: ISO C and POSIX Function Substitutes

9.819 pthread_spin_trylock

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_spin_trylock.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.9, mingw, MSVC 14, BeOS, Android 6.0.

9.820 pthread_spin_unlock

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_spin_unlock.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.7.9, mingw, MSVC 14, BeOS, Android 6.0.

9.821 pthread_testcancel

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pthread_testcancel.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS, Android 9.0.

9.822 ptsname

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ptsname.html

Gnulib module: ptsname
Portability problems fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS.

• This function fails to set errno on failure on some platforms: FreeBSD 8.2.
Portability problems not fixed by Gnulib:

- This function is not declared on some platforms: IRIX 5.3.
- On Solaris 11 2010-11, this function fails on all BSD-style /dev/pty* device files.
- This function is not thread-safe on some platforms: Cygwin 1.7.9. Likewise, the gnulib replacement is not thread-safe.

Note that the Gnulib module `ptsname_r` is a version of this function that is more likely to be thread-safe.

### 9.823 putc

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/putc.html

Gnulib module: stdio, nonblocking, sigpipe

Portability problems fixed by Gnulib module `stdio`, together with module `nonblocking`:

- When writing to a non-blocking pipe whose buffer is full, this function fails with `errno` being set to `ENOSPC` instead of `EAGAIN` on some platforms: mingw, MSVC 14.

Portability problems fixed by Gnulib module `stdio`, together with module `sigpipe`:

- When writing to a pipe with no readers, this function fails, instead of obeying the current `SIGPIPE` handler, on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

- On Windows platforms (excluding Cygwin), this function does not set `errno` upon failure.
- On some platforms, this function does not set `errno` or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

### 9.824 putc_unlocked

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/putc_unlocked.html

Gnulib module: —

Portability problems fixed by Gnulib:

- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.
- On some platforms, this function does not set `errno` or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.
9.825 putchar

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/putchar.html

Gnulib module: stdio, nonblocking, sigpipe

Portability problems fixed by Gnulib module stdio, together with module nonblocking:
- When writing to a non-blocking pipe whose buffer is full, this function fails with errno being set to ENOSPC instead of EAGAIN on some platforms: mingw, MSVC 14.

Portability problems fixed by Gnulib module stdio, together with module sigpipe:
- When writing to a pipe with no readers, this function fails, instead of obeying the current SIGPIPE handler, on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
- On Windows platforms (excluding Cygwin), this function does not set errno upon failure.
- On some platforms, this function does not set errno or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

9.826 putchar_unlocked

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/putchar_unlocked.html

Gnulib module: —

Portability problems fixed by Gnulib:
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.
- On some platforms, this function does not set errno or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

9.827 putenv

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/putenv.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

Extension: Gnulib provides a module ‘putenv’ that substitutes a putenv implementation that can also be used to remove environment variables.
9.828 putmsg

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/putmsg.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
  • This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.829 putpmsg

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/putpmsg.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
  • This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.830 puts

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/puts.html

Gnulib module: stdio, nonblocking, sigpipe

Portability problems fixed by Gnulib module stdio, together with module nonblocking:
  • When writing to a non-blocking pipe whose buffer is full, this function fails with errno being set to ENOSPC instead of EAGAIN on some platforms: mingw, MSVC 14.

Portability problems fixed by Gnulib module stdio, together with module sigpipe:
  • When writing to a pipe with no readers, this function fails, instead of obeying the current SIGPIPE handler, on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
  • On Windows platforms (excluding Cygwin), this function does not set errno upon failure.
  • On some platforms, this function does not set errno or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.
9.831 putuxline

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/putuxline.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.

9.832 putwc

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/putwc.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x, BeOS.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
• On some platforms, this function does not set errno or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

9.833 putwchar

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/putwchar.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x, BeOS.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
• On some platforms, this function does not set errno or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

9.834 pwrite

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/pwrite.html
Gnulib module: pwrite
Portability problems fixed by Gnulib:
• This function is missing on some platforms: HP-UX 10, mingw, MSVC 14, BeOS.
• On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)

• This function does not fail when an invalid (negative) offset is passed when large file support is enabled on some platforms: HP-UX 11.11.

• This function uses an arbitrary offset instead of the off_t argument when large file support is enabled on some platforms: HP-UX 11.11.

Portability problems not fixed by Gnulib:

9.835 qsort

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/qsort.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.836 quick_exit

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.837 raise

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/raise.html

Gnulib module: raise

Portability problems fixed by Gnulib:

• This function is missing on some old platforms.

• This function crashes when invoked with invalid arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.838 rand

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/rand.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is only defined as an inline function on some platforms: Android 4.4.
9.839 rand_r

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/rand_r.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Android 4.4.

9.840 random

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/random.html

Gnulib module: random

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14.
• This function is only defined as an inline function on some platforms: Android 4.4.

Portability problems not fixed by Gnulib:

• This function has a slightly incompatible declaration (the return type being ‘int’ instead of ‘long’) on some platforms: Cygwin 1.5.25, Haiku.

9.841 read

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/read.html

Gnulib module: stdio, nonblocking

Portability problems fixed by Gnulib module stdio, together with module nonblocking:

• This function crashes when invoked with invalid arguments on some platforms: MSVC 14.
• When reading from a non-blocking pipe whose buffer is empty, this function fails with errno being set to EINVAL instead of EAGAIN on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

• This function may fail with error EINTR, even in programs that don’t install any signal handlers, on some platforms: Mac OS X 10.5.

For handling EINTR, Gnulib provides a module ‘safe-read’ with a function safe_read.
9.842 readdir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/readdir.html

Gnulib module: readdir

Portability problems fixed by Gnulib:
- This function is missing on some platforms: MSVC 14.
- On platforms where off_t is a 32-bit type, this function may not work correctly on huge directories larger than 2 GB. Also, on platforms where ino_t is a 32-bit type, this function may report inode numbers incorrectly. (Cf. AC_SYS_LARGEFILE.)

Portability problems not fixed by Gnulib:
- Although POSIX places no restrictions on d_ino values, some older systems are rumored to return d_ino values equal to zero for directory entries that do not really exist. Although Gnulib formerly attempted to cater to these older systems, this caused misbehavior on standard systems and so Gnulib does not attempt to cater to them any more. If you know of any problems caused by this, please send a bug report.

9.843 readdir_r

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/readdir_r.html

Gnulib module: extensions

Portability problems fixed by Gnulib:
- This function is planned to be removed from POSIX and to be deprecated in glibc. Portable applications should use readdir.
- This function has an incompatible declaration on some platforms: Solaris 11.4 (when _POSIX_PTHREAD_SEMANTICS is not defined).

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS.
- On platforms where off_t is a 32-bit type, this function may not work correctly on huge directories larger than 2 GB. Also, on platforms where ino_t is a 32-bit type, this function may report inode numbers incorrectly. The fix is to use the AC_SYS_LARGEFILE macro.

9.844 readlink

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/readlink.html

Gnulib module: readlink

Portability problems fixed by Gnulib:
- Some platforms mistakenly succeed on readlink("link/",buf,len): FreeBSD 7.2, Solaris 9, Mac OS X 10.10.
- On some platforms, readlink returns int instead of ssize_t: glibc 2.4, FreeBSD 6.0, OpenBSD 3.8, Cygwin 1.5.x, AIX 7.1.
• This function is missing on some platforms: mingw, MSVC 14.

Portability problems not fixed by GnuLib:

• When `readlink` is called on a directory: In the case of NFS mounted directories, Cygwin sets `errno` to `ENOENT` or `EIO` instead of `EINVAL`. To avoid this problem, check for a directory before calling `readlink`.

• When `readlink` is called on a file that is not a symbolic link: Irix may set `errno` to `ENXIO` instead of `EINVAL`. Cygwin may set `errno` to `EACCES` instead of `EINVAL`.

• Symlink contents do not always have a trailing null byte, and there is no indication if symlink contents were truncated if the return value matches the length. Furthermore, AIX 5.1 and HP-UX 11 set `errno` to `ERANGE` rather than returning truncated contents, and Linux sets `errno` to `EINVAL` if the requested length is zero. Use the gnulib module `areadlink` for improved ability to read symlink contents.

9.845 readlinkat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/readlinkat.html

GnuLib module: readlinkat

Portability problems fixed by GnuLib:

• This function is missing on some platforms: glibc 2.3.6, Mac OS X < 10.10, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4. But the replacement function is not safe to be used in libraries and is not multithread-safe.

• Some platforms mistakenly succeed on `readlink("link/", buf, len)`: Mac OS X 10.10.

• On some platforms, `readlinkat` returns `int` instead of `ssize_t`: AIX 7.1.

Portability problems not fixed by GnuLib:

• This function always fails on platforms that don’t support symlinks: mingw, MSVC 14.

• When `readlink` is called on a directory: In the case of NFS mounted directories, Cygwin sets `errno` to `ENOENT` or `EIO` instead of `EINVAL`. To avoid this problem, check for a directory before calling `readlink`.

• When `readlink` is called on a file that is not a symbolic link: Irix may set `errno` to `ENXIO` instead of `EINVAL`. Cygwin may set `errno` to `EACCES` instead of `EINVAL`.

• Symlink contents do not always have a trailing null byte, and there is no indication if symlink contents were truncated if the return value matches the length. Furthermore, AIX 5.1 and HP-UX 11 set `errno` to `ERANGE` rather than returning truncated contents, and Linux sets `errno` to `EINVAL` if the requested length is zero. Use the gnulib module `areadlink` for improved ability to read symlink contents.
9.846 readv

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/readv.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.

9.847 realloc

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/realloc.html

Gnulib module: realloc-posix

Portability problems fixed by Gnulib:

• Upon failure, the function does not set errno to ENOMEM on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
• It is not portable to call realloc with a size of 0. With a NULL pointer argument, this is the same ambiguity as malloc (0) on whether a unique zero-size object is created. With a non-NULL pointer argument, C99 requires that if realloc (p, 0) returns NULL then p is still valid. Among implementations that obey C99, behavior varies on whether realloc (p, 0) always fails and leaves p valid, or usually succeeds and returns a unique zero-size object; either way, a program not suspecting these semantics will leak memory (either the still-valid p, or the non-NULL return value). Meanwhile, several implementations violate C99, by always calling free (p) but returning NULL: glibc, Cygwin

Extension: Gnulib provides a module ‘realloc-gnu’ that substitutes a realloc implementation that behaves more like the glibc implementation.

9.848 realpath

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/realpath.html

Gnulib module: canonicalize-lgpl

Portability problems fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS.
• This function does not allow for a NULL ‘resolved’ parameter on some platforms: Mac OS X 10.5, FreeBSD 6.4, OpenBSD 4.4, Solaris 10.
• This function does not always return an absolute path on some platforms: Solaris 10.
• This function fails to detect trailing slashes on non-directories on some platforms: glibc 2.3.5.
• This function fails to recognize non-directories followed ‘..’ on some platforms: cygwin.
• This function misbehaves on consecutive slashes on some platforms: AIX 7.

Portability problems not fixed by Gnulib:

• This function does not allow to determine the required size of output buffer; the use of a non-NULL ‘resolved’ buffer is non-portable, since PATH_MAX, if it is defined, is nothing more than a guess.

9.849 recv

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/recv.html

Gnulib module: recv

Portability problems fixed by Gnulib:

• This function has the return type int instead of ssize_t on some platforms: OSF/1 5.1.

• On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.

Portability problems not fixed by Gnulib:

9.850 recvfrom

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/recvfrom.html

Gnulib module: recvfrom

Portability problems fixed by Gnulib:

• This function has the return type int instead of ssize_t on some platforms: OSF/1 5.1.

• On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.

• On HP-UX 11, in 64-bit mode, when the macro _HPUX_ALT_XOPEN_SOCKET_API is not defined, this function behaves incorrectly because it is declared to take a pointer to a 64-bit wide socklen_t entity but in fact considers it as a pointer to a 32-bit wide unsigned int entity.

Portability problems not fixed by Gnulib:

• Some platforms don’t have a socklen_t type; in this case this function’s sixth argument type is ‘int *’.

9.851 recvmsg

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/recvmsg.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, Interix 3.5, BeOS.
9.852 regcomp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/regcomp.html

Gnulib module: regex

Portability problems fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.
• Many regular expression implementations have bugs.

Portability problems not fixed by Gnulib:

9.853 regerror

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/regerror.html

Gnulib module: regex

Portability problems fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.854 regexec

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/regexec.html

Gnulib module: regex

Portability problems fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.
• Many regular expression implementations have bugs.

Portability problems not fixed by Gnulib:

9.855 regfree

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/regfree.html

Gnulib module: regex

Portability problems fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
9.856 remainder

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/remainder.html

Gnulib module: remainder or remainder-ieee

Portability problems fixed by either Gnulib module remainder or remainder-ieee:

- This function is missing on some platforms: MSVC 9.
- This function is not declared on some platforms: IRIX 5.3.

Portability problems fixed by Gnulib module remainder-ieee:

- This function has problems when the second argument is zero on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.857 remainderf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/remainderf.html

Gnulib module: remainderf or remainderf-ieee

Portability problems fixed by either Gnulib module remainderf or remainderf-ieee:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, Solaris 9, MSVC 9.
- This function is not declared on some platforms: IRIX 6.5.
- This function may go into an endless loop on some platforms: IRIX 6.5.

Portability problems fixed by Gnulib module remainderf-ieee:

- This function has problems when the second argument is zero on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.858 remainderl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/remainderl.html

Gnulib module: remainderl or remainderl-ieee

Portability problems fixed by either Gnulib module remainderl or remainderl-ieee:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.4.
- This function is not declared on some platforms: IRIX 6.5.
- This function returns completely wrong values on some platforms: OpenBSD 5.1/SPARC.

Portability problems fixed by Gnulib module remainderl-ieee:

- This function has problems when the second argument is zero on some platforms: OSF/1 5.1.
Portability problems not fixed by Gnulib:

9.859 remove

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/remove.html

Gnulib module: remove

Portability problems fixed by Gnulib:

• This function fails to reject trailing slashes on non-directories on some platforms: FreeBSD 7.2, Solaris 9.
• This function mistakenly removes a directory with `remove("dir/./")` on some platforms: Cygwin 1.5.x.
• This function does not remove empty directories on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.860 remque

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/remque.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.861 remquo

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/remquo.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.862 remquof

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/remquof.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.

9.863 remquol

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/remquol.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.864 rename

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/rename.html

Gnulib module: rename

Portability problems fixed by Gnulib:

- This function does not allow trailing slashes when creating a destination directory, as in rename("dir","new/"'): NetBSD 1.6.
- This function does not reject trailing slashes on the destination for non-directories on some platforms, as in rename("file","new/"'): AIX 7.1, Solaris 11.3, Cygwin 1.5.x, mingw, MSVC 14.
- This function does not reject trailing slashes on symlinks to non-directories on some platforms, as in rename("link-to-file","f"'): FreeBSD 7.2.
- This function ignores trailing slashes on symlinks on some platforms, such that rename("link/","new") corrupts link: Solaris 9.
- This function incorrectly reduces the link count when comparing two spellings of a hard link on some platforms: NetBSD 1.6, Cygwin 1.5.x.
- This function will not always replace an existing destination on some platforms: Cygwin 1.5.x, mingw, MSVC 14. However, the replacement is not atomic for directories, and may end up losing the empty destination if the source could not be renamed.
- This function mistakenly allows names ending in ‘.’ or ‘..’ on some platforms: Cygwin 1.5.x, mingw, MSVC 14.
- This function does not reject attempts to rename existing directories and non-directories onto one another on some platforms: Cygwin 1.5.x, mingw, MSVC 14.
- This function does not allow trailing slashes on source directories on older platforms, as in ‘rename("dir/","new")’: SunOS 4.1.
Portability problems not fixed by Gnulib:

- POSIX requires that `rename("symlink-to-dir/","dir2") rename dir and leave symlink-to-dir dangling; likewise, it requires that `rename("dir","dangling/") rename dir so that dangling is no longer a dangling symlink. This behavior is counter-intuitive, so on some systems, `rename` fails with `ENOTDIR` if either argument is a symlink with a trailing slash: glibc, OpenBSD, Cygwin 1.7.

- POSIX requires that `rename` do nothing and return 0 if the source and destination are hard links to the same file. This behavior is counterintuitive, and on some systems `renameat` is a no-op in this way only if the source and destination identify the same directory entry. On these systems, for example, although renaming `.f` to `f` is a no-op, renaming `f` to `g` deletes `f` when `f` and `g` are hard links to the same file: NetBSD 7.0.

- After renaming a non-empty directory over an existing empty directory, the old directory name is still visible through the `stat` function for 30 seconds after the rename, on NFS file systems, on some platforms: Linux 2.6.18.

- This function will not rename a source that is currently opened by any process: mingw, MSVC 14.

### 9.865 renameat

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/renameat.html

Gnulib module: renameat

Portability problems fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 8, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS. But the replacement function is not safe to be used in libraries and is not multithread-safe.

- This function is declared in `<unistd.h>`, not in `<stdio.h>`, on some platforms: NetBSD 7.0, Solaris 11.4.

- This function is declared in `<sys/stat.h>`, not in `<stdio.h>`, on some platforms: Android 4.3.

- This function does not reject trailing slashes on non-directories on some platforms, as in `renameat(fd,"file",fd,"new/")`: Solaris 11.4.

- This function ignores trailing slashes on symlinks on some platforms, such that `renameat(fd,"link/",fd,"new")` corrupts link: Solaris 9.

Portability problems not fixed by Gnulib:

- POSIX requires that `renameat(fd,"symlink-to-dir/",fd,"dir2") rename dir and leave symlink-to-dir dangling; likewise, it requires that `renameat(fd,"dir",fd,"dangling/")` rename dir so that `dangling` is no longer a dangling symlink. This behavior is counter-intuitive, so on some systems, `renameat` fails with `ENOTDIR` if either argument is a symlink with a trailing slash: glibc, OpenBSD, Cygwin 1.7.

- POSIX requires that `renameat` do nothing and return 0 if the source and destination are hard links to the same file. This behavior is counterintuitive, and on some systems
renameat is a no-op in this way only if the source and destination identify the same directory entry. On these systems, for example, although renaming .\f to \f is a no-op, renaming \f to \g deletes \f when \f and \g are hard links to the same file: NetBSD 7.0.

- After renaming a non-empty directory over an existing empty directory, the old directory name is still visible through the stat function for 30 seconds after the rename, on NFS file systems, on some platforms: Linux 2.6.18.
- This function will not rename a source that is currently opened by any process: mingw, MSVC 14.

9.866 rewind

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/rewind.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- On Windows platforms (excluding Cygwin), this function does not set errno upon failure.

9.867 rewinddir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/rewinddir.html

Gnulib module: rewinddir

Portability problems fixed by Gnulib:
- This function is missing on some platforms: MSVC 14.
- On Mac OS X platforms where long int is a 32-bit type, this function may not work correctly on huge directories larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)

Portability problems not fixed by Gnulib:

9.868 rint

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/rint.html

Gnulib module: rint

Portability problems fixed by Gnulib:
- This function is missing on some platforms: MSVC 9.

Portability problems not fixed by Gnulib:
9.869 rintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/rintf.html

Gnulib module: rintf

Portability problems fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, Solaris 9, MSVC 9.
• This function is not declared on some platforms: IRIX 6.5.

Portability problems not fixed by Gnulib:

9.870 rintl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/rintl.html

Gnulib module: rintl

Portability problems fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin 1.5.x, MSVC 9, Interix 3.5, BeOS, Android 4.4.
• This function produces wrong results for negative numbers on some platforms: NetBSD 8.0.

Portability problems not fixed by Gnulib:

9.871 rmdir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/rmdir.html

Gnulib module: rmdir

Portability problems fixed by Gnulib:
• This function is declared in different header files (namely, `<io.h>` or `<direct.h>`) on some platforms: mingw, MSVC 14.
• This function mistakenly removes a directory with `rmdir("dir/./")` on some platforms: Cygwin 1.5.x.
• This function fails with EINVAL instead of the expected ENOTDIR for `rmdir("file/")` on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
• When `rmdir` fails because the specified directory is not empty, the `errno` value is system dependent.
• POSIX requires that `rmdir("link-to-empty/")` remove `empty` and leave `link-to-empty` as a dangling symlink. This is counter-intuitive, so some systems fail with ENOTDIR instead: glibc
9.872 round

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/round.html

Gnulib module: round or round-ieee

Portability problems fixed by either Gnulib module round or round-ieee:
- This function is missing on some platforms: FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, older IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.
- This function is not declared on some platforms: glibc 2.8, IRIX 6.5, OSF/1 5.1.
- This functions returns a wrong result for $x = 1/2 - 2^{-54}$ on some platforms: NetBSD 3.0, AIX 7.1.

Portability problems fixed by Gnulib module round-ieee:
- This function returns a positive zero for an argument between $-0.5$ and 0 on some platforms: AIX 7.1, OSF/1 5.1.
- This function returns a positive zero for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.873 roundf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/roundf.html

Gnulib module: roundf or roundf-ieee

Portability problems fixed by either Gnulib module roundf or roundf-ieee:
- This function is missing on some platforms: FreeBSD 5.2.1, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5.
- This function is not declared on some platforms: glibc 2.8, IRIX 6.5, OSF/1 5.1.
- This functions returns a wrong result for $x = 1/2 - 2^{-25}$ on some platforms: mingw.

Portability problems fixed by Gnulib module roundf-ieee:
- This function returns a positive zero for an argument between $-0.5$ and 0 on some platforms: AIX 7.1, OSF/1 5.1.
- This function returns a positive zero for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.874 roundl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/roundl.html

Gnulib module: roundl or roundl-ieee

Portability problems fixed by either Gnulib module roundl or roundl-ieee:
- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, older IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS.
• This function is not declared on some platforms: glibc 2.8, IRIX 6.5, OSF/1 5.1.

Portability problems fixed by GnuLib module roundl-ieee:

• This function returns a positive zero for an argument between $-0.5$ and 0 on some platforms: AIX 7.1.

• This function returns a positive zero for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems not fixed by GnuLib:

9.875 scalbln

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/scalbln.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5, Android 9.0.

9.876 scalblnf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/scalblnf.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5, Android 9.0.

9.877 scalblnl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/scalblnl.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, Android 9.0.
9.878 scalbn

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/scalbn.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: AIX 5.1, IRIX 6.5, OSF/1 4.0, MSVC 9.

9.879 scalbnf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/scalbnf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9.

9.880 scalbnl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/scalbnl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5.

9.881 scandir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/scandir.html

Gnulib module: scandir

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, Solaris 9, mingw, MSVC 14, BeOS.

• On platforms where off_t is a 32-bit type, this function may not work correctly on huge directories larger than 2 GB. Also, on platforms where ino_t is a 32-bit type, this function may report inode numbers incorrectly. (Cf. AC_SYS_LARGEFILE.)

Portability problems not fixed by Gnulib:

• The fourth parameter of this function is declared as int (*)(const void *, const void *) on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Interix 3.5.
• The fourth parameter of this function is declared as `int (*)(void *, void *)` on some platforms: AIX 5.1.

### 9.882 scanf

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/scanf.html

Gnulib module: stdio, nonblocking

Portability problems fixed by Gnulib module stdio, together with module nonblocking:

• When reading from a non-blocking pipe whose buffer is empty, this function fails with `errno` being set to `EINVAL` instead of `EAGAIN` on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

• C99 and POSIX.1-2001 and later require end-of-file to be sticky, that is, they require this function to act as if it reads end-of-file if `feof` would return nonzero. However, on some systems this function attempts to read from the underlying file descriptor even if the stream’s end-of-file indicator is set. These systems include glibc and default Solaris.

• On Windows platforms (excluding Cygwin), this function does not set `errno` upon failure.

• On Windows, this function doesn’t support the hh, ll, j, t, z size specifiers.

### 9.883 sched_get_priority_max

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/sched_get_priority_max.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

### 9.884 sched_get_priority_min

**POSIX specification:**

http://www.opengroup.org/onlinepubs/9699919799/functions/sched_get_priority_min.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, mingw, MSVC 14, BeOS.
9.885 sched_getparam

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sched_getparam.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS.

9.886 sched_getscheduler

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sched_getscheduler.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS.

9.887 sched_rr_get_interval

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sched_rr_get_interval.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS.

9.888 sched_setparam

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sched_setparam.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS.
9.889 sched_setscheduler

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sched_setscheduler.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS.

9.890 sched_yield

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sched_yield.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.891 seed48

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/seed48.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.892 seekdir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/seekdir.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: MSVC 14, BeOS, Android 5.1.

- On platforms where long int is a 32-bit type, this function may not work correctly on huge directories larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro (only on Mac OS X systems).
9.893 select

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/select.html

Gnulib module: select

Portability problems fixed by Gnulib:
• On Windows platforms (excluding Cygwin), select can only be called on descriptors created by the socket function, not on regular file descriptors.
• On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.
• This function fails when the nfds argument is 0 on some platforms: Interix 3.5.
• On some platforms, this function fails to detect invalid fds with EBADF, but only if they lie beyond the current maximum open fd: FreeBSD 8.2.

Portability problems not fixed by Gnulib:
• When you call select with a timeout, some implementations modify the timeout parameter so that upon return from the function, it contains the amount of time not slept. Other implementations leave the timeout parameter unmodified.
• On BeOS, select can only be called on descriptors created by the socket function, not on regular file descriptors.
• Under Windows, when passing a pipe, Gnulib’s select replacement might return 0 even before the timeout has passed. Programs using it with pipes can thus busy wait.
• On Solaris 2.6 and older, select applied to a file descriptor opened for reading and associated with /dev/null hangs, waiting for input, when instead it should return immediately.
• On Linux, when some file descriptor refers to a regular file, select may fail, setting errno to EBADF.
• This function is declared in <unistd.h>, not <sys/select.h>, on some platforms: IRIX 5.3.

9.894 sem_close

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sem_close.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.895 sem_destroy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sem_destroy.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.
• This function is not implemented on some platforms: Mac OS X 10.11.

9.896 sem_getvalue

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sem_getvalue.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.
• This function is not implemented on some platforms: Mac OS X 10.11.

9.897 sem_init

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sem_init.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.
• This function is not implemented on some platforms: Mac OS X 10.11.

9.898 sem_open

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sem_open.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.
9.899 sem_post

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sem_post.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.900 sem_timedwait

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sem_timedwait.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, mingw, MSVC 14, BeOS.

9.901 sem_trywait

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sem_trywait.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.902 sem_unlink

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sem_unlink.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
9.903 sem_wait

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sem_wait.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, BeOS.

9.904 semctl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/semctl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 7.1.

9.905 semget

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/semget.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 7.1.

9.906 semop

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/semop.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 7.1.
### 9.907 send

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/send.html

Gnulib module: send

Portability problems fixed by Gnulib:
- This function has the return type `int` instead of `ssize_t` on some platforms: OSF/1 5.1.
- On Windows platforms (excluding Cygwin), error codes from this function are not placed in `errno`, and `WSAGetLastError` must be used instead.

Portability problems not fixed by Gnulib:

### 9.908 sendmsg

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sendmsg.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, Interix 3.5, BeOS.

### 9.909 sendto

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sendto.html

Gnulib module: sendto

Portability problems fixed by Gnulib:
- This function has the return type `int` instead of `ssize_t` on some platforms: OSF/1 5.1.
- On Windows platforms (excluding Cygwin), error codes from this function are not placed in `errno`, and `WSAGetLastError` must be used instead.

Portability problems not fixed by Gnulib:

### 9.910 setbuf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setbuf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
9.911 **setegid**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setegid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: HP-UX 11.23, mingw, MSVC 14, BeOS.

9.912 **setenv**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setenv.html

Gnulib module: setenv

Portability problems fixed by Gnulib:
- This function is missing on some platforms: AIX 4.3.2, HP-UX 11.23, IRIX 6.5, Solaris 9, mingw, MSVC 14, BeOS.
- This function is not declared on some platforms: OSF/1 5.1.
- On some platforms, this function does not fail with ‘EINVAL’ when passed an empty string or a string containing ‘=’: Mac OS X 10.5, FreeBSD 6.0, NetBSD 1.6, OpenBSD 3.8, Cygwin 1.5.x.
- On some platforms, this function removes a leading ‘=’ from the value argument: Cygwin 1.5.x.

Portability problems not fixed by Gnulib:
- Older versions of POSIX required that `setenv(NULL,"",0)` gracefully fail with EINVAL, but not all implementations guarantee this, and the requirement was removed.

9.913 **seteuid**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/seteuid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: HP-UX 11.23, mingw, MSVC 14, BeOS.

9.914 **setgid**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setgid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.
9.915 setgrent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setgrent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14, Android 7.1.

9.916 sethostent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sethostent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 8.1.

9.917 setitimer

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setitimer.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.918 setjmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setjmp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• POSIX does not specify whether \texttt{setjmp} saves the signal mask in the \texttt{jmp.buf}. It does on BSD platforms, and on glibc platforms when \texttt{_BSD_SOURCE} (and/or \texttt{_DEFAULT_SOURCE} on glibc \textgreater 2.19) is defined; in this case \texttt{setjmp} behaves like \texttt{sigsetjmp(.1)}, and functions \texttt{setjmp} and \texttt{longjmp} are available that don’t save or restore the signal mask. On System V platforms (excluding HP-UX), and on glibc platforms by default, \texttt{setjmp} doesn’t save the signal mask.
9.919 setkey

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setkey.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
• This function is not declared in <stdlib.h> (without -D_GNU_SOURCE) on some platforms: glibc (at least 2.11–2.13).

9.920 setlocale

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setlocale.html

Gnulib module: setlocale
Portability problems fixed by Gnulib:
• On Windows platforms (excluding Cygwin), setlocale(category, NULL) ignores the environment variables LC_ALL, category, and LANG.
• On Windows platforms (excluding Cygwin) and Cygwin 1.5.x, setlocale(LC_ALL, name) succeeds and sets the LC_CTYPE category to ‘C’ when it does not support the encoding, instead of failing.
• On Windows platforms (excluding Cygwin), setlocale understands different locale names, that are not based on ISO 639 language names and ISO 3166 country names.
• On Android 4.3, which which doesn’t have locales, the setlocale function always fails. The replacement, however, supports only the locale names "C" and "POSIX".
Portability problems not fixed by Gnulib:
• On Cygwin 1.5.x, which doesn’t have locales, setlocale(LC_ALL, NULL) always returns "C".
• On Cygwin 1.7.0, only the charset portion of a locale designation is honored.
• On OpenBSD, setlocale(LC_ALL,"") will only update categories that are deemed appropriate for the LC_ALL environment value, even if there are other categories set to different values in the environment. In addition any value is accepted for LC_CTYPE, and so NULL is never returned to indicate a failure to set locale. To verify category values, each category must be set individually with setlocale(LC_COLLATE,"") etc.

9.921 setlogmask

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setlogmask.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS.
9.922 setnetent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setnetent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Cygwin, mingw, MSVC 14, BeOS, Android 8.1.

9.923 setpgid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setpgid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.924 setpgrp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setpgrp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Interix 3.5.

9.925 setpriority

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setpriority.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, BeOS.

9.926 setprotoent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setprotoent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 8.1.
9.927 setpwent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setpwent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14, Android 7.1.

9.928 setregid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setregid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.

9.929 setreuid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setreuid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, BeOS.

9.930 setrlimit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setrlimit.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS.
• On platforms where rlim_t is a 32-bit type, this function does not allow to set limits larger than 4 GB, such as for RLIMIT_FSIZE. The fix is to use the AC_SYS_LARGEFILE macro.
9.931 setservent

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setservent.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.932 setsid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setsid.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14.

9.933 setsockopt

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setsockopt.html

Gnulib module: setsockopt

Portability problems fixed by Gnulib:

• On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.

Portability problems not fixed by Gnulib:

• Many socket options are not available on all platforms.

9.934 setstate

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setstate.html

Gnulib module: random

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, Android 4.4.

• This function is not declared on some platforms: Cygwin 1.5.25.

Portability problems not fixed by Gnulib:

• This function has a slightly incompatible declaration (the argument type being ‘const char *’ instead of ‘char *’) on some platforms.
9.935 setuid
POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setuid.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.

9.936 setutxent
POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setutxent.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.

9.937 setvbuf
POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/setvbuf.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• On Windows platforms (excluding Cygwin), this function does not set errno upon failure.

9.938 shm_open
POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/shm_open.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
9.939  **shm_unlink**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/shm_unlink.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.940  **shmat**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/shmat.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 7.1.
- Attempts to **shmat** into a previously malloc-ed region fail on SunOS 4, with **errno** set to **EINVAL**, even if there is an **munmap** call in between.
- On Linux, the flag **SHM_REMAP** is needed in order to force **shmat** to replace existing memory mappings in the specify address range. On other platforms, it is not needed.

9.941  **shmct1**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/shmct1.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 7.1.

9.942  **shmdt**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/shmdt.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 7.1.
9.943 shmget

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/shmget.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 7.1.
- On many platforms (not Linux), SHMMAX is so small that it is unusable for reasonable applications, and/or shmget requires superuser privileges.

9.944 shutdown

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/shutdown.html

Gnulib module: shutdown

Portability problems fixed by Gnulib:
- On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.

Portability problems not fixed by Gnulib:

9.945 sigaction

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigaction.html

Gnulib module: sigaction

Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
- POSIX recommends that when specifying SA_RESETHAND, SA_NODEFER must also be specified.
- Support for SA_ONSTACK is missing on some platforms: mingw, MSVC 14, cygwin.
- Support for SA_SIGINFO is missing on some platforms: mingw, MSVC 14, Interix 3.5.
- Support for SIGCHLD, and thus for SA_NOCLDSTOP and SA_NOCLDWAIT, is missing on some platforms: mingw, MSVC 14.
- Support for SA_RESETHAND is missing on some platforms: NonStop.
- Support for SA_RESTART is missing on some platforms: mingw, MSVC 14, NonStop.
- In spite of having SA_SIGACTION, struct sigaction lacks the sa_sigaction member on some platforms: Irix 5.3.
- The symbolic value SIG_IGN for the SIGCHLD signal is equivalent to a signal handler

```c
void handle_child (int sigchld)
{
    while (waitpid (-1, NULL, WNOHANG) > 0)
```
except that `SIG_IGN` for `SIGCHLD` has the effect that the children execution times are not accounted in the `times` function. On some platforms (BSD? SystemV? Linux?), you need to use the `sigaction` flag `SA_NOCLDWAIT` in order to obtain this behavior.

### 9.946 sigaddset

**POSIX specification:**

Gnulib module: `sigprocmask`

Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

### 9.947 sigaltstack

**POSIX specification:**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.
- `sigaltstack` doesn’t work on HP-UX 11/IA-64 and OpenBSD 3.6/Sparc64.
- This function interprets the `ss_sp` member of `stack_t` as the upper bound instead of the lower bound of the alternate stack on some platforms: Irix 6.5

### 9.948 sigdelset

**POSIX specification:**

Gnulib module: `sigprocmask`

Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:
9.949 sigemptyset

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigemptyset.html

Gnulib module: sigprocmask
Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

9.950 sigfillset

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigfillset.html

Gnulib module: sigprocmask
Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

9.951 sighold

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sighold.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 7.1.

9.952 sigignore

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigignore.html

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, Cygwin 1.5.x, mingw, MSVC 14, BeOS, Android 7.1.
9.953 siginterrupt

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/siginterrupt.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, mingw, MSVC 14, Interix 3.5, BeOS.

Note: POSIX recommends using `sigaction` with `SA_RESTART` instead of `siginterrupt` (sig, 0).

9.954 sigismember

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigismember.html

Gnulib module: sigprocmask

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

9.955 siglongjmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/siglongjmp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.
- This is only provided as a macro on some platforms: Cygwin.

9.956 signal

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/signal.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function crashes when invoked with invalid arguments on some platforms: MSVC 14.
On System V platforms, when the signal is triggered, the kernel uninstalls the handler (i.e. resets the signal’s action to SIG_DFL) before invoking the handler. This opens the door to race conditions: undesired things happen if the signal is triggered twice and the signal handler was not quick enough reinstalling itself as a handler. On BSD platforms and glibc platforms, on the other hand, when the signal is triggered, the kernel blocks the signal before invoking the handler. This is saner, but POSIX still allows either behavior. To avoid this problem, use `sigaction` instead of `signal`.

### 9.957 `signbit`

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/signbit.html

Gnulib module: `signbit`

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.0, MSVC 9, Interix 3.5, Android 9.0.

Portability problems not fixed by Gnulib:

### 9.958 `signgam`

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/signgam.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This variable is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, mingw, MSVC 14.

### 9.959 `sigpause`

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/sigpause.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 7.1.

### 9.960 `sigpending`

**POSIX specification:**
http://www.opengroup.org/onlinepubs/9699919799/functions/sigpending.html

Gnulib module: `sigprocmask`

Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.
Portability problems not fixed by Gnulib:

**9.961 sigprocmask**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigprocmask.html

Gnulib module: sigprocmask

Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

**9.962 sigqueue**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigqueue.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

**9.963 sigrelse**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigrelse.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 7.1.

**9.964 sigset**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigset.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, Cygwin 1.5.x, mingw, MSVC 14, BeOS, Android 7.1.
9.965 sigsetjmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigsetjmp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.966 sigsuspend

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigsuspend.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14.

9.967 sigtimedwait

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigtimedwait.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, Solaris 2.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

• Linux implements the meaning of NULL timeout by doing what sigwaitinfo does; other platforms may not do the same.

9.968 sigwait

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigwait.html

Gnulib module: extensions

Portability problems fixed by Gnulib:

• This function has an incompatible declaration on some platforms: Solaris 11.4 (when _POSIX_PTHREAD_SEMANTICS is not defined).

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS.

• On Linux/glibc platforms before the advent of NPTL, signals could only be sent to one particular thread. In POSIX, signals are sent to the entire process and executed by any thread of the process that happens to have the particular signal currently unblocked.
9.969 **sigwaitinfo**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sigwaitinfo.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

9.970 **sin**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sin.html

Gnulib module: sin

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.971 **sinf**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sinf.html

Gnulib module: sinf

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.972 **sinh**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sinh.html

Gnulib module: sinh

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.973 **sinhf**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sinhf.html

Gnulib module: sinhf

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
• This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.974 sinh

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sinhl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.

• This function is only defined as a macro with arguments on some platforms: MSVC 14.

9.975 sinl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sinl.html

Gnulib module: sinl

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.

• This function is only defined as a macro with arguments on some platforms: MSVC 14.

• This function is not declared on some platforms: Mac OS X 10.3.

Portability problems not fixed by Gnulib:

9.976 sleep

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sleep.html

Gnulib module: sleep

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw (2005 or newer), MSVC 14.

• This function takes milliseconds as argument and returns void on some platforms: mingw (2005 and older).

• This function cannot sleep longer than 49.7 days on some platforms: Cygwin 1.5.x.

Portability problems not fixed by Gnulib:
• According to POSIX, the sleep function may interfere with the program’s use of the SIGALRM signal. On Linux, it doesn’t; on other platforms, it may.
Chapter 9: ISO C and POSIX Function Substitutes

9.977 snprintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/snprintf.html

Gnulib module: snprintf or snprintf-posix

Portability problems fixed by either Gnulib module snprintf or snprintf-posix:

• This function is missing on some platforms: IRIX 5.3, OSF/1 4.0, Solaris 2.5.1, MSVC 14.

• This function does not support format directives that access arguments in an arbitrary order, such as "%2$s", on some platforms: NetBSD 3.0, mingw, BeOS.

• This function does not return a byte count as specified in C99 on some platforms: HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, mingw.

• This function overwrites memory even when a size argument of 1 is passed on some platforms: Linux libc5, BeOS.

Portability problems fixed by Gnulib module snprintf-posix:

• This function does not support size specifiers as in C99 (hh, 11, j, t, z) on some platforms: AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.24, mingw, MSVC 14, BeOS.

• printf of ‘long double’ numbers is unsupported on some platforms: mingw, MSVC 14, BeOS.

• printf "%f", "%e", "%g" of Infinity and NaN yields an incorrect result on some platforms: AIX 5.2, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14.

• This function does not support the ‘a’ and ‘A’ directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, BeOS.

• This function does not support the ‘F’ directive on some platforms: NetBSD 3.0, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, BeOS.

• This function does not support the ‘n’ directive on some platforms: MSVC 14.

• This function does not support the ‘ls’ directive on some platforms: OpenBSD 4.0, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Haiku.

• This function does not support precisions in the ‘ls’ directive correctly on some platforms: Solaris 11.4.

• This function doesn’t support the ’ flag on some platforms: NetBSD 3.0, Cygwin 1.5.24, mingw, MSVC 14.

• This function does not round the argument of the ‘a’ directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.

• This function behaves incorrectly when a ‘-’ flag and a negative width are specified together, on some platforms: HP-UX 10.20.

• printf "%010f" of NaN and Infinity yields an incorrect result (padded with zeroes, or wrong capitalization) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, AIX 5.2, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14.
• This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: AIX 7.1, Solaris 10/x86, mingw, MSVC 14, BeOS.

• This function mishandles large floating point precisions (for example, formatting 1.0 with "%.511f") on some platforms: Solaris 10.

• This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.

• This function does not truncate the result as specified in C99 on some platforms: mingw, MSVC 14.

• This function does not fully support the ‘n’ directive on some platforms: HP-UX 11, mingw, MSVC 14.

• This function overwrites memory even when a zero size argument is passed on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

• The %m directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.

• Formatting noncanonical ‘long double’ numbers produces nonmeaningful results on some platforms: glibc and others, on x86, x86_64, IA-64 CPUs.

• When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.

9.978 sockatmark

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sockatmark.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.4, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.979 socket

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/socket.html

Gnulib module: socket

Portability problems fixed by Gnulib:

• On Windows platforms (excluding Cygwin), the descriptors returned by the socket function cannot be used in calls to read, write, and close; you have to use recv, send, closesocket in these cases instead.

• On Windows platforms (excluding Cygwin), error codes from this function are not placed in errno, and WSAGetLastError must be used instead.
Portability problems not fixed by Gnulib:

- On BeOS, the descriptors returned by the `socket` function cannot be used in calls to `read`, `write`, and `close`; you have to use `recv`, `send`, `closesocket` in these cases instead.

### 9.980 socketpair

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/socketpair.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14, BeOS.

### 9.981 sprintf

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/sprintf.html

Gnulib module: sprintf-posix

Portability problems fixed by Gnulib:

- This function does not support size specifiers as in C99 (`hh`, `11`, `j`, `t`, `z`) on some platforms: AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.24, mingw, MSVC 14, BeOS.
- `printf` of `long double` numbers is unsupported on some platforms: mingw, MSVC 14, BeOS.
- `printf` "`%f`", "%e", "%g" of Infinity and NaN yields an incorrect result on some platforms: AIX 5.2, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14.
- This function does not support the `a` and `A` directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
- This function does not support the `F` directive on some platforms: NetBSD 3.0, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
- This function does not support the `n` directive on some platforms: MSVC 14.
- This function does not support the `1s` directive on some platforms: OpenBSD 4.0, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Haiku.
- This function does not support precisions in the `1s` directive correctly on some platforms: Solaris 11.4.
- This function does not support format directives that access arguments in an arbitrary order, such as ""%2$s", on some platforms: NetBSD 3.0, mingw, MSVC 14, BeOS.
- This function doesn’t support the ‘’ flag on some platforms: NetBSD 3.0, Cygwin 1.5.24, mingw, MSVC 14.
- This function does not round the argument of the ‘a’ directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.
• This function behaves incorrectly when a ‘-’ flag and a negative width are specified together, on some platforms: HP-UX 10.20.
• printf "%010f" of NaN and Infinity yields an incorrect result (padded with zeroes, or wrong capitalization) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, AIX 5.2, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14.
• This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: AIX 7.1, Solaris 10/x86, mingw, MSVC 14, BeOS.
• This function mishandles large floating point precisions (for example, formatting 1.0 with "%.511f") on some platforms: Solaris 10.
• This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.

Portability problems not fixed by Gnulib:
• The %m directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.
• Formatting noncanonical ‘long double’ numbers produces nonmeaningful results on some platforms: glibc and others, on x86, x86_64, IA-64 CPUs.
• When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.

9.982 sqrt

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sqrt.html
Gnulib module: sqrt

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3.

9.983 sqrtf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sqrtf.html
Gnulib module: sqrft

Portability problems fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
• This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:
9.984 sqrtl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sqrtl.html
Gnulib module: sqrtl
Portability problems fixed by Gnulib:
• This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
• This function is only defined as a macro with arguments on some platforms: MSVC 14.
• This function is not declared on some platforms: Mac OS X 10.3.
• This function produces very imprecise results on some platforms: OpenBSD 5.1/SPARC.
Portability problems not fixed by Gnulib:

9.985 srand

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/srand.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is only defined as an inline function on some platforms: Android 4.4.

9.986 srand48

POSIX specification:
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.987 srandom

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/srandom.html
Gnulib module: random
Portability problems fixed by Gnulib:
• This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14.
• This function is only defined as an inline function on some platforms: Android 4.4.
Portability problems not fixed by Gnulib:
• This function has a slightly incompatible declaration (the return type being ‘long’ instead of ‘void’) on some platforms: Cygwin 1.5.25.
9.988 scanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/scanf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• On Windows platforms (excluding Cygwin), this function does not set errno upon failure.
• On Windows, this function doesn’t support the hh, ll, j, t, z size specifiers.

9.989 stat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/stat.html

Gnulib module: stat

Portability problems fixed by Gnulib:
• On platforms where off_t is a 32-bit type, stat may not correctly report the size of files or block devices larger than 2 GB. (Cf. AC_SYS_LARGEFILE.)
• The st_atime, st_ctime, st_mtime fields are affected by the current time zone and by the DST flag of the current time zone on some platforms: mingw, MSVC 14 (when the environment variable TZ is set).
• On MSVC 14, this function fails with error ENOENT on files such as ‘C:\pagefile.sys’ and on directories such as ‘C:\System Volume Information’.
• On some platforms, stat("link-to-file/",buf) succeeds instead of failing with ENOTDIR. FreeBSD 7.2, AIX 7.1, Solaris 9, mingw64.
• On some platforms, stat(".",buf) and stat("./",buf) give different results: mingw, MSVC 14.
• On Solaris 11.4, when this function yields a timestamp with a nonpositive tv_sec value, tv_nsec might be in the range −1000000000..−1, representing a negative nanoseconds offset from tv_sec.

Portability problems not fixed by Gnulib:
• See Section 8.63 [sys/stat.h], page 65, for general portability problems with struct stat.
• Cygwin’s stat function sometimes sets errno to EACCES when ENOENT would be more appropriate.
• Because of the definition of struct stat, it is not possible to portably replace stat via an object-like macro. Therefore, expressions such as (islnk ? lstat : stat) (name, buf) are not portable, and should instead be written islnk ? lstat (name, buf) : stat (name, buf).
9.990 statvfs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/statvfs.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, mingw, MSVC 14, Android 4.3.
• This function can hang if it stats all preceding entries in /proc/mounts, and any of those file systems are hard-mounted and not available. This affects Linux < 2.6.36.
• On platforms where f_blocks in ‘struct statvfs’ is a 32-bit value, this function may not work correctly on files systems larger than 4 TiB. The fix is to use the AC_SYS_LARGEFILE macro. This affects glibc/Hurd, HP-UX 11, Solaris.

Gnulib provides a module fsusage that provides similar information as statvfs.

9.991 stderr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/stderr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• stderr is created in 32-bit mode instead of 64-bit mode: Cygwin 1.5.x. One workaround is to use freopen(NULL, “r+”, stderr) on Cygwin 1.5.21 or newer. Another is to use the gnulib ftello module and do ftello(stderr).
• POSIX states that a setuid application can guarantee that fd 2 is open, but some systems guarantee this even for non-setuid programs. If an application is executed with fd 2 closed, use of stderr can affect an unrelated file that happened to be assigned to fd 2. The gnulib *-safer modules may be used to guarantee that fd 2 stays reserved for stderr.

9.992 stdin

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/stdin.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• stdin is created in 32-bit mode instead of 64-bit mode: Cygwin 1.5.x. One workaround is to use freopen(NULL, “r”, stdin) on Cygwin 1.5.21 or newer. Another is to use the gnulib ftello module and do ftello(stdin).
• POSIX states that a setuid application can guarantee that fd 0 is open, but some systems guarantee this even for non-setuid programs. If an application is executed with fd 0 closed, use of `stdin` can affect an unrelated file that happened to be assigned to fd 0. The gnulib *-safer modules may be used to guarantee that fd 0 stays reserved for `stdin`.

9.993 stdout

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/stdout.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• stdout is created in 32-bit mode instead of 64-bit mode: Cygwin 1.5.x. One workaround is to use freopen(NULL, “w”, stdout) on Cygwin 1.5.21 or newer. Another is to use the gnulib `ftello` module and do ftello(stdout).
• POSIX states that a setuid application can guarantee that fd 1 is open, but some systems guarantee this even for non-setuid programs. If an application is executed with fd 1 closed, use of `stdout` can affect an unrelated file that happened to be assigned to fd 1. The gnulib *-safer modules may be used to guarantee that fd 1 stays reserved for `stdout`.

9.994 stpcpy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/stpcpy.html

Gnulib module: stpcpy

Portability problems fixed by Gnulib:
• This function is missing on some platforms: NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, Android 4.4.
• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

9.995 stpcpy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/stpcpy.html

Gnulib module: stpcpy

Portability problems fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• This function has an incompatible return value on some platforms: AIX 5.1.
• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by GnuLib:

9.996 strcasecmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strcasecmp.html

GnuLib module: strcase

Portability problems fixed by GnuLib:
• This function is missing on some platforms: MSVC 14.

Portability problems not fixed by GnuLib:
• This function cannot work correctly on character strings in multibyte locales. GnuLib provides an alternative function mbstrcasecmp that does a case insensitive comparison of character strings and that works in all locales.

9.997 strcasecmp_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strcasecmp_l.html

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

9.998 strcat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strcat.html

GnuLib module: string

Portability problems fixed by GnuLib:
• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by GnuLib:
9.999 strchr

POSCX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strchr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function cannot work correctly on character strings in some multibyte locales.
  Gnulib provides an alternative function mbschr that works on character strings in all locales.

9.1000 strcmp

POSCX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strcmp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.1001 strcoll

POSCX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strcoll.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function fails, setting errno to EILSEQ, on Solaris 10, in UTF-8 locales, when at least one of the strings contains a Unicode character in a block that was not assigned in Unicode 4.0.

9.1002 strcoll_l

POSCX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strcoll_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
9.1003 strcpy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strcpy.html

Gnulib module: string

Portability problems fixed by Gnulib:
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

Note: strcpy (dst, src) is only safe to use when you can guarantee that there are at least strlen (src) + 1 bytes allocated at dst.

9.1004 strcspn

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strcspn.html

Gnulib module: strcspn

Portability problems fixed by Gnulib:
- This function is missing on some old platforms.

Portability problems not fixed by Gnulib:
- This function cannot work correctly on character strings in multibyte locales. Gnulib provides an alternative function mbscspn that works on character strings in all locales.

9.1005 strdup

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strdup.html

Gnulib module: strdup or strdup-posix

Portability problems fixed by either Gnulib module strdup or strdup-posix:
- This function is missing on some old platforms.
- This function has no prototype in <string.h> on some old platforms.

Portability problems fixed by Gnulib module strdup-posix:
- Upon failure, the function does not set errno to ENOMEM on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.1006 strerror

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strerror.html

Gnulib module: strerror
Portability problems fixed by Gnulib:

- This function does not support the error values that are specified by POSIX but not
defined by the system, on some platforms: OpenBSD 4.0, OSF/1 5.1, NonStop Kernel,
Cygwin 1.5.x, mingw, MSVC 14.
- This function reports failure for `strerror(0)` (by setting `errno` or using a string similar
to out-of-range values), although POSIX requires this to leave `errno` unchanged and
report success, on some platforms: FreeBSD 8.2, OpenBSD 4.7, Mac OS X 10.5.
- This function fails to return a string for out-of-range integers on some platforms: HP-
UX 11, IRIX 6.5, Solaris 8. (Some return NULL which is a POSIX violation, others
return the empty string which is valid but not as useful); this can still cause bugs
because most programs call `strerror` without setting and testing `errno`.

Portability problems not fixed by Gnulib:

### 9.1007 `strerror_l`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strerror_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0,
NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1,
Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

### 9.1008 `strerror_r`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strerror_r.html

Gnulib module: strerror_r-posix

Portability problems fixed by Gnulib:

- This function is missing on some platforms: NetBSD 3.0, Minix 3.1.8, HP-UX 11.23,
IRIX 6.5, Solaris 9, mingw, MSVC 14.
- glibc, Cygwin, and Android have an incompatible version of this function. The POSIX
compliant code

  ```c
  char *s = (strerror_r (err, buf, buflen) == 0 ? buf : NULL);
  ```

  is essentially equivalent to this code using the glibc function:

  ```c
  char *s = strerror_r (err, buf, buflen);
  ```

- This function clobbers the `strerror` buffer on some platforms: Cygwin 1.7.9.
- This function is sometimes not declared in `<string.h>` on some platforms: glibc 2.8,
OSF/1 5.1.
- The third argument is of type `int` instead of `size_t` on some platforms: AIX 5.1,
OSF/1 5.1.
When this function fails, it returns \(-1\) and sets `errno`, instead of returning the error number, on some platforms: glibc 2.12 with `\-D_POSIX_C_SOURCE=200112L`, AIX 6.1, OSF/1 5.1.

When this function fails, it corrupts `errno`, on some platforms: Solaris 10.

This function does not support many error values defined in `<errno.h>` on some platforms: MSVC 14.

This function does not support the error values that are specified by POSIX but not defined by the system, on some platforms: OpenBSD 4.0, OSF/1 5.1, NonStop Kernel, Cygwin 1.5.x.

This function reports failure for `strerror_r(0, buf, len)`, although POSIX requires this to succeed, on some platforms: FreeBSD 8.2.

This function produces a different string for 0 than `strerror` on some platforms: Mac OS X 10.5.

This function always fails when the third argument is less than 80 on some platforms: HP-UX 11.31.

When the buffer is too small and the value is in range, this function does not fail, but instead truncates the result and returns 0 on some platforms: AIX 6.1, OSF/1 5.1, Haiku 2017.

When the value is not in range or the buffer is too small, this function fails to leave a NUL-terminated string in the buffer on some platforms: glibc 2.13, FreeBSD 8.2, Solaris 10.

When the value is out of range but the buffer is too small, this function does not always return the longest possible string on some platforms: OpenBSD 4.7.

Portability problems not fixed by Gnulib:

### 9.1009 `strfmon`

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/strfmon.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Cygwin 1.7.1, mingw, MSVC 14, BeOS, Android 9.0.

### 9.1010 `strfmon_l`

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/strfmon_l.html

Gnulib module: strfmon_l

Portability problems fixed by Gnulib:

- This function uses a wrong locale for the numbers on some platforms: glibc 2.23.
Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

9.1011 strftime

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strftime.html

Gnulib module: strftime-fixes

Portability problems fixed by Gnulib:

- On native Windows platforms (mingw, MSVC), this function works incorrectly when the environment variable TZ has been set by Cygwin.

Portability problems not fixed by Gnulib:

- The Windows C runtime library (which is used by MinGW) does not support the %e specifier (and possibly the other more recent SUS specifiers too, i.e., %C, %D, %h, %n, %r, %R, %t, and %T).
- Native Windows platforms (mingw, MSVC) support only a subset of time zones supported by GNU or specified by POSIX. See Section 9.1101 [tzset], page 398.

Extension: Gnulib offers a module ‘nstrftime’ that provides an nstrftime function with various GNU extensions.

9.1012 strftime_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strftime_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.1013 strlen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strlen.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
9.1014 strncasecmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strncasecmp.html

Gnulib module: strcase

Portability problems fixed by Gnulib:
• This function is missing on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:
• This function cannot work correctly on character strings in multibyte locales. Gnulib provides alternative functions mbsncasecmp and mbspcasecmp that do a case insensitive comparison of character strings and that work in all locales.

9.1015 strncasecmp_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strncasecmp_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

9.1016 strncat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strncat.html

Gnulib module: strncat

Portability problems fixed by Gnulib:
• This function dereferences too much memory on some platforms: Solaris 10 on SPARC, Solaris 11.0 on x86.
• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

9.1017 strncmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strncmp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
9.1018 strncpy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strncpy.html

Gnulib module: string

Portability problems fixed by Gnulib:

• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

Note: This function was designed for the use-case of filling a fixed-size record with a string, before writing it to a file. This function is not appropriate for copying a string into a bounded memory area, because you have no guarantee that the result will be NUL-terminated. Even if you add the NUL byte at the end yourself, this function is inefficient (as it spends time clearing unused memory) and will allow silent truncation to occur, which is not a good behavior for GNU programs. For more details, see https://meyering.net/crusade-to-eliminate-strncpy/.

9.1019 strndup

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strndup.html

Gnulib module: strndup

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, Interix 3.5, BeOS.

• This function does not NUL-terminate the result on some platforms: AIX 5.1.

Portability problems not fixed by Gnulib:

9.1020 strnlen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strnlen.html

Gnulib module: strnlen

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, Interix 3.5.

• This function is buggy on some platforms: AIX 4.3.

Portability problems not fixed by Gnulib:
9.1021 strpbrk

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strpbrk.html

Gnulib module: strpbrk

Portability problems fixed by Gnulib:
- This function is missing on some old platforms.

Portability problems not fixed by Gnulib:
- This function cannot work correctly on character strings in multibyte locales. Gnulib provides an alternative function mbspbrk that works on character strings in all locales.

9.1022 strptime

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strptime.html

Gnulib module: strptime

Portability problems fixed by Gnulib:
- This function is missing on some platforms: IRIX 5.3, mingw, MSVC 14, BeOS.

Portability problems not fixed by Gnulib:

9.1023 strrchr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strrchr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function cannot work correctly on character strings in some multibyte locales. Gnulib provides an alternative function mbsrchr that works on character strings in all locales.

9.1024 strsignal

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strsignal.html

Gnulib module: strsignal

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, mingw, MSVC 14.
- This function does not return a string for out-of-range numbers on some platforms: Solaris, AIX 5.1.
- This function is declared in unistd.h instead of string.h on some platforms: NetBSD 5.0.

Portability problems not fixed by Gnulib:
- This function returns const char * instead of char * on some platforms: cygwin 1.5.25.
9.1025 strspn

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strspn.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function cannot work correctly on character strings in multibyte locales. Gnulib provides an alternative function mbsspn that works on character strings in all locales.

9.1026 strstr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strstr.html

Gnulib module: strstr or strstr-simple

Portability problems fixed by either Gnulib module strstr-simple or strstr:
- This function can trigger memchr bugs on some platforms: glibc 2.10.
- This function can trigger false positives for long periodic needles on some platforms: glibc 2.12, Cygwin 1.7.7.
- This function may fail to find matches on some platforms: glibc 2.28.

Portability problems fixed by Gnulib strstr:
- This function has quadratic instead of linear worst-case complexity on some platforms: glibc 2.8, Mac OS X 10.5, FreeBSD 6.2, NetBSD 5.0, OpenBSD 4.0, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14.

Portability problems not fixed by Gnulib:
- This function cannot work correctly on character strings in most multibyte locales. Gnulib provides an alternative function mbsstr that works on character strings in all locales.

9.1027 strtod

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strtod.html

Gnulib module: strtod or strtod-obsolete

Portability problems fixed by either Gnulib module strtod or strtod-obsolete:
- This function mis-parses strings with leading ‘+’ on some old platforms: Old versions of Linux.
- This function returns a wrong end pointer on some old platforms.
- This function consumes whitespace even when there is nothing that should be parsed on some platforms: IRIX 6.5, OSF/1 5.1.
- This function allows whitespace between ‘e’ and the exponent on some platforms: HP-UX 11.11, IRIX 6.5, OSF/1 4.0.
Portability problems fixed by Gnulib module **strtod-obsolete**:

- This function is missing on some old platforms.

Portability problems not fixed by Gnulib:

- This function returns +0.0 (not −0.0) for negative underflow on some platforms: glibc 2.7, Cygwin 1.5.x, mingw, MSVC 14.
- This function cannot distinguish between “nan” and “-nan” on some platforms: glibc 2.7, IRIX 6.5, OSF/1 5.1, mingw, MSVC 14.
- This function fails to correctly parse very long strings on some platforms: Mac OS X 10.5, FreeBSD 6.2, NetBSD 5.0, OpenBSD 4.0, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14.
- The replacement function does not always return correctly rounded results.

### 9.1028 **strtof**

POSIX specification:  

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5, BeOS, Android 4.4.
9.1029 strtoimax

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strtoimax.html

Gnulib module: strtoimax

Portability problems fixed by Gnulib:

• This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, IRIX 6.5, OSF/1 5.1, Solaris 9, MSVC 9, Interix 3.5.
• This function fails on valid input strings on some platforms: AIX 5.1.

Portability problems not fixed by Gnulib:

• This function is only defined as a macro on some platforms: HP-UX 11.11.

9.1030 strtok

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strtok.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.1031 strtok_r

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strtok_r.html

Gnulib module: strtok_r

Portability problems fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14.
• This function crashes when invoked from code compiled with optimization enabled on some platforms: glibc 2.7.

Portability problems not fixed by Gnulib:

• This function cannot work correctly on character strings in multibyte locales. Gnulib provides an alternative function mbstok_r that works on character strings in all locales.

9.1032 strtol

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strtol.html

Gnulib module: strtol

Portability problems fixed by Gnulib:

• This function is missing on some old platforms.

Portability problems not fixed by Gnulib:
9.1033 `strtold`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strtold.html

Gnulib module: strtold

Portability problems fixed by Gnulib:

- This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, older IRIX 6.5, OSF/1 4.0, Solaris 9, older Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.4.
- This function returns a struct, not a `long double`, on some platforms: HP-UX 11.31/hppa.
- This function consumes whitespace even when there is nothing that should be parsed on some platforms: IRIX 6.5.
- This function allows whitespace between ‘e’ and the exponent on some platforms: HP-UX 11.31/ia64, IRIX 6.5.
- This function returns the wrong end pointer for ‘-0x’ on some platforms: glibc-2.3.2, Mac OS X 10.5, Haiku.
- This function returns +0.0 (not −0.0) for ‘-0’ on some platforms: IRIX 6.5.
- This function fails to parse Infinities and plain NaNs on some platforms: HP-UX 11.31/ia64, IRIX 6.5.
- This function fails to parse ‘NaN(0)’ on some platforms: glibc-2.3.2, IRIX 6.5, mingw, Haiku.
- This function fails to parse ‘NaN(n-char-sequence)’ on some platforms: IRIX 6.5.
- This function parses ‘NaN(n-char-sequence)’, but returns the wrong end pointer on some platforms: glibc-2.3.2, mingw, Haiku.
- This function fails to parse C99 hexadecimal floating point on some platforms: IRIX 6.5, mingw.
- In hexadecimal floats, this function allows whitespace between ‘p’ and the exponent on some platforms: HP-UX 11.31/ia64.

Portability problems not fixed by Gnulib:

- The replacement function does not always return correctly rounded results.

9.1034 `strtoll`

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strtoll.html

Gnulib module: strtoll

Portability problems fixed by Gnulib:

- This function is missing on some platforms: HP-UX 11.11, OSF/1 5.1, MSVC 9, Interix 3.5.

Portability problems not fixed by Gnulib:
9.1035  **strtoul**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strtoul.html

Gnulib module: strtoul

Portability problems fixed by Gnulib:
• This function is missing on some old platforms.

Portability problems not fixed by Gnulib:

9.1036  **strtoull**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strtoull.html

Gnulib module: strtoull

Portability problems fixed by Gnulib:
• This function is missing on some platforms: HP-UX 11.11, OSF/1 5.1, MSVC 9, Interix 3.5.

Portability problems not fixed by Gnulib:

9.1037  **strtoumax**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strtoumax.html

Gnulib module: strtoumax

Portability problems fixed by Gnulib:
• This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 9, MSVC 9, Interix 3.5.

Portability problems not fixed by Gnulib:
• This function is only defined as a macro on some platforms: HP-UX 11.11.

9.1038  **strxfrm**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strxfrm.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
9.1039 strxfrm_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/strxfrm_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.1040 swab

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/swab.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: BeOS, Android 8.1.

9.1041 swprintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/swprintf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• The %m directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.
• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Interix 3.5, BeOS.
• This function has a different signature on some platforms: MSVC 9.
• This function is only defined as a macro on some platforms: MSVC 14.
• This function does not support the ‘n’ directive on some platforms: MSVC 14.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
• On Windows, this function does not take a buffer size as second argument.
• When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.
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9.1042  swscanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/swscanf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Interix 3.5, BeOS.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1043  symlink

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/symlink.html

Gnulib module: symlink

Portability problems fixed by Gnulib:

• On some systems, symlink(value,"name/") mistakenly creates a symlink: FreeBSD 7.2, AIX 7.1, Solaris 9.
• This function is missing on some platforms; however, the replacement always fails with EPERM: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

• Some file systems do not support symbolic links.

9.1044  symlinkat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/symlinkat.html

Gnulib module: symlinkat

Portability problems fixed by Gnulib:

• This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4. But the replacement function is not safe to be used in libraries and is not multithread-safe.
• Some platforms declare this function in stdio.h instead of unistd.h: Cygwin 1.7.1.
• On some systems, symlinkat(value, fd, "name") mistakenly creates a symlink: AIX 7.1.

Portability problems not fixed by Gnulib:

• This function always fails with ‘ENOSYS’ on platforms that don’t support symlinks: mingw, MSVC 14.
9.1045 sync

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sync.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, Interix 3.5.

9.1046 sysconf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/sysconf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14.

9.1047 syslog

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/syslog.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS.

9.1048 system

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/system.html

Gnulib module: system-posix

Portability problems fixed by Gnulib:

• The macros WIFSIGNALED, WIFEXITED, WIFSTOPPED, WTERMSIG, WEXITSTATUS, WNOHANG, WUNTRACED, WSTOPSIG are not defined in <stdlib.h> (only in <sys/wait.h>) on some platforms: MirBSD 10.

Portability problems not fixed by Gnulib:

• On Windows platforms (excluding Cygwin), the command processor used by the system function is cmd.exe, not /bin/sh. Accordingly, the rules for quoting shell arguments containing spaces, quote or other special characters are different.
9.1049  tan

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tan.html

Gnulib module: tan

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.1050  tanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tanf.html

Gnulib module: tanf

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:

9.1051  tanh

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tanh.html

Gnulib module: tanh

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.1052  tanhf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tanhf.html

Gnulib module: tanhf

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 9.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.

Portability problems not fixed by Gnulib:
9.1053 tanhl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tanhl.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.

9.1054 tanl

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tanl.html

Gnulib module: tanl

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, Interix 3.5, BeOS, Android 4.4.
- This function is only defined as a macro with arguments on some platforms: MSVC 14.
- This function is not declared on some platforms: Mac OS X 10.3.

Portability problems not fixed by Gnulib:

9.1055 tcdrain

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tcdrain.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.
- On some platforms, tcdrain on a non-tty fails with errno set to EINVAL or, on Mac OS X, also EOPNOTSUPP or ENODEV, rather than ENOTTY.

9.1056 tcflow

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tcflow.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.
9.1057 tcflush

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tcflush.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, Android 4.4.
• On some platforms, tcflush of TCIFLUSH on a non-tty fails with errno set to EINVAL rather than ENOTTY.
• On some platforms, tcflush of TCOFLUSH on a non-tty fails with errno set to EINVAL or, on IRIX, also ENOSYS, or, on Mac OS X, also EOPNOTSUPP or ENODEV, rather than ENOTTY.

9.1058 tcgetattr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tcgetattr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, Android 4.4.

9.1059 tcgetpgrp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tcgetpgrp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.1060 tcgetsid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tcgetsid.html

Gnulib module: tcgetsid

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, OpenBSD 4.5, Minix 3.1.8, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• This function is not declared on some platforms: OSF/1 5.1.
• The declaration of this function in C++ compilation units has C++ linkage, not C linkage, on some platforms: HP-UX 11.00.
Portability problems not fixed by Gnulib:

- This function always fails on some platforms: FreeBSD 6.0, Cygwin 1.7.8, mingw, MSVC 14, Interix 3.5, BeOS.
- This function returns int instead of pid_t on some platforms: Cygwin 1.7.11.

9.1061 tcsendbreak

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tcsendbreak.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.

9.1062 tcsetattr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tcsetattr.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14, Android 4.4.

9.1063 tcsetpgrp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tcsetpgrp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

9.1064 tdelete

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tdelete.html

Gnulib module: tsearch

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 4.0.4.
- tdelete returns NULL when removing the last element of a tree on some platforms: OpenBSD 4.0.

Portability problems not fixed by Gnulib:
9.1065 telldir

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/telldir.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: MSVC 14, BeOS, Android 5.1.
- On platforms where `long int` is a 32-bit type, this function may not work correctly on huge directories larger than 2 GB. The fix is to use the `AC_SYS_LARGEFILE` macro (only on Mac OS X systems).

9.1066 tempnam

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tempnam.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8.
- This function is not appropriate for creating temporary files. (It has security risks.) Better use `mkstemp` instead.

9.1067 tfind

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tfind.html

Gnulib module: tsearch

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 4.0.4.

9.1068 tgamma

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tgamma.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5, BeOS.
9.1069 \texttt{tgammaf}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/tgammaf.html}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, MSVC 9, Interix 3.5, BeOS.

9.1070 \texttt{tgammal}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/tgammal.html}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.4.

9.1071 \texttt{time}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/time.html}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.1072 \texttt{timer_create}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/timer_create.html}

Gnulib module: timer-time

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: OS X 10.11, FreeBSD 6.4, Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Tandem/NSK.
- This function fails with \texttt{ENOSYS} on some platforms: OpenBSD 4.9.
9.1073  timer_delete

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/timer_delete.html

Gnulib module: timer-time

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: OS X 10.11, FreeBSD 6.4, Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Tandem/NSK.
- This function fails with ENOSYS on some platforms: OpenBSD 4.9.

9.1074  timer_getoverrun

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/timer_getoverrun.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: OS X 10.11, FreeBSD 6.0, Minix 3.1.8, IRIX 5.3, Solaris 2.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

9.1075  timer_gettime

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/timer_gettime.html

Gnulib module: timer-time

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: OS X 10.11, FreeBSD 6.4, Minix 3.1.8, IRIX 5.3, mingw, MSVC 14, Interix 3.5, BeOS, Tandem/NSK.
- This function fails with ENOSYS on some platforms: OpenBSD 4.9.

9.1076  timer_settime

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/timer_settime.html

Gnulib module: timer-time

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: OS X 10.11, FreeBSD 6.4, Minix 3.1.8, IRIX 5.3, Solaris 2.4, mingw, MSVC 14, Interix 3.5, BeOS, Tandem/NSK.
- This function fails with ENOSYS on some platforms: OpenBSD 4.9.
9.1077 **times**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/times.html

Gnulib module: times

Portability problems fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

- There is no function on Windows to measure consumed process child times, thus the `tms_cutime` and `tms_cstime` will always be 0 when the module is used.

9.1078 **timezone**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/timezone.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This variable is missing on some platforms: IRIX 6.5, OSF/1 5.1, mingw.
- The address of this variable is not a compile-time constant on some platforms: mingw.
- Native Windows platforms (mingw, MSVC) support only a subset of time zones supported by GNU or specified by POSIX. See Section 9.1101 [tzset], page 398.

A more portable way of getting the UTC offset is to use `strftime` with the `%z` format. See Section 9.1011 [strftime], page 372.

9.1079 **tmpfile**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tmpfile.html

Gnulib module: tmpfile

Portability problems fixed by Gnulib:

- This function always fails on some platforms: Android 4.3.
- This function often fails for trivial reasons on some platforms: mingw, MSVC 14.
- On platforms where `off_t` is a 32-bit type, `tmpfile` may not work correctly to create files larger than 2 GB. (Cf. `AC_SYS_LARGEFILE`.)

Portability problems not fixed by Gnulib:
9.1080 tmpnam

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tmpnam.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is not appropriate for creating temporary files. (It has security risks.) Better use mkstemp instead.

9.1081 toascii

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/toascii.html

Gnulib module: ctype

Portability problems fixed by Gnulib:

• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

9.1082 tolower

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tolower.html

Gnulib module: ctype

Portability problems fixed by Gnulib:

• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:

• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1083 tolower_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tolower_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
9.1084 toupper

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/toupper.html

Gnulib module: ctype

Portability problems fixed by Gnulib:
- This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1085 toupper_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/toupper_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

9.1086 towctrans

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/towctrans.html

Gnulib module: towctrans

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.5.1, mingw, MSVC 9, Interix 3.5, Android 7.1.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1087 towctrans_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/towctrans_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1088 towlower

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/towlower.html
Gnulib module: wctype-h
Portability problems fixed by Gnulib:
• This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.
• This function returns values of which the upper 16 bits are incorrect on some platforms: mingw.
• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.
Portability problems not fixed by Gnulib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1089 towlower_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/towlower_l.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1090 towupper

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/towupper.html
Gnulib module: wctype-h
Portability problems fixed by Gnulib:
• This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.
• This function returns values of which the upper 16 bits are incorrect on some platforms: mingw.
• This function cannot be called from plain inline or extern inline functions on some platforms: OS X 10.8.
Portability problems not fixed by Gnulib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1091  **towupper_l**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/towupper_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1092  **trunc**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/trunc.html

Gnulib module: trunc or trunc-ieee

Portability problems fixed by either Gnulib module trunc or trunc-ieee:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 3.0, OpenBSD 3.8, Solaris 9, MSVC 9, Interix 3.5.
- This function is not declared (without -D_GNU_SOURCE) on some platforms: glibc 2.8.

Portability problems fixed by Gnulib module trunc-ieee:

- This function returns a positive zero for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.1093  **truncate**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/truncate.html

Gnulib module: truncate

Portability problems fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14, Android 4.4 with AC_SYS_LARGEFILE in effect.
- On platforms where off_t is a 32-bit type, this function is not applicable to arbitrary lengths for files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

Portability problems not fixed by Gnulib:
9.1094 **truncf**

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/truncf.html

Gnulib module: truncf or truncf-ieee

Portability problems fixed by either Gnulib module **truncf** or **truncf-ieee**:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, Solaris 9, MSVC 9, Interix 3.5.
- This function is not declared (without -D_GNU_SOURCE) on some platforms: glibc 2.8.

Portability problems fixed by Gnulib module **truncf-ieee**:

- This function returns a positive zero for a minus zero argument on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.1095 **truncl**

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/truncl.html

Gnulib module: truncl or truncl-ieee

Portability problems fixed by either Gnulib module **truncl** or **truncl-ieee**:

- This function is missing on some platforms: FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS.
- This function is not declared (without -D_GNU_SOURCE) on some platforms: glibc 2.8.
- This function crashes on some platforms: OSF/1 4.0.

Portability problems fixed by Gnulib module **truncl-ieee**:

- This function returns a positive zero for an argument between −1 and 0 on some platforms: OSF/1 5.1.

Portability problems not fixed by Gnulib:

9.1096 **tsearch**

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/tsearch.html

Gnulib module: tsearch

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 4.0.4.

Portability problems not fixed by Gnulib:
9.1097 ttynamename

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ttynamename.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14.
• This function is just a stub that produces an error message on standard error on some platforms: Android 4.3.

9.1098 ttynamename_r

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ttynamename_r.html

Gnulib module: ttynamename_r

Portability problems fixed by Gnulib:

• This function is missing on some platforms: NetBSD 3.0, Minix 3.1.8, mingw, MSVC 14, BeOS.
• This function is not declared unless _REENTRANT is defined, on some platforms: HP-UX 11.
• This function has an incompatible declaration on some platforms: Mac OS X 10.4, Solaris 11.4 (when _POSIX_PTHREAD_SEMANTICS is not defined).
• This function ignores the size argument, thus overwriting memory after the buffer, on some platforms: OSF/1 5.1.
• This function refuses to do anything when the output buffer is less than 128 bytes large, on some platforms: Solaris 11 2010-11.
• This function is just a stub that produces an error message on standard error on some platforms: Android 4.3.

Portability problems not fixed by Gnulib:

9.1099 twalk

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/twalk.html

Gnulib module: tsearch

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 4.4.

Portability problems not fixed by Gnulib:
9.1100 tzname

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tzname.html

Gnulib module: —

Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This variable is missing on some platforms: IRIX 6.5, OSF/1 5.1, mingw.
- The address of this variable is not a compile-time constant on some platforms: Cygwin, mingw.
- Native Windows platforms (mingw, MSVC) support only a subset of time zones supported by GNU or specified by POSIX. See Section 9.1101 [tzset], page 398.

A more portable way of getting the time zone abbreviation is to use strftime with the %Z format. See Section 9.1011 [strftime], page 372.

9.1101 tzset

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/tzset.html

Gnulib module: tzset
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- On native Windows platforms (mingw, MSVC), this function works incorrectly when the environment variable TZ has been set by Cygwin.
- This function clobbers the buffer used by the localtime function on some platforms: Solaris 2.6.

Portability problems not fixed by Gnulib:
- Native Windows platforms (mingw, MSVC) support only a subset of POSIX-specified values for the TZ environment variable, consisting of a time zone abbreviation containing exactly three ASCII letters with no daylight saving time or angle brackets, and with no support for tz database settings like TZ='America/New_York'. Even this subset does not work on applications built via the Universal Windows Platform, as it does not make environment variables like TZ available to applications.
- Older POSIX platforms do not support angle brackets in TZ values, as this feature was added in IEEE Std 1003.1-2001.

9.1102 ulimit

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ulimit.html

Gnulib module: —

Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
9.1103 umask

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/umask.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

9.1104 uname

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/uname.html

Gnulib module: uname

Portability problems fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.1105 ungetc

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ungetc.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• On Windows platforms (excluding Cygwin), this function does not set errno upon failure.

9.1106 ungetwc

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/ungetwc.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x, BeOS.

• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1107 unlink

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/unlink.html

Gnulib module: unlink

Portability problems fixed by Gnulib:
- On Mac OS X 10.10, in a writable HFS mount, `unlink("..")` succeeds without doing anything.

Portability problems not fixed by Gnulib:
- Some systems allow a superuser to unlink directories, even though this can cause file system corruption. The error given if a process is not permitted to unlink directories varies across implementations; it is not always the POSIX value of `EPERM`. Meanwhile, if a process has the ability to unlink directories, POSIX requires that `unlink("symlink-to-dir/")` remove `dir` and leave `symlink-to-dir` dangling; this behavior is counter-intuitive. The gnulib module `unlinkdir` can help determine whether code must be cautious of unlinking directories.
- Removing an open file is non-portable: On Unix this allows the programs that have the file already open to continue working with it; the file’s storage is only freed when the no process has the file open any more. On Windows, the attempt to remove an open file fails.

9.1108 unlinkat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/unlinkat.html

Gnulib module: unlinkat

Portability problems fixed by Gnulib:
- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS. But the replacement function is not safe to be used in libraries and is not multithread-safe.
- This function is declared in `<fcntl.h>`, not in `<unistd.h>`, on some platforms: Cygwin 1.7.1, Android 4.3.
- On Mac OS X 10.10, in a writable HFS mount, `unlinkat(fd, "..", 0)` succeeds without doing anything.

Portability problems not fixed by Gnulib:
- When `unlinkat(fd,name,AT_REMOVEDIR)` fails because the specified directory is not empty, the `errno` value is system dependent.
- POSIX requires that `unlinkat(fd,"link-to-empty/",AT_REMOVEDIR)` remove `empty` and leave `link-to-empty` as a dangling symlink. This is counter-intuitive, so some systems fail with `ENOTDIR` instead: glibc
• Some systems allow a superuser to unlink directories, even though this can cause
file system corruption. The error given if a process is not permitted to unlink di-
rectories varies across implementations; it is not always the POSIX value of \texttt{EPERM}.
Meanwhile, if a process has the ability to unlink directories, POSIX requires that
\texttt{unlinkat(fd, ”symlink-to-dir/”, 0)} remove \texttt{dir} and leave \texttt{symlink-to-dir} dan-
gling; this behavior is counter-intuitive. The gnulib module \texttt{unlinkdir} can help deter-
mine whether code must be cautious of unlinking directories.

• Removing an open file is non-portable: On Unix this allows the programs that have
the file already open to continue working with it; the file’s storage is only freed when
the no process has the file open any more. On Windows, the attempt to remove an
open file fails.

9.1109 \texttt{unlockpt}

\textbf{POSIX specification:}
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/unlockpt.html}

Gnulib module: unlockpt

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix
3.1.8, mingw, MSVC 14, BeOS.

Portability problems not fixed by Gnulib:

• This function is not declared on some platforms: IRIX 5.3.

• This function reports success for invalid file descriptors on some platforms: NetBSD
5.1, Cygwin 1.7.9.

9.1110 \texttt{unsetenv}

\textbf{POSIX specification:}
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/unsetenv.html}

Gnulib module: unsetenv

Portability problems fixed by Gnulib:

• This function is missing on some platforms: AIX 5.1, HP-UX 11.23, IRIX 6.5, Solaris
9, mingw, MSVC 14, BeOS.

• This function is not declared on some platforms: OSF/1 5.1.

• This function has the return type ‘\texttt{void}’ instead of ‘\texttt{int}’ on some platforms: Mac OS
X 10.3, FreeBSD 6.0, NetBSD 1.6, OpenBSD 3.8, OSF/1 5.1.

• On some platforms, this function does not fail with ‘\texttt{EINVAL}’ when passed an empty
string or a string containing ‘\texttt{=}’: FreeBSD 6.0, NetBSD 1.6, OpenBSD 4.7.

• This function removes only the first value association for the given environment vari-
able, not all of them, on some platforms: Solaris 11.4, Haiku.

Portability problems not fixed by Gnulib:

• Older versions of POSIX required that \texttt{unsetenv(NULL)} gracefully fail with \texttt{EINVAL},
but not all implementations guarantee this, and the requirement was removed.
9.1111 uselocale

POSIX specification:  
http://www.opengroup.org/onlinepubs/9699919799/functions/uselocale.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 9.0, NetBSD 5.0, OpenBSD 6.1, Minix 3.1.8, AIX 6.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 2.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- This function is not documented and leads to crashes in subsequent setlocale invocations on some platforms: AIX 7.2.
- This function is useless because the locale_t type contains basically no information on some platforms: OpenBSD 6.3.

9.1112 utime

POSIX specification:  
http://www.opengroup.org/onlinepubs/9699919799/functions/utime.html

Gnulib module: utime

Portability problems fixed by Gnulib:

- The times that are set on the file are affected by the current time zone and by the DST flag of the current time zone on some platforms: mingw, MSVC 14 (when the environment variable TZ is set).
- On some platforms, the prototype for utime omits const for the second argument: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

- On some platforms, this function mis-handles trailing slash: Solaris 9.
- This function cannot set full timestamp resolution. Use utimensat(AT_FDCWD,file,times,0), or the gnulib module utimens, instead.

9.1113 utimensat

POSIX specification:  
http://www.opengroup.org/onlinepubs/9699919799/functions/utimensat.html

Gnulib module: utimensat

Portability problems fixed by Gnulib:

- This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 3.0. However, the replacement function may end up truncating timestamps to worse resolution than supported by the file system. Furthermore, the replacement function is not safe to be used in libraries and is not multithread-safe.
• This function returns a bogus value instead of failing with ENOSYS on some platforms: Linux kernel 2.6.21.
• This function fails with ENOSYS if passed the flag AT_SYMLINK_NOFOLLOW on a regular file: Linux kernel 2.6.22.
• When using UTIME_OMIT or UTIME_NOW, some systems require the tv_sec argument to be 0, and don’t necessarily handle all file permissions in the manner required by POSIX: Linux kernel 2.6.25.
• When using UTIME_OMIT for the modification time, but specifying an access time, some systems fail to update the change time: Linux kernel 2.6.32, Solaris 11.1.
• Out-of-range values of tv_nsec do not lead to a failure on some platforms: Linux kernel 2.6.22.19 on hppa.

Portability problems not fixed by Gnulib:
• On some platforms, timestamps of symbolic links cannot be modified, so the replacement fails with ENOSYS if passed the flag AT_SYMLINK_NOFOLLOW on a symlink.
• The mere act of using lstat modifies the access time of symlinks on some platforms, so utimensat with AT_SYMLINK_NOFOLLOW can only effectively change modification time: Cygwin.
• The mere act of using stat modifies the access time of directories on some platforms, so utimensat can only effectively change directory modification time: Cygwin 1.5.x.

The gnulib module fdutimensat provides a similar interface.

9.1114 utimes

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/utimes.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS.
• The declaration of this function lacks const in the second argument on some platforms: OSF/1 5.1.
• On some platforms, this function mis-handles trailing slash: FreeBSD 7.2, Solaris 9.
• This function cannot set full timestamp resolution. In particular, some platforms incorrectly round rather than truncate. Use utimensat(AT_FDCWD,file,times,0), or the gnulib module utimens, instead.
• On some platforms, utimes (file, NULL) fails to set the file’s timestamp to the current time: glibc 2.3.3.
• On some platforms, utimes failed on read-only files when utime worked fine. glibc 2.2.5.
• On OS/2, this function cannot set the timestamp to earlier than the year 1980 in local time.
• On OS/2, this function cannot set the timestamp to an odd number of seconds.
• On OS/2, this function does not work on an opened file.

Extension: Gnulib provides a module ‘utimens’ that works around these problems and allows to set the time with nanosecond resolution (as far as supported by the file system).

9.1115 va_arg

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/va_arg.html
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• The second argument of va_arg must be a type that is invariant under the “default argument promotions” (ISO C 99 6.5.2.2 paragraph 6). This means that the following are not valid here:
  ‘float’ Use ‘double’ instead.
  ‘bool’ Use ‘int’ instead.
  Integer types smaller than ‘int’.
    Use ‘int’ or ‘unsigned int’ instead.

This is a portability problem because you don’t know the width of some abstract types like uid_t, gid_t, mode_t. So, instead of
  mode = va_arg (ap, mode_t);
you have to write
  mode = (sizeof (mode_t) < sizeof (int)
    ? va_arg (ap, int)
    : va_arg (ap, mode_t));

9.1116 va_copy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/va_copy.html
Gnulib module: stdarg
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This macro is missing on some platforms: AIX 5.1 with cc or xlc, HP-UX 11 with cc, IRIX 6.5 with cc, OSF/1 5.1 with cc.

Portability problems not fixed by Gnulib:

9.1117 va_end

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/va_end.html
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
9.1118 va_start

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/va_start.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

9.1119 vdprintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vdprintf.html

Gnulib module: vdprintf or vdprintf-posix
Portability problems fixed by either Gnulib module vdprintf or vdprintf-posix:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5.

Portability problems fixed by Gnulib module vdprintf-posix:
- This function does not support size specifiers as in C99 (hh, ll, j, t, z) on some platforms: BeOS.
- printf of ‘long double’ numbers is unsupported on some platforms: BeOS.
- printf "%f", "%e", "%g" of Infinity and NaN yields an incorrect result on some platforms: Solaris 11.4.
- This function does not support the ‘a’ and ‘A’ directives on some platforms: glibc-2.3.6, BeOS.
- This function does not support the ‘F’ directive on some platforms: BeOS.
- This function does not support format directives that access arguments in an arbitrary order, such as "%2$s", on some platforms: BeOS.
- printf "%010f" of NaN and Infinity yields an incorrect result (padded with zeroes, or wrong capitalization) on some platforms: Solaris 11.4.
- This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: AIX 7.1, BeOS.

Portability problems not fixed by Gnulib:
- The %a directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.
- Formatting noncanonical ‘long double’ numbers produces nonmeaningful results on some platforms: glibc and others, on x86, x86_64, IA-64 CPUs.
- When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.
- On some platforms, this function does not set errno or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.
9.1120 vfprintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vfprintf.html

Gnulib module: vfprintf-posix or stdio, nonblocking, sigpipe

Portability problems fixed by Gnulib module vfprintf-posix:
- This function does not support size specifiers as in C99 (hh, 11, j, t, z) on some platforms: AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.24, mingw, MSVC 14, BeOS.
- printf of ‘long double’ numbers is unsupported on some platforms: mingw, MSVC 14, BeOS.
- printf "%f", "%e", "%g" of Infinity and NaN yields an incorrect result on some platforms: AIX 5.2, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14.
- This function does not support the ‘a’ and ‘A’ directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
- This function does not support the ‘F’ directive on some platforms: NetBSD 3.0, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
- This function does not support the ‘n’ directive on some platforms: MSVC 14.
- This function does not support the ‘1s’ directive on some platforms: OpenBSD 4.0, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Haiku.
- This function does not support precisions in the ‘1s’ directive correctly on some platforms: Solaris 11.4.
- This function does not support format directives that access arguments in an arbitrary order, such as "%2$s", on some platforms: NetBSD 3.0, mingw, MSVC 14, BeOS.
- This function doesn’t support the ‘ ‘ flag on some platforms: NetBSD 3.0, Cygwin 1.5.24, mingw, MSVC 14.
- This function does not round the argument of the ‘a’ directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.
- This function behaves incorrectly when a ‘-’ flag and a negative width are specified together, on some platforms: HP-UX 10.20.
- printf "%010f" of NaN and Infinity yields an incorrect result (padded with zeroes, or wrong capitalization) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, AIX 5.2, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14.
- This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: AIX 7.1, Solaris 10/x86, mingw, MSVC 14, BeOS.
- This function mishandles large floating point precisions (for example, formatting 1.0 with "%.511f") on some platforms: Solaris 10.
- This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.
Portability problems fixed by Gnulib module stdio or vfprintf-posix, together with module nonblocking:

- When writing to a non-blocking pipe whose buffer is full, this function fails with errno being set to ENOSPC instead of EAGAIN on some platforms: mingw, MSVC 14.

Portability problems fixed by Gnulib module stdio or vfprintf-posix, together with module sigpipe:

- When writing to a pipe with no readers, this function fails, instead of obeying the current SIGPIPE handler, on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

- The %a directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.
- Formatting noncanonical ‘long double’ numbers produces nonmeaningful results on some platforms: glibc and others, on x86, x86_64, IA-64 CPUs.
- When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.
- Attempting to write to a read-only stream fails with EOF but does not set the error flag for ferror on some platforms: glibc 2.13, cygwin 1.7.9.

### 9.1121 vfscanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vfscanf.html

Gnulib module: vfscanf, nonblocking

Portability problems fixed by Gnulib module vfscanf, together with module nonblocking:

- When reading from a non-blocking pipe whose buffer is empty, this function fails with errno being set to EINVAL instead of EAGAIN on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 4.3.2, IRIX 6.5, OSF/1 5.1, Solaris 8, Interix 3.5.
- On Windows platforms (excluding Cygwin), this function does not set errno upon failure.
- On Windows, this function doesn’t support the hh, ll, j, t, z size specifiers.

### 9.1122 vfwprintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vfwprintf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- The %a directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.
• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Interix 3.5, BeOS.

• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

• When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.

• On some platforms, this function does not set errno or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

9.1123 vfwscanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vfwscanf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 8, Cygwin 1.5.x, Interix 3.5, BeOS, Android 4.4.

• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1124 vprintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vprintf.html

Gnulib module: vprintf-posix or stdio, nonblocking, sigpipe

Portability problems fixed by Gnulib module vprintf-posix:

• This function does not support size specifiers as in C99 (hh, ll, j, t, z) on some platforms: AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.24, mingw, MSVC 14, BeOS.

• printf of ‘long double’ numbers is unsupported on some platforms: mingw, MSVC 14, BeOS.

• printf "%f", "%e", "%g" of Infinity and NaN yields an incorrect result on some platforms: AIX 5.2, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14.

• This function does not support the ‘a’ and ‘A’ directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, BeOS.

• This function does not support the ‘F’ directive on some platforms: NetBSD 3.0, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, BeOS.

• This function does not support the ‘n’ directive on some platforms: MSVC 14.

• This function does not support the ‘1s’ directive on some platforms: OpenBSD 4.0, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Haiku.
• This function does not support precisions in the ‘ls’ directive correctly on some platforms: Solaris 11.4.
• This function does not support format directives that access arguments in an arbitrary order, such as "%2$s", on some platforms: NetBSD 3.0, mingw, MSVC 14, BeOS.
• This function doesn’t support the ‘a’ flag on some platforms: NetBSD 3.0, Cygwin 1.5.24, mingw, MSVC 14.
• This function does not round the argument of the ‘a’ directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.
• This function behaves incorrectly when a ‘-’ flag and a negative width are specified together, on some platforms: HP-UX 10.20.
• printf "%10f" of NaN and Infinity yields an incorrect result (padded with zeroes, or wrong capitalization) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, AIX 5.2, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14.
• This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: AIX 7.1, Solaris 10/x86, mingw, MSVC 14, BeOS.
• This function mishandles large floating point precisions (for example, formatting 1.0 with "%.511f") on some platforms: Solaris 10.
• This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.

Portability problems fixed by Gnulib module stdio or vprintf-posix, together with module nonblocking:
• When writing to a non-blocking pipe whose buffer is full, this function fails with errno being set to ENOSPC instead of EAGAIN on some platforms: mingw, MSVC 14.

Portability problems fixed by Gnulib module stdio or vprintf-posix, together with module sigpipe:
• When writing to a pipe with no readers, this function fails, instead of obeying the current SIGPIPE handler, on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
• The %m directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.
• Formatting noncanonical ‘long double’ numbers produces nonmeaningful results on some platforms: glibc and others, on x86, x86_64, IA-64 CPUs.
• When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.
• Attempting to write to a read-only stream fails with EOF but does not set the error flag for ferror on some platforms: glibc 2.13, cygwin 1.7.9.

9.1125 vscanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vscanf.html
Gnulib module: vscanf, nonblocking
Portability problems fixed by Gnulib module `vscanf`, together with module `nonblocking`:

- When reading from a non-blocking pipe whose buffer is empty, this function fails with `errno` being set to `EINVAL` instead of `EAGAIN` on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 4.3.2, IRIX 6.5, OSF/1 5.1, Solaris 8.
- On Windows platforms (excluding Cygwin), this function does not set `errno` upon failure.
- On Windows, these functions don’t support the `hh`, `ll`, `j`, `t`, `z` size specifiers.

### 9.1126 vsnprintf

POSIX specification:

http://www.opengroup.org/onlinepubs/9699919799/functions/vsnprintf.html

Gnulib module: vsnprintf or vsnprintf-posix

Portability problems fixed by either Gnulib module `vsnprintf` or `vsnprintf-posix`:

- This function is missing on some platforms: IRIX 5.3, OSF/1 4.0, Solaris 2.5.1.
- This function does not support format directives that access arguments in an arbitrary order, such as "%2$s", on some platforms: NetBSD 3.0, mingw, MSVC 14, BeOS.
- This function overwrites memory even when a size argument of 1 is passed on some platforms: Linux libc5, BeOS.
- This function does not return a byte count as specified in C99 on some platforms: HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.24, mingw, MSVC 14, BeOS.

Portability problems fixed by Gnulib module `vsnprintf-posix`:

- This function does not support size specifiers as in C99 (hh, ll, j, t, z) on some platforms: AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.24, mingw, MSVC 14, BeOS.
- `printf` of `long double` numbers is unsupported on some platforms: mingw, MSVC 14, BeOS.
- `printf "%f", "%e", "%g" of Infinity and NaN yields an incorrect result on some platforms: AIX 5.2, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14.
- This function does not support the ‘a’ and ‘A’ directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
- This function does not support the ‘F’ directive on some platforms: NetBSD 3.0, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
- This function does not support the ‘ls’ directive on some platforms: OpenBSD 4.0, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Haiku.
- This function does not support precisions in the ‘ls’ directive correctly on some platforms: Solaris 11.4.
- This function doesn’t support the ‘ ’ flag on some platforms: NetBSD 3.0, Cygwin 1.5.24, mingw, MSVC 14.
• This function does not round the argument of the ‘a’ directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.
• This function behaves incorrectly when a ‘-’ flag and a negative width are specified together, on some platforms: HP-UX 10.20.
• printf "%010f" of NaN and Infinity yields an incorrect result (padded with zeroes, or wrong capitalization) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, AIX 5.2, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14.
• This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: AIX 7.1, Solaris 10/x86, mingw, MSVC 14, BeOS.
• This function mishandles large floating point precisions (for example, formatting 1.0 with "%.511f") on some platforms: Solaris 10.
• This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.
• This function does not truncate the result as specified in C99 on some platforms: mingw, MSVC 14.
• This function does not fully support the ‘n’ directive on some platforms: HP-UX 11, mingw, MSVC 14.
• This function overwrites memory even when a zero size argument is passed on some platforms: HP-UX 11, OSF/1 5.1.

Portability problems not fixed by Gnulib:
• The %a directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.
• Formatting noncanonical ‘long double’ numbers produces nonmeaningful results on some platforms: glibc and others, on x86, x86_64, IA-64 CPUs.
• When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.

9.1127 vsprintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vsprintf.html
Gnulib module: vsprintf-posix

Portability problems fixed by Gnulib:
• This function does not support size specifiers as in C99 (hh, 11, j, t, z) on some platforms: AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.24, mingw, MSVC 14, BeOS.
• printf of ‘long double’ numbers is unsupported on some platforms: mingw, MSVC 14, BeOS.
• printf "%f", "%e", "%g" of Infinity and NaN yields an incorrect result on some platforms: AIX 5.2, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14.
• This function does not support the ‘a’ and ‘A’ directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
• This function does not support the ‘F’ directive on some platforms: NetBSD 3.0, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
• This function does not support the ‘n’ directive on some platforms: MSVC 14.
• This function does not support the ‘1s’ directive on some platforms: OpenBSD 4.0, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Haiku.
• This function does not support precisions in the ‘1s’ directive correctly on some platforms: Solaris 11.4.
• This function does not support format directives that access arguments in an arbitrary order, such as "%2$s", on some platforms: NetBSD 3.0, mingw, MSVC 14, BeOS.
• This function doesn’t support the ‘f’ flag on some platforms: NetBSD 3.0, Cygwin 1.5.24, mingw, MSVC 14.
• This function does not round the argument of the ‘a’ directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.
• This function behaves incorrectly when a ‘-’ flag and a negative width are specified together, on some platforms: HP-UX 10.20.
• printf "%010f" of NaN and Infinity yields an incorrect result (padded with zeroes, or wrong capitalization) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, AIX 5.2, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14.
• This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: AIX 7.1, Solaris 10/x86, mingw, MSVC 14, BeOS.
• This function mishandles large floating point precisions (for example, formatting 1.0 with ‘%.511f’) on some platforms: Solaris 10.
• This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.

Portability problems not fixed by Gnulib:
• The ‘%an’ directive is not portable, use ‘%s’ mapped to an argument of strerror(errno) (or a version of strerror_r) instead.
• Formatting noncanonical ‘long double’ numbers produces nonmeaningful results on some platforms: glibc and others, on x86, x86_64, IA-64 CPUs.
• When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.

9.1128 vsscanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vsscanf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Solaris 8, MSVC 14.
• On Windows platforms (excluding Cygwin), this function does not set `errno` upon failure.
• On Windows, these functions don’t support the `hh, ll, j, t, z` size specifiers.

9.1129 vswprintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vswprintf.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• The `%m` directive is not portable, use `%s` mapped to an argument of `strerror(errno)` (or a version of `strerror_r`) instead.
• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Interix 3.5, BeOS.
• On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.
• On Windows, this function does not take a buffer size as second argument.
• When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.

9.1130 vswscanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vswscanf.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 8, Cygwin 1.5.x, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1131 vwprintf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vwprintf.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• The `%m` directive is not portable, use `%s` mapped to an argument of `strerror(errno)` (or a version of `strerror_r`) instead.
• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Interix 3.5, BeOS, Cygwin 1.7.
• This function exists, but does not support wide arguments on some platforms: Cygwin 1.5.x.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
• When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.
• On some platforms, this function does not set errno or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

9.1132 vwscanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/vwscanf.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 8, Cygwin 1.5.x, Interix 3.5, BeOS, Android 4.4.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1133 wait

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wait.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: mingw, MSVC 14.

9.1134 waitid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/waitid.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.
• As of 2005, no system is known on which waitid with flag WNOWAIT works correctly.
9.1135 waitpid

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/waitpid.html

Gnulib module: waitpid

Portability problems fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:

9.1136 wcpcpy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcpcpy.html

Gnulib module: wcpcpy

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS.
- This function is not declared (without `-D_GNU_SOURCE`) on some platforms: glibc 2.13.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1137 wcpncpy

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcpncpy.html

Gnulib module: wcpncpy

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5. BeOS.
- This function is not declared (without `-D_GNU_SOURCE`) on some platforms: glibc 2.13.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1138 wcrtomb

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcrtomb.html

Gnulib module: wcrtomb

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, mingw, Interix 3.5.
• This function produces wrong characters in the C locale on some platforms: Android 4.3.
• This function returns 0 when the first argument is NULL in some locales on some platforms: AIX 4.3, OSF/1 5.1, Solaris 11.3.

Portability problems not fixed by GnuLib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1139 wcscascmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcscascmp.html
GnuLib module: wcscascmp
Portability problems fixed by GnuLib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14.
Portability problems not fixed by GnuLib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1140 wcscascmp_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcscascmp_l.html
GnuLib module: —
Portability problems fixed by GnuLib:
Portability problems not fixed by GnuLib:
• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1141 wcscat

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcscat.html
GnuLib module: wcscat
Portability problems fixed by GnuLib:
• This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.
Portability problems not fixed by GnuLib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1142 wcschr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcschr.html
Gnulib module: wcschr
Portability problems fixed by Gnulib:
- This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.
Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1143 wcscmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcscmp.html
Gnulib module: wcscmp
Portability problems fixed by Gnulib:
- This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.
Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1144 wcscoll

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcscoll.html
Gnulib module: wcscoll
Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1.
Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1145 wcscoll_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcscoll_l.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1146 **wcscpy**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcscpy.html

Gnulib module: wcscpy

Portability problems fixed by Gnulib:
- This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

Note: wcscpy (dst, src) is only safe to use when you can guarantee that there are at least wcslen (src) + 1 wide characters allocated at dst.

9.1147 **wcscspn**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcscspn.html

Gnulib module: wcscspn

Portability problems fixed by Gnulib:
- This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1148 **wcsdup**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsdup.html

Gnulib module: wcsdup

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, BeOS.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1149 **wcsftime**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsftime.html

Gnulib module: wcsftime
Portability problems fixed by Gnulib:
- On native Windows platforms (mingw, MSVC), this function works incorrectly when the environment variable TZ has been set by Cygwin.

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x, BeOS.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
- Native Windows platforms (mingw, MSVC) support only a subset of time zones specified by POSIX. See Section 9.1101 [tzset], page 398.

9.1150 wcslen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcslen.html
Gnulib module: wcslen
Portability problems fixed by Gnulib:
- This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1151 wcsncasecmp

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsncasecmp.html
Gnulib module: wcsncasecmp
Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, BeOS.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1152 wcsncasecmp_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsncasecmp_l.html
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.
On AIX and Windows platforms, \texttt{wchar\_t} is a 16-bit type and therefore cannot accommodate all Unicode characters.

**9.1153 wcsncat**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsncat.html

Gnulib module: wcsncat

Portability problems fixed by Gnulib:

- This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.

Portability problems not fixed by Gnulib:

- On AIX and Windows platforms, \texttt{wchar\_t} is a 16-bit type and therefore cannot accommodate all Unicode characters.

**9.1154 wcsncmp**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsncmp.html

Gnulib module: wcsncmp

Portability problems fixed by Gnulib:

- This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.

Portability problems not fixed by Gnulib:

- On AIX and Windows platforms, \texttt{wchar\_t} is a 16-bit type and therefore cannot accommodate all Unicode characters.

**9.1155 wcsncpy**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsncpy.html

Gnulib module: wcsncpy

Portability problems fixed by Gnulib:

- This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.

Portability problems not fixed by Gnulib:

- On AIX and Windows platforms, \texttt{wchar\_t} is a 16-bit type and therefore cannot accommodate all Unicode characters.

Note: This function has no real use: It cannot be used for filling a fixed-size record with a wide string, before writing it to a file, because the wide string encoding is platform dependent and, on some platforms, also locale dependent. And this function is not appropriate for copying a wide string into a bounded memory area, because you have no guarantee that the result will be null-terminated. Even if you add the null character at the end yourself, this function is inefficient (as it spends time clearing unused memory) and will allow silent truncation to occur, which is not a good behavior for GNU programs.
9.1156 wcsnlen

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsnlen.html

Gnulib module: wcsnlen

Portability problems fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, Interix 3.5, BeOS.

Portability problems not fixed by Gnulib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1157 wcsnrtombs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsnrtombs.html

Gnulib module: wcsnrtombs

Portability problems fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• This function cannot consume valid sequences of wide characters on some platforms: Solaris 11.4.

Portability problems not fixed by Gnulib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1158 wcspbrk

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcspbrk.html

Gnulib module: wcspbrk

Portability problems fixed by Gnulib:
• This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.

Portability problems not fixed by Gnulib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1159 wcsrchr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsrchr.html

Gnulib module: wcsrchr

Portability problems fixed by Gnulib:
- This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1160 wcsrtombs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsrtombs.html

Gnulib module: wcsrtombs

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, mingw, Interix 3.5.
- This function may set the source pointer to NULL before NUL terminating the destination string on some platforms: OSF/1 5.1.
- This function does not ignore the length argument if the destination argument is NULL on some platforms: mingw.
- This function updates the source pointer also if the destination argument is NULL on some platforms: HP-UX 11, OSF/1 5.1.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1161 wcsspn

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsspn.html

Gnulib module: wcsspn

Portability problems fixed by Gnulib:
- This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1162 wcsstr

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsstr.html

Gnulib module: wcsstr

Portability problems fixed by Gnulib:
- This function is missing on some platforms: HP-UX 11.00, IRIX 5.3, Solaris 2.6.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1163 wcstod

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcstod.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1164 wcstof

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcstof.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, MSVC 9, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1165 wcstoiimax

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcstoiimax.html

Gnulib module: —
Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
- This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, MSVC 9, Interix 3.5, Android 4.4.
- On AIX and Windows platforms, \texttt{wchar\_t} is a 16-bit type and therefore cannot accommodate all Unicode characters.

\section*{9.1166 \texttt{wcstok}}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/wcstok.html}
GnuLib module: wcstok

Portability problems fixed by GnuLib:
- This function is missing on some platforms: IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x.

Portability problems not fixed by GnuLib:
- On AIX and Windows platforms, \texttt{wchar\_t} is a 16-bit type and therefore cannot accommodate all Unicode characters.

\section*{9.1167 \texttt{wcstol}}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/wcstol.html}
GnuLib module: —

Portability problems fixed by GnuLib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x.
- On AIX and Windows platforms, \texttt{wchar\_t} is a 16-bit type and therefore cannot accommodate all Unicode characters.

\section*{9.1168 \texttt{wcstold}}

POSIX specification:
\url{http://www.opengroup.org/onlinepubs/9699919799/functions/wcstold.html}
GnuLib module: —

Portability problems fixed by GnuLib:
- This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 9, Cygwin, MSVC 9, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, \texttt{wchar\_t} is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1169 wcstoll

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcstoll.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11.11, IRIX 5.3, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, MSVC 9, Interix 3.5, Android 4.4.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1170 wcstombs

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcstombs.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1171 wcstoul

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcstoul.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1172 wcstoull

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcstoull.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11.11, IRIX 5.3, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, MSVC 9, Interix 3.5, Android 4.4.
• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1173 wcstoumax

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcstoumax.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.11, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, MSVC 9, Interix 3.5, Android 4.4.

• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1174 wcswidth

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcswidth.html

Gnulib module: wcswidth

Portability problems fixed by Gnulib:

• This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, mingw, MSVC 14, BeOS.

• This function handles combining characters in UTF-8 locales incorrectly on some platforms: Mac OS X 10.3.

Portability problems not fixed by Gnulib:

• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1175 wcsxfrm

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsxfrm.html

Gnulib module: wcsxfrm

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, Cygwin 1.5.x.

Portability problems not fixed by Gnulib:

• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1176 wcsxfrm_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcsxfrm_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1177 wctob

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wctob.html

Gnulib module: wctob

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 5.3, Solaris 2.6, mingw, Interix 3.5.
- This function clobbers caller-owned registers on some platforms: Cygwin 1.7.5.
- This function does not work on some platforms: Solaris 9.
- This function is missing a declaration on some platforms: IRIX 6.5.

Portability problems not fixed by Gnulib:

- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1178 wctomb

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wctomb.html

Gnulib module: wctomb

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1179 wctrans

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wctrans.html

Gnulib module: wctrans

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.5.1, mingw, MSVC 9, Interix 3.5, Android 7.1.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1180 wctrans_l

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wctrans_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1181 wctype

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wctype.html

Gnulib module: wctype

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, MSVC 9.
- This function is declared in <wchar.h>, not in <wctype.h>, on some platforms: HP-UX 11.00.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1182 **wctype_l**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wctype_l.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1183 **wcwidth**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wcwidth.html

Gnulib module: wcwidth

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, IRIX 5.3, Solaris 2.5.1, mingw, MSVC 14, BeOS.
- This function is not declared (without `-D_GNU_SOURCE`) on some platforms: glibc 2.8.
- This function handles combining characters in UTF-8 locales incorrectly on some platforms: Mac OS X 10.3, OpenBSD 5.8.

Portability problems not fixed by Gnulib:

- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1184 **wmemchr**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wmemchr.html

Gnulib module: wmemchr

Portability problems fixed by Gnulib:

- This function is missing on some platforms: HP-UX 11.00, IRIX 6.5, Solaris 2.6, MSVC 14, Interix 3.5.

Portability problems not fixed by Gnulib:

- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1185  

**wmemcmp**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wmemcmp.html

Gnulib module: wmemcmp

Portability problems fixed by Gnulib:
- This function is missing on some platforms: HP-UX 11.00, IRIX 6.5, Solaris 2.6, MSVC 14, Interix 3.5.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1186  

**wmemcpy**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wmemcpy.html

Gnulib module: wmemcpy

Portability problems fixed by Gnulib:
- This function is missing on some platforms: HP-UX 11.00, IRIX 6.5, Solaris 2.6, MSVC 9, Interix 3.5.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1187  

**wmemmove**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wmemmove.html

Gnulib module: wmemmove

Portability problems fixed by Gnulib:
- This function is missing on some platforms: HP-UX 11.00, IRIX 6.5, Solaris 2.6, MSVC 9, Interix 3.5.

Portability problems not fixed by Gnulib:
- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

9.1188  

**wmemset**

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wmemset.html

Gnulib module: wmemset

Portability problems fixed by Gnulib:
- This function is missing on some platforms: HP-UX 11.00, IRIX 6.5, Solaris 2.6, MSVC 9, Interix 3.5.
Portability problems not fixed by Gnulib:

- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

### 9.1189 `wordexp`

POSIX specification:

```markdown
http://www.opengroup.org/onlinepubs/9699919799/functions/wordexp.html
```

Gnulib module: —

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On some platforms, this function does not set `errno` or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.

### 9.1190 `wordfree`

POSIX specification:

```markdown
http://www.opengroup.org/onlinepubs/9699919799/functions/wordfree.html
```

Gnulib module: —

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

### 9.1191 `wprintf`

POSIX specification:

```markdown
http://www.opengroup.org/onlinepubs/9699919799/functions/wprintf.html
```

Gnulib module: —

Portability problems not fixed by Gnulib:

- The `%a` directive is not portable, use `%s` mapped to an argument of `strftime(errno)` (or a version of `strerror_r`) instead.
- This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, Interix 3.5, BeOS.
- This function exists, but does not support wide arguments on some platforms: Cygwin 1.5.x.
- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.
- When formatting an integer with grouping flag, this function inserts thousands separators even in the "C" locale on some platforms: NetBSD 5.1.
- On some platforms, this function does not set `errno` or the stream error indicator on attempts to write to a read-only stream: Cygwin 1.7.9.
9.1192 write

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/write.html

Gnulib module: write, nonblocking, sigpipe

Portability problems fixed by Gnulib module stdio, together with module nonblocking:
- This function crashes when invoked with invalid arguments on some platforms: MSVC 14.
- When writing to a non-blocking pipe whose buffer is full, this function fails with errno being set to ENOSPC instead of EAGAIN on some platforms: mingw, MSVC 14.
- When writing to a non-blocking pipe on which no reader is currently waiting an amount of bytes that exceeds the pipe buffer’s size, then—even if the pipe’s buffer is empty—this function fails, instead of performing a partial write into the pipe buffer, on some platforms: mingw, MSVC 14.

Portability problems fixed by Gnulib module stdio, together with module sigpipe:
- When writing to a pipe with no readers, this function fails with error EINVAL, instead of obeying the current SIGPIPE handler, on some platforms: mingw, MSVC 14.

Portability problems not fixed by Gnulib:
- This function may fail with error EINTR, even in programs that don’t install any signal handlers, on some platforms: Mac OS X 10.5.

For handling EINTR, Gnulib provides a module ‘safe-write’ with a function safe_write.

9.1193 writev

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/writev.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: mingw, MSVC 14.

9.1194 wscanf

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/wscanf.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11.00, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Interix 3.5, BeOS.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
9.1195 y0

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/y0.html

Gnulib module: y0
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8.

9.1196 y1

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/y1.html

Gnulib module: y1
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8.

9.1197 yn

POSIX specification:
http://www.opengroup.org/onlinepubs/9699919799/functions/yn.html

Gnulib module: yn
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8.
10 Past POSIX Function Substitutes

This chapter describes which functions and function-like macros specified by older versions of POSIX are substituted by Gnulib, which portability pitfalls are fixed by Gnulib, and which (known) portability problems are not worked around by Gnulib.

The notation “Gnulib module: —” means that Gnulib does not provide a module providing a substitute for the function. When the list “Portability problems not fixed by Gnulib” is empty, such a module is not needed: No portability problems are known. Otherwise, it indicates that such a module would be useful but is not available: No one so far found this function important enough to contribute a substitute for it. If you need this particular function, you may write to <bug-gnulib at gnu dot org>.

10.1 bcmp

POSIX specification: http://www.opengroup.org/susv3xsh/bcmp.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, Android 9.0.
- This function is marked as “legacy” in POSIX. Better use memcmp instead.

10.2 bcopy

POSIX specification: http://www.opengroup.org/susv3xsh/bcopy.html

Gnulib module: bcopy

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, Android 9.0.

Portability problems not fixed by Gnulib:
- This function is marked as “legacy” in POSIX. Better use memcpy or memmove instead.

10.3 bsd_signal

POSIX specification: http://www.opengroup.org/susv3xsh/bsd_signal.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, IRIX 5.3, Solaris 2.5.1, Cygwin, mingw, MSVC 14, Interix 3.5.
10.4 bzero

POSIX specification: \url{http://www.opengroup.org/susv3xsh/bzero.html}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, Android 9.0.
- This function is marked as “legacy” in POSIX. Better use \texttt{memset} instead.

10.5 ecvt

POSIX specification: \url{http://www.opengroup.org/susv3xsh/ecvt.html}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, Android 9.0.
- This function is marked as “legacy” in POSIX. Better use \texttt{sprintf} instead.

10.6 fcvt

POSIX specification: \url{http://www.opengroup.org/susv3xsh/fcvt.html}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, Android 9.0.
- This function is marked as “legacy” in POSIX. Better use \texttt{sprintf} instead.

10.7 ftime

POSIX specification: \url{http://www.opengroup.org/susv3xsh/ftime.html}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, IRIX 5.3, Solaris 2.4, Android 9.0.
- On native Windows platforms (mingw, MSVC), this function works incorrectly when the environment variable TZ has been set by Cygwin.
- This function is marked as “legacy” in POSIX. Better use \texttt{gettimeofday} or \texttt{clock_gettime} instead, and use \texttt{ftime} only as a fallback for portability to Windows platforms.
10.8 gcvt

POSIX specification: [http://www.opengroup.org/susv3xsh/gcvt.html](http://www.opengroup.org/susv3xsh/gcvt.html)

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, Android 9.0.
- This function is marked as “legacy” in POSIX. Better use `sprintf` instead.

10.9 getcontext

POSIX specification: [http://www.opengroup.org/susv3xsh/getcontext.html](http://www.opengroup.org/susv3xsh/getcontext.html)

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, OpenBSD 3.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

10.10 gethostbyaddr


Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.

10.11 gethostbyname

POSIX specification: [http://www.opengroup.org/susv3xsh/gethostbyname.html](http://www.opengroup.org/susv3xsh/gethostbyname.html)

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.

10.12 getwd

POSIX specification: [http://www.opengroup.org/susv3xsh/getwd.html](http://www.opengroup.org/susv3xsh/getwd.html)

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, BeOS, Android 9.0.
• The size of the buffer required for this function is not a compile-time constant. Also, the function truncates a result that would be larger than the minimum buffer size. For these reasons, this function is marked as “legacy” in POSIX. Better use the `getcwd` function instead.

10.13  **h_errno**

POSIX specification: [http://www.opengroup.org/susv3xsh/h_errno.html](http://www.opengroup.org/susv3xsh/h_errno.html)

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

10.14  **index**


Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, Android 9.0.

• This function is marked as “legacy” in POSIX. Better use `strchr` instead.

10.15  **makecontext**

POSIX specification: [http://www.opengroup.org/susv3xsh/makecontext.html](http://www.opengroup.org/susv3xsh/makecontext.html)

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.4, OpenBSD 3.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

10.16  **mktemp**

POSIX specification: [http://www.opengroup.org/susv3xsh/mktemp.html](http://www.opengroup.org/susv3xsh/mktemp.html)

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is not appropriate for creating temporary files. (It has security risks.) Therefore it is marked as “legacy” in POSIX. Better use `mkstemp` instead.
10.17 pthread_attr_getstackaddr

POSIX specification:
http://www.opengroup.org/susv3xsh/pthread_attr_getstackaddr.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: HP-UX 11, Solaris 2.4, Cygwin 1.7.9, mingw, MSVC 14, BeOS, Android 9.0.

10.18 pthread_attr_setstackaddr

POSIX specification:
http://www.opengroup.org/susv3xsh/pthread_attr_setstackaddr.html

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: HP-UX 11, IRIX 5.3, Solaris 2.4, Cygwin 1.7.9, mingw, MSVC 14, BeOS, Android 9.0.

10.19 rindex

POSIX specification: http://www.opengroup.org/susv3xsh/rindex.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, Android 9.0.
• This function is marked as “legacy” in POSIX. Better use strrchr instead.

10.20 scalb

POSIX specification: http://www.opengroup.org/susv3xsh/scalb.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

10.21 setcontext

POSIX specification: http://www.opengroup.org/susv3xsh/setcontext.html
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.4, OpenBSD 3.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
• The effects of this call are system and compiler optimization dependent, since it re-
stores the contents of register-allocated variables but not the contents of stack-allocated
variables.

10.22 swapcontext

POSIX specification: http://www.opengroup.org/susv3xsh/swapcontext.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.4, OpenBSD 3.8, Cygwin,
mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

10.23 ualarm

POSIX specification: http://www.opengroup.org/susv3xsh/ualarm.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Solaris 2.4, mingw, MSVC 14, BeOS,
Android 9.0.

10.24 usleep

POSIX specification: http://www.opengroup.org/susv3xsh/usleep.html

Gnulib module: usleep

Portability problems fixed by Gnulib:

• On some systems, usleep rejects attempts to sleep longer than 1 second, as allowed
by POSIX: mingw.

• This function is missing on some platforms. However, the replacement is designed to be
lightweight, and may round to the nearest second; use select or nanosleep if better
resolution is needed: IRIX 5.3, Solaris 2.4, older mingw, MSVC 14, BeOS.

Portability problems not fixed by Gnulib:
• According to POSIX, the usleep function may interfere with the program’s use of the
SIGALRM signal. On Linux, it doesn’t; on other platforms, it may.

10.25 vfork

POSIX specification: http://www.opengroup.org/susv3xsh/vfork.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: IRIX 6.5, mingw, MSVC 14, BeOS.
10.26 wcswcs

POSIX specification: http://www.opengroup.org/susv3xsh/wcswcs.html

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, IRIX 5.3, Solaris 2.5.1, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

• On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

• This function is marked as “legacy” in POSIX. Better use wcsstr instead.
11 Glibc Header File Substitutes

This chapter describes which header files contained in GNU libc but not specified by ISO C or POSIX are substituted by Gnulib, which portability pitfalls are fixed by Gnulib, and which (known) portability problems are not worked around by Gnulib.

The notation “Gnulib module: —” means that Gnulib does not provide a module providing a substitute for the header file. When the list “Portability problems not fixed by Gnulib” is empty, such a module is not needed: No portability problems are known. Otherwise, it indicates that such a module would be useful but is not available: No one so far found this header file important enough to contribute a substitute for it. If you need this particular header file, you may write to <bug-gnulib at gnu dot org>.

11.1 a.out.h

Describes the structure of executables (and object files?) in the old a.out format.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: Mac OS X 10.5, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This header file is useless because most executables and object files are in ELF format on some platforms: glibc 2.3.6, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8.

11.2 aliases.h

Defines the type struct aliasent and declares the functions setaliasent, endaliasent, getaliasent, getaliasent_r, getaliasbyname, getaliasbyname_r.

Documentation:

- man setaliasent.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

11.3 alloca.h

Declares the alloca function of function-like macro.

Documentation:

- man alloca.
Chapter 11: Glibc Header File Substitutes

Gnulib module: alloca

Portability problems fixed by Gnulib:

- This header file is missing on some platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, AIX 4.3.2, mingw, MSVC 14.

Portability problems not fixed by Gnulib:

11.4 ar.h

Describes the structure of files produced by the ‘ar’ program. Defines the type struct ar_hdr and the macros ARMAG, SARMAG, ARFMAG.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: mingw, MSVC 14, BeOS.

11.5 argp.h

Documentation:


Gnulib module: argp

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

11.6 argz.h

Documentation:

- https://www.gnu.org/software/libc/manual/html_node/Argz-Functions.html,
- man argz.

Gnulib module: argz

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- The argz functions do not work on some platforms: Cygwin.
11.7 byteswap.h

Defines the functions or function-like macros `bswap_16`, `bswap_32`, `bswap_64`.

Gnulib module: `byteswap`

Portability problems fixed by Gnulib:

- This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS.

Portability problems not fixed by Gnulib:

11.8 crypt.h

Defines the type `struct crypt_data` and declares the functions `crypt`, `crypt_r`, `setkey`, `setkey_r`, `encrypt`, `encrypt_r`.

Documentation:

- man crypt, man encrypt.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- The functions `crypt`, `setkey`, `encrypt` are missing on some platforms: HP-UX 11, OSF/1 5.1.
- The type `struct crypt_data` and the functions `crypt_r`, `setkey_r`, `encrypt_r` are missing on some platforms: IRIX 6.5, Solaris 11.4, Cygwin.

11.9 endian.h

Describes the platform’s endianness (byte ordering of words stored in memory). Defines the macros `BYTE_ORDER`, `LITTLE_ENDIAN`, `BIG_ENDIAN`, `PDP_ENDIAN`.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5.
11.10 envz.h

Documentation:

- man envz.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

11.11 err.h

Declares the functions warn, vwarn, warnx, vwarnx, err, verr, errx, verrx.

Documentation:

- man err.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, BeOS.

11.12 error.h

 Declares the functions error, error_at_line and the variables error_print_progname, error_message_count, error_one_per_line.

Documentation:

- man error.

Gnulib module: error

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on many platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.
11.13 execinfo.h

Declares the functions backtrace, backtrace_symbols, backtrace_symbols_fd. Documentation:
- man backtrace.

Gnulib module: —

Portability problems fixed by Gnulib:
- This header file is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

Portability problems not fixed by Gnulib:
- On platforms where the header file is missing, the Gnulib substitute implementation is just a stub, and does nothing.

11.14 fpu_control.h

Handling of the FPU control word. Defines the fpu_control_t type, declares the _fpu_control variable, and defines the _FPU_GETCW, _FPU_SETCW macros.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This header file is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

11.15 fstab.h

Defines the type struct fstab, the macros FSTAB_*, _PATH_FSTAB, and declares the functions setfsent, endfsent, getfsent, getfsspec, getfsfile.

Documentation:
- man setfsent.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This header file is missing on some platforms: Minix 3.1.8, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- The macro _PATH_FSTAB is missing on some platforms: AIX 5.1, HP-UX 11.
11.16 fts.h

Defines the types FTS, FTSENT and the macros FTS_*, and declares the functions fts_open, fts_read, fts_children, fts_set, fts_close.

Documentation:
- man fts.

Gnulib module: —
Portability problems fixed by Gnulib:
- This header file is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, mingw, MSVC 14, BeOS.

11.17 getopt.h

Defines the type struct option and declares the variables optarg, optind, opterr, optopt and the functions getopt, getopt_long, getopt_long_only.

Documentation:
- man getopt.

Gnulib module: getopt-gnu
Portability problems fixed by Gnulib:
- This header file is missing on some platforms: AIX 5.1, HP-UX 11, MSVC 14, Interix 3.5.
- The function getopt_long is missing on some platforms: IRIX 6.5, OSF/1 5.1, Solaris 9.
- The function getopt_long_only is missing on some platforms: Mac OS X 10.3, FreeBSD 5.2.1, NetBSD 5.0, IRIX 6.5, OSF/1 5.1, Solaris 9, mingw.
- The method to reset options is incompatible on some platforms: FreeBSD 6.0, NetBSD 5.0(?), OpenBSD 3.8, Cygwin 1.5.x, mingw.
- The function getopt does not handle a leading ‘+’ character in the options string on some platforms: Solaris 11 2010-11.

Portability problems not fixed by Gnulib:

11.18 gshadow.h

Defines the type struct sgrp and declares the functions setsgent, endsgent, getsgent, getsgnam, sgetsgent, fgetsgent, putsgent, getsgent_r, getsgnam_r, sgetsgent_r, fgetsgent_r.

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This header file is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
11.19 ieee754.h

Defines the types union ieee754_float, union ieee754_double, union ieee854_long_double.

Gnulib module: —

Portability problems fixed by Gnulib:
- This header file is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

Portability problems not fixed by Gnulib:
- The substitute for this header file has not been tested for long double and does not work on some platforms.
- The substitute for this header file returns nonsense on (now-quite-rare) platforms that do not use IEEE floating point.

11.20 ifaddrs.h

Defines the type struct ifaddrs and declares the functions getifaddrs, freeifaddrs.

Documentation:

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This header file is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

11.21 libintl.h

Defines the macros __USE_GNU_GETTEXT, __GNU_GETTEXT_SUPPORTED_REVISION, and declares the functions gettext, dgettext, dcgettext, ngettext, dngettext, dcngettext, textdomain, bindtextdomain, bind_textdomain_codeset.

Documentation:

Gnulib module: gettext

Portability problems fixed by Gnulib, if GNU gettext is installed:
- This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- The functions cannot deal with GNU .mo files with system-dependent strings (of major version 1 or of minor version 1) on some non-glibc platforms: NetBSD 3.0, Solaris 10.

Portability problems not fixed by Gnulib:
11.22 mcheck.h

Defines the type `enum mcheck_status` and declares the functions `mcheck, mcheck_pedantic, mcheck_check_all, mprobe, mtrace, muntrace`.

Documentation:

Gnulib module: —
Portability problems fixed by Gnulib:
- This header file is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

11.23 mntent.h

Defines the type `struct mntent` and the macros `MNTTAB, MOUNTED, MNTTYPE_*, MNTOPT_*,` and declares the functions `setmntent, getmntent, getmntent_r, addmntent, endmntent, hasmntopt`.

Documentation:
- `man setmntent`

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS.
- The function `getmntent_r` is missing on all non-glibc platforms: AIX 5.1, HP-UX 11, IRIX 6.5, Cygwin, Android 9.0.

Gnulib module `mountlist` provides a higher-level abstraction.

11.24 obstack.h

Documentation:

Gnulib module: obstack
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.
11.25 paths.h

Defines the macros _PATH_*.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 11 2010-11, mingw, MSVC 14, BeOS.
- The set of _PATH_* macros is platform dependent.

11.26 printf.h

Defines the type struct printf_info and the macros and enum values PA_*, and declares the functions printf_function, printf_arginfo_function, register_printf_function, parse_printf_format, printf_size, printf_size_info.

Documentation:


Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

11.27 pty.h

Declares the functions openpty and forkpty.

Documentation:

- man openpty.

Gnulib module: pty

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms that declare the forkpty and openpty functions in util.h or libutil.h instead: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8.
- This header file is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, BeOS.

Portability problems not fixed by Gnulib:

- This header file is missing on some platforms: mingw, MSVC 14.
11.28 resolv.h

Defines the types res_sendhookact, res_send_qhook, res_send_rhook, res_state, struct res_sym and the macros _PATH_RESCONF, RES_, and declares the functions fp_nquery, fp_query, hostalias, p_query, res_close, res_init, res_isourserver, res_mkquery, res_query, res_querydomain, res_search, res_send.

Documentation:
• man res_init.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.
• The functions are missing on some platforms: HP-UX 11.

11.29 shadow.h

Defines the type struct spwd and declares the functions setspent, endspent, getspent, getspent_r, getspnam, getspnam_r, sgetspent, sgetspent_r, fgetspent, fgetspent_r, putspent, lckpwdf, ulckpwdf.

Documentation:
• man setspent.

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This header file is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
• The functions getspent_r, getspnam_r, sgetspent_r, fgetspent, fgetspent_r, putspent are missing on some platforms: HP-UX 11.
• The functions sgetspent, sgetspent_r are missing on some platforms: HP-UX 11, IRIX 6.5, Solaris 11.4.

11.30 sys/ioctl.h

Declares the function ioctl.

Documentation:
• https://www.gnu.org/software/libc/manual/html_node/IOCTLs.html,
• man ioctl.

Gnulib module: sys_ioctl

Portability problems fixed by Gnulib:
• This header file is missing on some platforms: mingw, MSVC 14.
• This header file does not declare the ioctl function on some platforms: AIX 5.1, Solaris 11.4, Haiku 2017.

Portability problems not fixed by GnuLib:

11.31 sysexits.h

Defines the EX_* macros, including EX_OK.
GnuLib module: sysexits

Portability problems fixed by GnuLib:
• This header file is missing on some platforms: mingw, MSVC 14, Interix 3.5, BeOS.
• The macro EX_CONFIG is missing on some platforms: HP-UX 11.

Portability problems not fixed by GnuLib:

11.32 ttyent.h

Defines the type struct ttyent and declares the functions settyent, endttyent, getttyent, getttynam.

Documentation:
• man settyent.

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
• This header file is missing on some platforms: HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12 Glibc Function Substitutes

This chapter describes which functions and function-like macros provided as extensions by at least GNU libc are also supported by Gnulib, which portability pitfalls are fixed by Gnulib, and which (known) portability problems are not worked around by Gnulib.

The notation “Gnulib module: —” means that Gnulib does not provide a module providing a substitute for the function. When the list “Portability problems not fixed by Gnulib” is empty, such a module is not needed: No portability problems are known. Otherwise, it indicates that such a module would be useful but is not available: No one so far found this function important enough to contribute a substitute for it. If you need this particular function, you may write to <bug-gnulib at gnu dot org>.

This list of functions is sorted according to the header that declares them.

12.1 Glibc Extensions to <aio.h>

12.1.1 aio_init

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.2 Glibc <aliases.h>

12.2.1 endaliasent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.2.2 getaliasbyname

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.2.3 getaliasbyname_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.2.4 getaliasent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.2.5 getaliasent_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.2.6 setaliasent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.3 Glibc <argp.h>

12.3.1 argp_err_exit_status

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This variable is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.3.2 argp_error

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.3.3 argp_failure

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.3.4 argp_help

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.3.5 argp_parse

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.3.6 argp_program_bug_address

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This variable is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.3.7 argp_program_version
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This variable is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.3.8 argp_program_version_hook
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This variable is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.3.9 argp_state_help
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.3.10 argp_usage
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.4 Glibc <argz.h>

12.4.1 argz_add
Gnulib module: argz
Portability problems fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
• This function is broken on some platforms: Cygwin 1.5.24.
Portability problems not fixed by Gnulib:
12.4.2 argz_add_sep

Gnulib module: argz

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function is broken on some platforms: Cygwin 1.5.24.

Portability problems not fixed by Gnulib:

12.4.3 argz_append

Gnulib module: argz

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function is broken on some platforms: Cygwin 1.5.24.

Portability problems not fixed by Gnulib:

12.4.4 argz_count

Gnulib module: argz

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function is broken on some platforms: Cygwin 1.5.24.

Portability problems not fixed by Gnulib:

12.4.5 argz_create

Gnulib module: argz

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function is broken on some platforms: Cygwin 1.5.24.

Portability problems not fixed by Gnulib:

12.4.6 argz_create_sep

Gnulib module: argz

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
• This function is broken on some platforms: Cygwin 1.5.24.

Portability problems not fixed by Gnulib:

12.4.7 argz_delete

Gnulib module: argz

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

• This function is broken on some platforms: Cygwin 1.5.24.

Portability problems not fixed by Gnulib:

12.4.8 argz_extract

Gnulib module: argz

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

• This function is broken on some platforms: Cygwin 1.5.24.

Portability problems not fixed by Gnulib:

12.4.9 argz_insert

Gnulib module: argz

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

• This function is broken on some platforms: Cygwin 1.5.24.

Portability problems not fixed by Gnulib:

12.4.10 argz_next

Gnulib module: argz

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

• This function is broken on some platforms: Cygwin 1.5.24.

Portability problems not fixed by Gnulib:
12.4.11 argz_replace

Gnulib module: argz

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

- This function is broken on some platforms: Cygwin 1.5.24.

Portability problems not fixed by Gnulib:

12.4.12 argz_stringify

Gnulib module: argz

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

12.5 Glibc Extensions to <arpa/inet.h>

12.5.1 inet_aton

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14, BeOS.

12.5.2 inet_lnaof

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 4.4.

12.5.3 inet_makeaddr

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 4.4.
12.5.4 \texttt{inet\_net\__ntop}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, OSF/1 4.0, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.5.5 \texttt{inet\_net\_pton}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, OSF/1 4.0, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.5.6 \texttt{inet\_neta}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 6.5, OSF/1 4.0, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.5.7 \texttt{inet\_netof}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 4.4.

12.5.8 \texttt{inet\_network}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 4.4.

12.5.9 \texttt{inet\_nsap\_addr}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.
12.5.10 inet_nsap_ntoa

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11.00, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.6 Glibc <byteswap.h>

12.6.1 bswap_16

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.6.2 bswap_32

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.6.3 bswap_64

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.7 Glibc Extensions to <complex.h>

12.7.1 clog10

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 9, Interix 3.5, Android 9.0.
12.7.2 clog10f

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 9, Interix 3.5, Android 9.0.

12.7.3 clog10l

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 9, Interix 3.5, BeOS, Android 9.0.

12.8 Glibc <crypt.h>

12.8.1 crypt_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.8.2 encrypt_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.8.3 setkey_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.9 Glibc Extensions to <ctype.h>

12.9.1 isctype

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.10 Glibc Extensions to <dirent.h>

12.10.1 getdirententries

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 4.3.2, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

- On platforms where off_t is a 32-bit type, this function may not work correctly on huge directories larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

12.10.2 scandirat

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.14, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.10, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

12.10.3 versionsort

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.11 Glibc Extensions to <dlfcn.h>

12.11.1 dladdr

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.11.2 dladdr1

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.11.3 dlinfo

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.11.4 dlmopen

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.11.5 dlvsym

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.
12.12 Glibc <envz.h>

12.12.1 envz_add

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.12.2 envz_entry

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.12.3 envz_get

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.12.4 envz_merge

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.12.5 envz_remove

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.12.6 envz_strip

Gnumib module: —

Portability problems fixed by Gnumlib:

Portability problems not fixed by Gnumlib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.13 Glibc <err.h>

12.13.1 err

Gnumib module: —

Portability problems fixed by Gnumlib:

Portability problems not fixed by Gnumlib:

- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, BeOS.

12.13.2 errx

Gnumib module: —

Portability problems fixed by Gnumlib:

Portability problems not fixed by Gnumlib:

- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, BeOS.

12.13.3 verr

Gnumib module: —

Portability problems fixed by Gnumlib:

Portability problems not fixed by Gnumlib:

- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, BeOS.

12.13.4 verrx

Gnumib module: —

Portability problems fixed by Gnumlib:

Portability problems not fixed by Gnumlib:

- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, BeOS.
12.13.5 vwarn
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, BeOS.

12.13.6 vwarnx
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, BeOS.

12.13.7 warn
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, BeOS.

12.13.8 warnx
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, BeOS.

12.14 Glibc Extensions to <errno.h>

12.14.1 program_invocation_name
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This variable is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.7, mingw, MSVC 14, Interix 3.5, Android 9.0.
12.14.2 program_invocation_short_name

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This variable is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.7, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.15 Glibc <error.h>

12.15.1 error

Gnulib module: error

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.15.2 error_at_line

Gnulib module: error

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.15.3 error_message_count

Gnulib module: error

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This variable is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.15.4 error_one_per_line

Gnulib module: error

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This variable is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.
12.15.5 error_print_progname

Gnulib module: error
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This variable is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.16 Glibc <execinfo.h>

12.16.1 backtrace

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.16.2 backtrace_symbols

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.16.3 backtrace_symbols_fd

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.4, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.17 Glibc Extensions to <fcntl.h>

12.17.1 fallocate

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on older glibc versions and many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX
11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

- On platforms where off_t is a 32-bit type, this function may not work correctly across the entire data range of files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

### 12.17.2 name_to_handle_at

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.13, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

### 12.17.3 readahead

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

### 12.17.4 open_by_handle_at

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.13, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

### 12.18 Glibc Extensions to <fenv.h>

#### 12.18.1 fedisableexcept

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.7, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
12.18.2 feenableexcept

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.7, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.18.3 fegetexcept

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.7, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.19 Glibc Extensions to <fmtmsg.h>

12.19.1 addseverity

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.20 Glibc <fstab.h>

12.20.1 endfsent

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.20.2 getfsent

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.20.3 getfsfile
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.20.4 getfsspec
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.20.5 setfsent
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.21 Glibc <fts.h>

12.21.1 fts_children
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, mingw, MSVC 14, BeOS.
- On platforms where off_t is a 32-bit type, this function may not correctly report the size of files or block devices larger than 2 GB and may not work correctly on huge directories larger than 2 GB. Also, on platforms where ino_t is a 32-bit type, this function may report inode numbers incorrectly. The fix is to use the AC_SYS_LARGEFILE macro (only on Mac OS X systems).

12.21.2 fts_close
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, mingw, MSVC 14, BeOS.
12.21.3 fts_open

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, mingw, MSVC 14, BeOS.

12.21.4 fts_read

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, mingw, MSVC 14, BeOS.

• On platforms where off_t is a 32-bit type, this function may not correctly report the size of files or block devices larger than 2 GB and may not work correctly on huge directories larger than 2 GB. Also, on platforms where ino_t is a 32-bit type, this function may report inode numbers incorrectly. The fix is to use the AC_SYS_LARGEFILE macro (only on Mac OS X systems).

12.21.5 fts_set

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, mingw, MSVC 14, BeOS.

12.22 Glibc <getopt.h>

12.22.1 getopt_long

Gnulib module: getopt-gnu

Portability problems fixed by Gnulib:

• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, MSVC 14, Interix 3.5.

• The function getopt_long does not obey the combination of ‘+’ and ‘:’ flags in the options string on some platforms: glibc 2.11.

• The use of ‘W’ in the optstring argument to does not always allow --foo to behave synonymously with -W foo: glibc 2.11.

• The function getopt_long does not support the ‘+’ flag in the options string on some platforms: Mac OS X 10.5, AIX 5.2, OSF/1 5.1, Solaris 10.

• The value of optind after a missing required argument is wrong on some platforms: Mac OS X 10.5.
• The function `getopt_long` does not obey the ‘-’ flag in the options string when `POSIXLY_CORRECT` is set on some platforms: Cygwin 1.7.0.
• Some implementations fail to reset state, including re-checking `POSIXLY_CORRECT`, when `optind` is set to ‘0’: NetBSD, Cygwin 1.7.0.
• The function `getopt_long` does not support options with optional arguments on some platforms: Mac OS X 10.5, OpenBSD 4.0, AIX 5.2, IRIX 6.5, Solaris 11 2010-11, Cygwin 1.5.x.
• This function crashes if the option string includes `W`; but there are no long options, on some platforms: glibc 2.14.

Portability problems not fixed by Gnulib:

12.22.2 `getopt_long_only`

Gnulib module: `getopt-gnu`

Portability problems fixed by Gnulib:

• The function `getopt_long_only` does not obey the combination of ‘+’ and ‘:’ flags in the options string on some platforms: glibc 2.11.
• The use of ‘W,’ in the optstring argument to does not always allow `-W foo` to behave synonymously with `--foo`: glibc 2.11.
• The function `getopt_long_only` does not support the ‘+’ flag in the options string on some platforms: Mac OS X 10.5, AIX 5.2, OSF/1 5.1, Solaris 10.
• The value of `optind` after a missing required argument is wrong on some platforms: Mac OS X 10.5.
• The function `getopt_long_only` does not obey the ‘-’ flag in the options string when `POSIXLY_CORRECT` is set on some platforms: Cygwin 1.7.0.
• Some implementations fail to reset state, including re-checking `POSIXLY_CORRECT`, when `optind` is set to ‘0’: NetBSD, Cygwin 1.7.0.
• The function `getopt_long_only` does not support options with optional arguments on some platforms: Mac OS X 10.5, OpenBSD 4.0, AIX 5.2, Solaris 11 2010-11, Cygwin 1.5.x.
• This function is missing on some platforms: Mac OS X 10.3, FreeBSD 5.2.1, NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, mingw, MSVC 14, Interix 3.5.
• This function crashes if the option string includes `W`; but there are no long options, on some platforms: glibc 2.14.

Portability problems not fixed by Gnulib:

• Some implementations return success instead of reporting an ambiguity if user’s option is a prefix of two long options with the same outcome: FreeBSD.
• The GNU Coding Standards discourage the use of `getopt_long_only` in new programs.

12.23 Glibc Extensions to `<glob.h>`
12.23.1 glob_pattern_p
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on most non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.24 Glibc Extensions to <gnu/libc-version.h>

12.24.1 gnu_get_libc_release
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.24.2 gnu_get_libc_version
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.25 Glibc Extensions to <grp.h>

12.25.1 fgetgrent
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.25.2 fgetgrent_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.25.3 getgrent_r
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.25.4 getgrouplist
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function takes int instead of gid_t parameters on some platforms: OS X 10.11.
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.0, Cygwin 1.7.9, mingw, MSVC 14, BeOS.

The Gnulib module getugroups provides a similar API.

12.25.5 initgroups
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is unsafe to call between fork and exec if the parent process is multi-threaded. Instead, use getgroups or getgrouplist (or use the gnulib module mgetgroups) before forking, and setgroups in the child.
• This function is missing on some platforms: mingw, MSVC 14, Interix 3.5, BeOS.

12.25.6 putgrent
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.25.7 setgroups

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, mingw, MSVC 14, Interix 3.5, BeOS.
- On very old systems, this function operated on an array of ‘int’, even though that was a different size than an array of ‘gid_t’; you can use autoconf’s AC_TYPE_GETGROUPS to set GETGROUPS_T to the appropriate size (since getgroups and setgroups share the same bug).

12.26 Glibc <gshadow.h>

12.26.1 endsgent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.26.2 fgetsgent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.26.3 fgetsgent_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.26.4 getsgent

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.26.5 getsgent_r
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.26.6 getsgnam
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.26.7 getsgnam_r
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.26.8 putsgent
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.26.9 setsgent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.26.10 sgetsgent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.26.11 sgetsgent_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.27 Glibc <ifaddrs.h>

12.27.1 getifaddrs

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

12.27.2 freeifaddrs

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.
12.28 Glibc <libintl.h>

12.28.1 bind_textdomain_codeset

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.28.2 bindtextdomain

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.28.3 dcgettext

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.28.4 dcngettext

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.28.5 dgettext

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.28.6  dngettext

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.28.7  gettext

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.28.8  ngettext

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.28.9  textdomain

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.29  Glibc <link.h>

12.29.1  dl_iterate_phdr

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
12.30 Glibc <malloc.h>

12.30.1 mallinfo

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Solaris 11 2010-11, mingw, MSVC 14, Interix 3.5, BeOS.

12.30.2 malloc_get_state

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.30.3 malloc_set_state

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.30.4 malloc_info

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.30.5 malloc_stats

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.30.6 malloc_trim

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.30.7 malloc_usable_size

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.00, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.1.

12.30.8 mallocopt

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Solaris 11 2010-11, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.

12.30.9 memalign

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.00, OSF/1 5.1, mingw, MSVC 14, Interix 3.5.

12.30.10 pvalloc

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.
12.31 Glibc Extensions to <math.h>

12.31.1 drem

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 11.4, mingw, MSVC 14.

12.31.2 dremf

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, mingw, MSVC 14.

12.31.3 dreml

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.31.4 exp10

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.31.5 exp10f

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, Android 9.0.
12.31.6 exp10l

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.31.7 finite

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, MSVC 14.

12.31.8 finitef

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, mingw, MSVC 14.

12.31.9 finitel

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.31.10 gamma

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14.

12.31.11 gammaf

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, mingw, MSVC 14.
12.31.12 `gammal`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.31.13 `isinff`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Android 4.4.
- This function is not declared on some platforms: Android 9.0.

12.31.14 `isinfl`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 4.4.
- This function is not declared on some platforms: Android 9.0.

12.31.15 `isnanf`

Gnulib module: `isnanf`

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, MSVC 14.

12.31.16 `isnanl`

Gnulib module: `isnanl`

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Cygwin, MSVC 14, Interix 3.5, Android 4.4.
- This function is not declared on some platforms: Android 9.0.
12.31.17  j0f
    Gnulib module: —
    Portability problems fixed by Gnulib:
    Portability problems not fixed by Gnulib:
    • This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, mingw, MSVC 14.

12.31.18  j0l
    Gnulib module: —
    Portability problems fixed by Gnulib:
    Portability problems not fixed by Gnulib:
    • This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.31.19  j1f
    Gnulib module: —
    Portability problems fixed by Gnulib:
    Portability problems not fixed by Gnulib:
    • This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, mingw, MSVC 14.

12.31.20  j1l
    Gnulib module: —
    Portability problems fixed by Gnulib:
    Portability problems not fixed by Gnulib:
    • This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.31.21  jnf
    Gnulib module: —
    Portability problems fixed by Gnulib:
    Portability problems not fixed by Gnulib:
    • This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, mingw, MSVC 14.
12.31.22 jnl
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.31.23 lgamma_r
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5 x86, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, mingw, MSVC 14.

12.31.24 lgammaf_r
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, mingw, MSVC 14.

12.31.25 lgammal_r
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.31.26 matherr
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: FreeBSD 6.0, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, mingw, MSVC 14, Android 9.0.
12.31.27 pow10
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.31.28 pow10f
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.31.29 pow10l
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.31.30 scalbf
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, mingw, MSVC 14.

12.31.31 scalbl
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.31.32 significand
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, mingw, MSVC 14.

12.31.33 significandf
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, mingw, MSVC 14.

12.31.34 significandl
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.31.35 sincos
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, mingw, MSVC 14, Interix 3.5.

12.31.36 sincosf
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, mingw, MSVC 14, Interix 3.5.
12.31.37 sincosl

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.31.38 y0f

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, mingw, MSVC 14.

12.31.39 y0l

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.31.40 y1f

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, mingw, MSVC 14.

12.31.41 y1l

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.31.42 **ynf**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, mingw, MSVC 14.

12.31.43 **ynl**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.32 **Glibc <mcheck.h>**

12.32.1 **mcheck**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.32.2 **mcheck_check_all**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.32.3 **mcheck_pedantic**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.32.4 mprobe

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.32.5 mtrace

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.32.6 muntrace

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.33 Glibc <mntent.h>

12.33.1 addmntent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.32, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.33.2 endmntent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.32, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
12.33.3 getmntent
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, OSF/1 5.1, mingw, MSVC 14, BeOS.

12.33.4 getmntent_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.33.5 hasmntopt
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.

12.33.6 setmntent
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.34 Glibc Extensions to <netdb.h>

12.34.1 endnetgrent
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.34.2 gethostbyaddr_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.34.3 gethostbyname2
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS.

12.34.4 gethostbyname2_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.34.5 gethostbyname_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.34.6 gethostent_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.34.7 getnetbyaddr_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.8 getnetbyname_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.9 getnetent_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.10 getnetgrent
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.11 getnetgrent_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.34.12 getprotobyname_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.13 getprotobynumber_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.14 getprotoent_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.15 getservbyname_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.16 getservbyport_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.17 getservent_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.34.18 herror

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Interix 3.5.

12.34.19 hstrerror

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, mingw, MSVC 14, Interix 3.5, BeOS.

12.34.20 innetgr

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.21 rcmd

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 9.0.

12.34.22 rcmd_af

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11.11, IRIX 6.5, OSF/1 4.0, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.23 rexec

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.
12.34.24 `rexec_af`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.11, IRIX 6.5, OSF/1 4.0, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.25 `rresvport`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.

12.34.26 `rresvport_af`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11.11, IRIX 6.5, OSF/1 4.0, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.34.27 `ruserok`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, BeOS, Android 9.0.

12.34.28 `ruserok_af`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.34.29 setnetgrent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.35 Glibc <netinet/ether.h>

12.35.1 ether_aton

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: HP-UX 11, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 2.3.

12.35.2 ether_aton_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 2.3.

12.35.3 ether_hostton

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: HP-UX 11, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.35.4 ether_line

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: HP-UX 11, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.35.5 ether_ntoa

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: HP-UX 11, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 2.3.

12.35.6 ether_ntoa_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 2.3.

12.35.7 ether_ntohost

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: HP-UX 11, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36 Glibc Extensions to <netinet/in.h>

12.36.1 bindresvport

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Cygwin 1.5.x, mingw, MSVC 14, BeOS.

12.36.2 getipv4sourcefilter

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.36.3 **getsourcefilter**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.4 **in6addr_any**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This constant is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, HP-UX 11.00, IRIX 6.5, OSF/1 5.1, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

12.36.5 **in6addr_loopback**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This constant is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 4.3.2, HP-UX 11.00, IRIX 6.5, OSF/1 5.1, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

12.36.6 **inet6_option_alloc**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.7 **inet6_option_append**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.36.8 inet6_option_find

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.9 inet6_option_init

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.10 inet6_option_next

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.11 inet6_option_space

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.12 inet6_opt_append

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.36.13 *inet6_opt_find*

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.14 *inet6_opt_finish*

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.15 *inet6_opt_get_val*

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.16 *inet6_opt_init*

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.17 *inet6_opt_next*

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:

- This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.36.18 inet6_opt_set_val
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.19 inet6_rth_add
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.20 inet6_rth_getaddr
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.21 inet6_rth_init
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.22 inet6_rth_reverse
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.36.23 **inet6_rth_segments**
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.24 **inet6_rth_space**
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on many non-glibc platforms: glibc 2.4, Mac OS X 10.5, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.25 **setipv4sourcefilter**
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.36.26 **setsourcefilter**
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.37 **Glibc <obstack.h>**

12.37.1 **obstack_alloc_failed_handler**
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This variable is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.
12.37.2 obstack_exit_failure

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This variable is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.37.3 obstack_free

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.37.4 obstack_printf

Gnulib module: obstack_printf or obstack_printf-posix

Portability problems fixed by either Gnulib module obstack_printf or obstack_printf-posix:
- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

Portability problems fixed by Gnulib module obstack_printf-posix:
- This function does not support size specifiers as in C99 (hh, 11, j, t, z) on some platforms: AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.24, mingw, MSVC 14, BeOS.
- printf of 'long double' numbers is unsupported on some platforms: mingw, MSVC 14, BeOS.
- printf "%f", "%e", "%g" of Infinity and NaN yields an incorrect result on some platforms: AIX 5.2, OSF/1 5.1, Solaris 11.0, mingw, MSVC 14.
- This function does not support the 'a' and 'A' directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
- This function does not support the 'F' directive on some platforms: NetBSD 3.0, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
- This function does not support the 'n' directive on some platforms: MSVC 14.
- This function does not support the 'ls' directive on some platforms: OpenBSD 4.0, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Haiku.
- This function does not support precisions in the 'ls' directive correctly on some platforms: Solaris 11.4.
• This function does not support format directives that access arguments in an arbitrary order, such as "%2$s", on some platforms: NetBSD 3.0, mingw, MSVC 14, BeOS.
• This function doesn't support the ' ' flag on some platforms: NetBSD 3.0, Cygwin 1.5.24, mingw, MSVC 14.
• This function does not round the argument of the 'a' directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.
• This function behaves incorrectly when a '-' flag and a negative width are specified together, on some platforms: HP-UX 10.20.
• printf "%010f" of NaN and Infinity yields an incorrect result (padded with zeroes) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, AIX 5.2, IRIX 6.5, OSF/1 5.1, Solaris 11.0, Cygwin 1.5.x, mingw, MSVC 14.
• This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: Solaris 10/x86, mingw, MSVC 14, BeOS.
• This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.
• This function does not fully support the 'n' directive on some platforms: HP-UX 11, mingw, MSVC 14.

Portability problems not fixed by Gnulib:
• The %m directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.

12.37.5 obstack_vprintf

Gnulib module: obstack-printf or obstack-printf-posix

Portability problems fixed by either Gnulib module obstack-printf or obstack-printf-posix:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

Portability problems fixed by Gnulib module obstack-printf-posix:
• This function does not support size specifiers as in C99 (hh, 11, j, t, z) on some platforms: AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.24, mingw, MSVC 14, BeOS.
• printf of 'long double' numbers is unsupported on some platforms: mingw, MSVC 14, BeOS.
• printf "%f", "%e", "%g" of Infinity and NaN yields an incorrect result on some platforms: AIX 5.2, OSF/1 5.1, Solaris 11.0, mingw, MSVC 14.
• This function does not support the 'a' and 'A' directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, AIX 5.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
• This function does not support the 'F' directive on some platforms: NetBSD 3.0, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Solaris 9, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
• This function does not support the 'n' directive on some platforms: MSVC 14.
• This function does not support the 'ls' directive on some platforms: OpenBSD 4.0, IRIX 6.5, Solaris 2.6, Cygwin 1.5.x, Haiku.
• This function does not support precisions in the 'ls' directive correctly on some platforms: Solaris 11.4.
• This function does not support format directives that access arguments in an arbitrary order, such as "%2$s", on some platforms: NetBSD 3.0, mingw, MSVC 14, BeOS.
• This function doesn't support the 'a' directive correctly on some platforms: NetBSD 3.0, Cygwin 1.5.24, mingw, MSVC 14.
• This function does not properly round the argument of the 'a' directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.
• This function behaves incorrectly when a '-' flag and a negative width are specified together, on some platforms: HP-UX 10.20.
• printf "%010f" of NaN and Infinity yields an incorrect result (padded with zeroes) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, AIX 5.2, IRIX 6.5, OSF/1 5.1, Solaris 11.0, Cygwin 1.5.x, mingw, MSVC 14.
• This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: Solaris 10/x86, mingw, MSVC 14, BeOS.
• This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.
• This function does not fully support the 'n' directive on some platforms: HP-UX 11, mingw, MSVC 14.

Portability problems not fixed by Gnulib:
• The %n directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.

12.38 Glibc <printf.h>

12.38.1 parse_printf_format

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.38.2 printf_size

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.38.3 `printf_size_info`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.38.4 `register_printf_function`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.38.5 `register_printf_modifier`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.38.6 `register_printfSpecifier`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.38.7 `register_printf_type`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.39 Glibc Extensions to <pthread.h>

12.39.1 pthread_attr_getaffinity_np

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on all non-glibc platforms: glibc 2.3.2, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function has a different signature on some platforms: glibc 2.3.3.

12.39.2 pthread_attr_setaffinity_np

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on all non-glibc platforms: glibc 2.3.2, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function has a different signature on some platforms: glibc 2.3.3.

12.39.3 pthread_getaffinity_np

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many non-glibc platforms: glibc 2.3.2, Mac OS X 10.5, FreeBSD 6.4, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function has a different signature on some platforms: glibc 2.3.3.
- The third parameter has a different type on some platforms: FreeBSD 7.2, NetBSD 5.0.

12.39.4 pthread_getattr_np

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS.
12.39.5  pthread_getname_np

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.11, Mac OS X 10.5, FreeBSD 6.4, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, Solaris 11.0, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.

12.39.6  pthread_kill_other_threads_np

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.39.7  pthread_mutex_consistent_np

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 7, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.39.8  pthread_mutexattr_getrobust_np

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 7, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

This function has now been standardized by POSIX under the name pthread_mutexattr_getrobust.

12.39.9  pthread_mutexattr_setrobust_np

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 7, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
This function has now been standardized by POSIX under the name `pthread_mutexattr_setrobust`.

12.39.10 `pthread_rwlockattr_getkind_np`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.39.11 `pthread_rwlockattr_setkind_np`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.39.12 `pthread_setaffinity_np`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.3.2, Mac OS X 10.5, FreeBSD 6.4, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function has a different signature on some platforms: glibc 2.3.3.
- The third parameter has a different type on some platforms: FreeBSD 7.2, NetBSD 5.0.

12.39.13 `pthread_setname_np`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.11, Mac OS X 10.5, FreeBSD 6.4, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, Solaris 11.0, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.
- This function has a different signature on some platforms: NetBSD 5.0, OSF/1 5.1. On OSF/1 the third argument must be NULL. On NetBSD the second argument is interpreted as a `printf` format string, with the third argument as parameter.
12.39.14 pthread_sigqueue

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.10, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.0, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.39.15 pthread_timedjoin_np

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.3.2, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

- FreeBSD 6.4 has a function of this name in libthr but not in libpthread, and it also is missing a declaration.

12.39.16 pthread_tryjoin_np

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.3.2, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.39.17 pthread_yield

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin 1.7.7, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.40 Glibc <pty.h>

12.40.1 forkpty

Gnulib module: forkpty

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.3, Android 5.1.
• One some systems (at least including Cygwin, Interix, OSF/1 4 and 5, and Mac OS X) linking with `-lutil` is not required.
• On glibc, OpenBSD, NetBSD and FreeBSD linking with `-lutil` is required.
• The function is declared in pty.h on Cygwin, Interix, OSF/1 4 and 5, and glibc. It is declared in util.h on Mac OS X, OpenBSD and NetBSD. It is declared in libutil.h on FreeBSD.
• Some platforms declare the function without marking the last two parameters `const`. FreeBSD, Cygwin 1.7.1.

Portability problems not fixed by GnuLib:
• This function is missing on some platforms: mingw, MSVC 14.

12.40.2 openpty

GnuLib module: openpty

Portability problems fixed by GnuLib:
• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.3, Android 5.1.
• One some systems (at least including Cygwin, Interix, OSF/1 4 and 5, and Mac OS X) linking with `-lutil` is not required.
• On glibc, OpenBSD, NetBSD and FreeBSD linking with `-lutil` is required.
• The function is declared in pty.h on Cygwin, Interix, OSF/1 4 and 5, and glibc. It is declared in util.h on Mac OS X, OpenBSD and NetBSD. It is declared in libutil.h on FreeBSD.
• Some platforms declare the function without marking the last two parameters `const`. FreeBSD, Cygwin 1.7.1.

Portability problems not fixed by GnuLib:
• This function is missing on some platforms: mingw, MSVC 14.
• After a successful call to `openpty`, the application needs to close the master’s file descriptor before closing the slave’s file descriptor, otherwise the process may hang in a state where it cannot be killed, on some platforms: Mac OS X 10.4.11.

12.41 Glibc Extensions to `<pwd.h>`

12.41.1 fgetpwent

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.41.2 fgetpwent_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.41.3 getpw
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.41.4 getpwent_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.41.5 putpwent
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.42 Glibc Extensions to <regex.h>

12.42.1 re_comp
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.
12.42.2 re_compile_fastmap

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.42.3 re_compile_pattern

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.42.4 re_exec

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.42.5 re_match

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.42.6 re_match_2

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.
12.42.7 re_search

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.42.8 re_search_2

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.42.9 re_set_registers

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.42.10 re_set_syntax

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.42.11 re_syntax_options

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This variable is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.
12.43 Glibc <regexp.h>

12.43.1 advance
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.43.2 loc1
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This variable is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.43.3 loc2
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This variable is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.43.4 locs
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This variable is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.43.5 step
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.44 Glibc `<resolv.h>

12.44.1 `dn_expand`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5.

12.44.2 `res_init`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5.

12.44.3 `res_mkquery`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5.

12.44.4 `res_query`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5.

12.44.5 `res_querydomain`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.44.6 `res_search`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5.
12.45 Glibc <rpc/auth.h>

12.45.1 authdes_create

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.2 authdes_pk_create

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.3 authnone_create

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.45.4 authunix_create

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 11.4, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.45.5 authunix_create_default

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 11.4, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.45.6 getnetname
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.7 host2netname
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.8 key_decryptsession
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.9 key_decryptsession_pk
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.10 key_encryptsession
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.45.11 key_encryptsession_pk
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.12 key_gendes
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.13 key_get_conv
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.14 key_secretkey_is_set
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.15 key_setsecret
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.45.16 netname2host

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.17 netname2user

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.18 user2netname

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.45.19 xdr_des_block

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.45.20 xdr_opaque_auth

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.46 Glibc <rpc/auth_des.h>
12.46.1 authdes_getucred
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.46.2 getpublickey
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.46.3 getsecretkey
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.46.4 rtime
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.47 Glibc <rpc/auth_unix.h>

12.47.1 xdr_authunix_parms
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 11.4, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.48 Glibc <rpc/clnt.h>

12.48.1 callrpc
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.2 clnt_create
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.3 clnt_pcreateerror
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.4 clnt_perrno
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.5 clnt_perror
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.48.6 clnt_spcreateerror

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.7 clnt_sperrno

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.8 clnt_sperror

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.9 clnt_raw_create

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.10 clnttcp_create

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.11 clntudp_bufcreate

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.48.12 clntudp_create
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.13 clntunix_create
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.48.14 get_myaddress
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.15 getrpcport
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 4.3.2, IRIX 6.5, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.48.16 rpc_createerr
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This variable is missing on some platforms: Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.49  Glibc <rpc/des_crypt.h>

12.49.1  cbc_crypt

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.49.2  des_setparity

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.49.3  ecb_crypt

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.50  Glibc <rpc/key_prot.h>

12.50.1  xdr_cryptkeyarg

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.50.2  xdr_cryptkeyarg2

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.50.3 xdr_cryptkeyres
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.50.4 xdr_getcredres
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.50.5 xdr_key_netstarg
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.50.6 xdr_key_netstres
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.50.7 xdr_keybuf
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.50.8 xdr_keystatus
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.50.9 xdr_netnamestr
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.50.10 xdr_unixcred
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.51 Glibc <rpc/netdb.h>

12.51.1 endrpcent
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.51.2 getrpcbyname
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.51.3 getrpcbyname_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.51.4 getrpcbynumber
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.51.5 getrpcbynumber_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.51.6 getrpcent
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.51.7 getrpcent_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 5.3, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.51.8 setrpcent
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.52 Glibc <rpc/pmap_clnt.h>

12.52.1 clnt_broadcast
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.52.2 pmap_getmaps
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.52.3 pmap_getport
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.52.4 pmap_rmtcall
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.52.5 pmap_set
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.52.6 pmap_unset
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.53 Glibc <rpc/pmap_prot.h>

12.53.1 xdr_pmap
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.53.2 xdr_pmaplist
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.54 Glibc <rpc/pmap_rmt.h>

12.54.1 xdr_rmtcall_args
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 11.4, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.54.2 xdr_rmtcallres
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.55 Glibc <rpc/rpc_msg.h>

12.55.1 xdr_callhdr
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.55.2 xdr_callmsg
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.55.3 xdr_replymsg
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56 Glibc <rpc/svc.h>

12.56.1 svc_exit
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.56.2 svc_fdset
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This variable is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.3 svc_getreq
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.4 svc_getreq_common
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.56.5 svc_getreq_poll
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.56.6 svc_getreqset
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.7 svc_max_pollfd
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This variable is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
### 12.56.8 svc_pollfd

Gnulib module: —  
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This variable is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

### 12.56.9 svc_register

Gnulib module: —  
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

### 12.56.10 svc_run

Gnulib module: —  
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

### 12.56.11 svc_sendreply

Gnulib module: —  
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

### 12.56.12 svc_unregister

Gnulib module: —  
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

### 12.56.13 svcerr_auth

Gnulib module: —  
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.56.14  svcerr_decode
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.15  svcerr_noproc
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.16  svcerr_noprog
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.17  svcerr_progvers
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.18  svcerr_systemerr
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.19  svcerr_weakauth
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.56.20 svcraw_create

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.21 svctcp_create

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.22 svcudp_bufcreate

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.23 svcudp_create

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.56.24 svcunix_create

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.56.25 xprt_register

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.56.26  **xprt_unregister**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.

12.57  **Glibc <rpc/xdr.h>**

12.57.1  **xdr_array**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.2  **xdr_bool**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.3  **xdr_bytes**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.4  **xdr_char**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.
12.57.5 xdr_double
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.6 xdr_enum
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.7 xdr_float
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.8 xdr_free
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.9 xdr_hyper
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.57.10 xdr_int
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.
12.57.11 xdr_int16_t
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.3, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.7.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.57.12 xdr_int32_t
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.3, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.7.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.57.13 xdr_int64_t
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.7.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.57.14 xdr_int8_t
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.7.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.57.15 xdr_long
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.
12.57.16 xdr_longlong_t

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.57.17 xdr_netobj

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.18 xdropaque

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.19 xdr_pointer

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.20 xdr_quad_t

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.57.21 xdr_reference

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.
12.57.22 xdr_short
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.23 xdr_sizeof
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin 1.7.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.57.24 xdr_string
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.25 xdr_u_char
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.26 xdr_u_hyper
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, IRIX 5.3, Cygwin 1.7.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.57.27 xdr_u_int
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.
12.57.28 xdr_u_long

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.29 xdr_u_longlong_t

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.3, OpenBSD 3.8, Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.57.30 xdr_u_quad_t

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.57.31 xdr_u_short

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.32 xdr_uint16_t

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin 1.7.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
• This function is not declared in the header on some platforms: Cygwin 1.7.5.
12.57.33  \texttt{xdr\_uint32\_t}

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function is not declared in the header on some platforms: Cygwin 1.7.5.

12.57.34  \texttt{xdr\_uint64\_t}

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function is not declared in the header on some platforms: Cygwin 1.7.5.

12.57.35  \texttt{xdr\_uint8\_t}

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function is not declared in the header on some platforms: Cygwin 1.7.5.

12.57.36  \texttt{xdr\_union}

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.37  \texttt{xdr\_vector}

Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.
12.57.38 xdr_void
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.39 xdr_wrapstring
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.40 xdrmem_create
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.41 xdrrec_create
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.42 xdrrec_endofrecord
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.43 xdrrec_eof
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.
12.57.44 xdrrec_skiprecord

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.57.45 xdrstdio_create

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Cygwin 1.7.4, mingw, MSVC 14, BeOS, Android 9.0.

12.58 Glibc <rpcsvc/nislib.h>

12.58.1 nis_add

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.2 nis_add_entry

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.3 nis_addmember

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.58.4 nis_checkpoint

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.5 nis_clone_object

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.6 nis_creategroup

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.7 nis_destroy_object

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.8 nis_destroygroup

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.58.9 nis_dir_cmp

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.10 nis_domain_of

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.11 nis_domain_of_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.12 nis_first_entry

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.13 nis_freenames

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.58.14 nis_freeresult

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.15 nis_freeservlist

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.16 nis_freetags

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.17 nis_getnames

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.18 nis_getservlist

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.58.19 *nis_ismember*

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.20 *nis_leaf_of*

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.21 *nis_leaf_of_r*

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.22 *nis_lerror*

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.23 *nis_list*

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.58.24 **nis_local_directory**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.25 **nis_local_group**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.26 **nis_local_host**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.27 **nis_local_principal**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.28 **nis_lookup**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.58.29 nis_mkdir

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.30 nis_modify

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.31 nis_modify_entry

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.32 nis_name_of

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.33 nis_name_of_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.58.34 nis_next_entry
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.35 nis_perror
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.36 nis_ping
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.37 nis_print_directory
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.38 nis_print_entry
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.58.39 nis_print_group

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.40 nis_print_group_entry

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.41 nis_print_link

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.42 nis_print_object

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.43 nis_print_result

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.58.44 nis_print_rights
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.45 nis_print_table
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.46 nis_remove
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.47 nis_remove_entry
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.48 nis_removemember
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.58.49 nis_rmdir
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.50 nis_servstate
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.51 nis_sperrno
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.52 nis_sperror
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.53 nis_sperror_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.58.54 nis_stats
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.58.55 nis_verifygroup
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.59 Glibc <rpcsvc/nis_callback.h>

12.59.1 xdr_cback_data
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.59.2 xdr_obj_p
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60 Glibc <rpcsvc/yp.h>

12.60.1 xdr_domainname
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.2 xdr_keydat

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.3 xdr_mapname

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.4 xdr_peername

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.5 xdr_valdat

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.6 xdr_ypbind_binding

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.60.7 xdr_ypbind_resp

- Gnulib module: —
- Portability problems fixed by Gnulib:
- Portability problems not fixed by Gnulib:
  - This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.8 xdr_ypbind_resptype

- Gnulib module: —
- Portability problems fixed by Gnulib:
- Portability problems not fixed by Gnulib:
  - This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.9 xdr_ypbind_setdom

- Gnulib module: —
- Portability problems fixed by Gnulib:
- Portability problems not fixed by Gnulib:
  - This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.10 xdr_ypmap_parms

- Gnulib module: —
- Portability problems fixed by Gnulib:
- Portability problems not fixed by Gnulib:
  - This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.11 xdr_ypmaplist

- Gnulib module: —
- Portability problems fixed by Gnulib:
- Portability problems not fixed by Gnulib:
  - This function is missing on some platforms: Minix 3.1.8, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.12 xdr_yppush_status

- Gnulib module: —
- Portability problems fixed by Gnulib:
- Portability problems not fixed by Gnulib:
  - This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.60.13 xdr_yppushresp_xfr
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.14 xdr_ypreq_key
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.15 xdr_ypreq_nokey
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.16 xdr_ypreq_xfr
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.17 xdr_ypresp_all
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.18 xdr_ypresp_key_val
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.60.19  xdr_ypresp_maplist
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.20  xdr_ypresp_master
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.21  xdr_ypresp_order
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.22  xdr_ypresp_val
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.23  xdr_ypresp_xfr
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.60.24 xdr_ypstat
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.60.25 xdr_ypxfrstat
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.61 Glibc <rpcsvc/yp_prot.h>

12.61.1 xdr_ypall
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.62 Glibc <rpcsvc/ypclnt.h>

12.62.1 yp_all
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.62.2 yp_bind
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.62.3 yp_first
   Gnulib module: —
   Portability problems fixed by Gnulib:
   Portability problems not fixed by Gnulib:
   • This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.62.4 yp_get_default_domain
   Gnulib module: —
   Portability problems fixed by Gnulib:
   Portability problems not fixed by Gnulib:
   • This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.62.5 yp_master
   Gnulib module: —
   Portability problems fixed by Gnulib:
   Portability problems not fixed by Gnulib:
   • This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.62.6 yp_match
   Gnulib module: —
   Portability problems fixed by Gnulib:
   Portability problems not fixed by Gnulib:
   • This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.62.7 yp_next
   Gnulib module: —
   Portability problems fixed by Gnulib:
   Portability problems not fixed by Gnulib:
   • This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.62.8 yp_order
   Gnulib module: —
   Portability problems fixed by Gnulib:
   Portability problems not fixed by Gnulib:
   • This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.62.9 yp_unbind
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.62.10 yp_update
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.62.11 ypbinderr_string
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.62.12 yperr_string
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.62.13 ypprot_err
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.63 Glibc <rpcsvc/ypupd.h>

12.63.1 xdr_yp_buf

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.63.2 xdr ypdelete_args

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.63.3 xdr_ypupdate_args

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.64 Glibc Extensions to <sched.h>

12.64.1 clone

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.64.2 sched_getaffinity

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 3.0.
12.64.3 sched_setaffinity

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 3.0.

12.64.4 setns

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.13, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.65 Glibc Extensions to <search.h>

12.65.1 hcreate_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, mingw, MSVC 14, BeOS, Android 8.1.

12.65.2 hdestroy_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, mingw, MSVC 14, BeOS, Android 8.1.

12.65.3 hsearch_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, mingw, MSVC 14, BeOS, Android 8.1.
12.65.4 tdestroy

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.0, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

12.66 Glibc Extensions to <selinux/selinux.h>

12.66.1 fgetfilecon

Gnulib module: selinux-h

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0. On those platforms, this module provides a stub that always sets errno to ENOTSUP and returns ‘-1’.

- On systems with SELinux support, this module provides a wrapper for the fgetfilecon function that insulates the caller from API-nonconforming behavior. Without this wrapper, fgetfilecon can return ‘0’ and set the context pointer to NULL, and in another scenario can return ‘10’ and set the context pointer to ‘unlabeled’. This wrapper returns ‘-1’ in each case and sets errno to ENOTSUP and ENODATA respectively. While the conditions that can provoke such behavior are rare, the average caller does not handle them because the possibility of such behavior is not documented.

Portability problems not fixed by Gnulib:

12.66.2 getfilecon

Gnulib module: selinux-h

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0. On those platforms, this module provides a stub that always sets errno to ENOTSUP and returns ‘-1’.

- On systems with SELinux support, this module provides a wrapper for the getfilecon function that insulates the caller from API-nonconforming behavior. Without this wrapper, getfilecon can return ‘0’ and set the context pointer to NULL, and in another scenario can return ‘10’ and set the context pointer to ‘unlabeled’. This wrapper returns ‘-1’ in each case and sets errno to ENOTSUP and ENODATA respectively. While the conditions that can provoke such behavior are rare, the average caller does not handle them because the possibility of such behavior is not documented.

Portability problems not fixed by Gnulib:
12.66.3 lgetfilecon

Gnulib module: selinux-h

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0. On those platforms, this module provides a stub that always sets errno to ENOTSUP and returns ‘-1’.

- On systems with SELinux support, this module provides a wrapper for the lgetfilecon function that insulates the caller from API-nonconforming behavior. Without this wrapper, lgetfilecon can return ‘0’ and set the context pointer to NULL, and in another scenario can return ‘10’ and set the context pointer to ‘unlabeled’. This wrapper returns ‘-1’ in each case and sets errno to ENOTSUP and ENODATA respectively. While the conditions that can provoke such behavior are rare, the average caller does not handle them because the possibility of such behavior is not documented.

Portability problems not fixed by Gnulib:

12.67 Glibc <shadow.h>

12.67.1 endspent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.67.2 fgetspent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.67.3 fgetspent_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 5.3, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.67.4 getspent
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.67.5 getspent_r
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 5.3, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.67.6 getspnam
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.67.7 getspnam_r
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 5.3, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.67.8 lckpwdf
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.67.9 putspent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.67.10 setspent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.67.11 sgetspent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.67.12 sgetspent_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.67.13 ulckpwdf

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.68 Glibc Extensions to <signal.h>

12.68.1 gsignal
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.68.2 sigandset
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.68.3 sigblock
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, Solaris 11.4, Cygwin, mingw, MSVC 14, BeOS.

12.68.4 sigsetmask
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.68.5 sigisemptyset
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.68.6 sigorset

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.68.7 sigreturn

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.68.8 sigsetmask

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, Solaris 11.4, Cygwin, mingw, MSVC 14, BeOS.

12.68.9 sigstack

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.68.10 sigvec

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, Solaris 11.4, Cygwin, mingw, MSVC 14, BeOS, Android 9.0.
12.68.11 ssignal

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.68.12 sys_siglist

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This constant is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5.

12.68.13 sysv_signal

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.69 Glibc Extensions to <stdio.h>

12.69.1 asprintf

Gnulib module: vasprintf or vasprintf-posix

Portability problems fixed by either Gnulib module vasprintf or vasprintf-posix:

- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, Interix 3.5.

Portability problems fixed by Gnulib module vasprintf-posix:

- This function does not support size specifiers as in C99 (hh, 11, j, t, z) on some platforms: Cygwin 1.5.24, BeOS.
- printf of ‘long double’ numbers is unsupported on some platforms: BeOS.
- printf ”%f”, ”%e”, ”%g” of Infinity and NaN yields an incorrect result on some platforms: Solaris 11.0.
- This function does not support the ‘a’ and ‘A’ directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, Solaris 11.4, Cygwin 1.5.x, BeOS.
- This function does not support the ‘F’ directive on some platforms: NetBSD 3.0, Cygwin 1.5.x, BeOS.
- This function does not support the ‘ls’ directive on some platforms: OpenBSD 4.0, Cygwin 1.5.x, Haiku.
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- This function does not support precisions in the ‘1s’ directive correctly on some platforms: Solaris 11.4.
- This function does not support format directives that access arguments in an arbitrary order, such as "%2$s", on some platforms: NetBSD 3.0, BeOS.
- This function doesn’t support the ‘’ flag on some platforms: NetBSD 3.0, Cygwin 1.5.24.
- This function does not round the argument of the ‘a’ directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.
- printf "%010f" of NaN and Infinity yields an incorrect result (padded with zeroes) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, Solaris 11.0, Cygwin 1.5.x.
- This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: BeOS.
- This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.

Portability problems not fixed by Gnulib:
- The "%n directive is not portable, use "%s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.

12.69.2 cuserid
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, mingw, MSVC 14, Android 9.0.

12.69.3 clearerr_unlocked
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 5.1.

12.69.4 fcloseall
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, Interix 3.5, Android 9.0.
12.69.5 **feof_unlocked**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 5.1.

12.69.6 **ferror_unlocked**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 5.1.

12.69.7 **fflush_unlocked**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 8.1.

12.69.8 **fgetc_unlocked**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

12.69.9 **fgets_unlocked**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 8.1.
12.69.10 fileno_unlocked

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 6.0.

12.69.11 fopencookie

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.69.12 fputc_unlocked

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 8.1.

12.69.13 fputs_unlocked

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

12.69.14 fread_unlocked

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 8.1.
12.69.15 fwrite_unlocked

GnuLib module: —
Portability problems fixed by GnuLib:
Portability problems not fixed by GnuLib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 8.1.

12.69.16 getw

GnuLib module: —
Portability problems fixed by GnuLib:
Portability problems not fixed by GnuLib:
• This function is missing on some platforms: BeOS, Android 9.0.

12.69.17 putw

GnuLib module: —
Portability problems fixed by GnuLib:
Portability problems not fixed by GnuLib:
• This function is missing on some platforms: BeOS.

12.69.18 setbuffer

GnuLib module: —
Portability problems fixed by GnuLib:
Portability problems not fixed by GnuLib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11, mingw, MSVC 14.

12.69.19 setlinebuf

GnuLib module: —
Portability problems fixed by GnuLib:
Portability problems not fixed by GnuLib:
• This function is missing on some platforms: Minix 3.1.8, HP-UX 11.23, mingw, MSVC 14.

12.69.20 sys_errlist

GnuLib module: —
Portability problems fixed by GnuLib:
Portability problems not fixed by GnuLib:
• This variable is missing on some platforms: Minix 3.1.8, Mac OS X 10.5, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, Interix 3.5, BeOS, Android 9.0.
12.69.21 sys_nerr
  Gnulib module: —
  Portability problems fixed by Gnulib:
  Portability problems not fixed by Gnulib:
  • This variable is missing on some platforms: Mac OS X 10.5, Minix 3.1.8, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, Interix 3.5, BeOS, Android 9.0.

12.69.22 tmpnam_r
  Gnulib module: —
  Portability problems fixed by Gnulib:
  Portability problems not fixed by Gnulib:
  • This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.69.23 vasprintf
  Gnulib module: vasprintf or vasprintf-posix
  Portability problems fixed by either Gnulib module vasprintf or vasprintf-posix:
  • This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, Interix 3.5.
  Portability problems fixed by Gnulib module vasprintf-posix:
  • This function does not support size specifiers as in C99 (hh, l1, j, t, z) on some platforms: Cygwin 1.5.24, BeOS.
  • printf of ‘long double’ numbers is unsupported on some platforms: BeOS.
  • printf ‘%f’, ‘%e’, ‘%g’ of Infinity and NaN yields an incorrect result on some platforms: Solaris 11.0.
  • This function does not support the ‘a’ and ‘A’ directives on some platforms: glibc-2.3.6, Mac OS X 10.5, NetBSD 5.0, OpenBSD 4.0, Solaris 11.4, Cygwin 1.5.x, BeOS.
  • This function does not support the ‘F’ directive on some platforms: NetBSD 3.0, Cygwin 1.5.x, BeOS.
  • This function does not support the ‘ls’ directive on some platforms: OpenBSD 4.0, Cygwin 1.5.x, Haiku.
  • This function does not support precisions in the ‘ls’ directive correctly on some platforms: Solaris 11.4.
  • This function does not support format directives that access arguments in an arbitrary order, such as ‘%$s’, on some platforms: NetBSD 3.0, BeOS.
  • This function doesn’t support the ‘’ flag on some platforms: NetBSD 3.0, Cygwin 1.5.24.
  • This function does not round the argument of the ‘a’ directive correctly on some platforms: Mac OS X 10.12, FreeBSD 6.1.
  • printf ‘%010f’ of NaN and Infinity yields an incorrect result (padded with zeroes) on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, Solaris 11.0, Cygwin 1.5.x.
• This function does not support precisions larger than 512 or 1024 in integer, floating-point and pointer output on some platforms: BeOS.
• This function can crash in out-of-memory conditions on some platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0.

Portability problems not fixed by Gnulib:
• The %m directive is not portable, use %s mapped to an argument of strerror(errno) (or a version of strerror_r) instead.

12.70 Glibc Extensions to <stdlib.h>

12.70.1 canonicalize_file_name

Gnulib module: canonicalize-lgpl

Portability problems fixed by Gnulib:
• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
• This function fails to detect trailing slashes on non-directories on some platforms: glibc 2.3.5.

Portability problems not fixed by Gnulib:

12.70.2 cfree

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.70.3 clearenv

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, IRIX 6.5, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.70.4 drand48_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.
12.70.5 ecvt_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.70.6 erand48_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.70.7 fcvt_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.70.8 getloadavg

Gnulib module: getloadavg

Portability problems fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 2.6, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function is declared in `<sys/loadavg.h>`, not `<stdlib.h>`, on some platforms: Solaris 11.4.

Portability problems not fixed by Gnulib:

12.70.9 getpt

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS.
12.70.10 initstate_r
   Gnulib module: random_r
   Portability problems fixed by Gnulib:
   • This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.
   • This function has an incompatible declaration on some platforms: AIX 7.1, OSF/1 5.1.
   Portability problems not fixed by Gnulib:
   • This function has a slightly different (but compatible) declaration on some platforms: Haiku 2017.

12.70.11 jrand48_r
   Gnulib module: —
   Portability problems fixed by Gnulib:
   Portability problems not fixed by Gnulib:
   • This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.70.12 lcong48_r
   Gnulib module: —
   Portability problems fixed by Gnulib:
   Portability problems not fixed by Gnulib:
   • This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.70.13 lrand48_r
   Gnulib module: —
   Portability problems fixed by Gnulib:
   Portability problems not fixed by Gnulib:
   • This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.70.14 mkostemp
   Gnulib module: mkostemp
   Portability problems fixed by Gnulib:
   • This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.5, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.
• This function is declared in `<unistd.h>` instead of `<stdlib.h>` on some platforms: Mac OS X 10.13.

• On platforms where `off_t` is a 32-bit type, `mkostemp` may not work correctly to create files larger than 2 GB. (Cf. `AC_SYS_LARGEFILE`.)

Portability problems not fixed by Gnumlib:

The gnumlib module `clean-temp` can create temporary files that will not be left behind after signals such as SIGINT.

12.70.15 `mkostemps`  
Gnumlib module: `mkostemps`  
Portability problems fixed by Gnumlib:

• This function is missing on many non-glibc platforms: glibc 2.10, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.5, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

• This function is declared in `<unistd.h>` instead of `<stdlib.h>` on some platforms: Mac OS X 10.13.

• On platforms where `off_t` is a 32-bit type, `mkostemps` may not work correctly to create files larger than 2 GB. (Cf. `AC_SYS_LARGEFILE`.)

Portability problems not fixed by Gnumlib:

The gnumlib module `clean-temp` can create temporary files that will not be left behind after signals such as SIGINT.

12.70.16 `mrand48_r`  
Gnumlib module: —  
Portability problems fixed by Gnumlib:

Portability problems not fixed by Gnumlib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.70.17 `mkstemps`  
Gnumlib module: `mkstemps`  
Portability problems fixed by Gnumlib:

• This function is missing on many non-glibc platforms: glibc 2.10, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS.

• This function is declared in `<unistd.h>` instead of `<stdlib.h>` on some platforms: Mac OS X 10.5.

• On platforms where `off_t` is a 32-bit type, `mkstemps` may not work correctly to create files larger than 2 GB. (Cf. `AC_SYS_LARGEFILE`.)
Portability problems not fixed by Gnulib:

The gnulib module `clean-temp` can create temporary files that will not be left behind after signals such as SIGINT.

12.70.18 `nrnd48_r`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.70.19 `on_exit`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.70.20 `ptsname_r`

Gnulib module: `ptsname_r`

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin 1.7.9, mingw, MSVC 14, BeOS.

- This function is not declared unless `_REENTRANT` is defined, on some platforms: OSF/1 5.1.

- This function has an incompatible declaration on some platforms: OSF/1 5.1.

- When this functions fails, it returns -1 instead of the error code on some platforms: Android 4.3.

Portability problems not fixed by Gnulib:

Note: Portable programs should expect to find the error code as the return value of this function, not as the value of `errno`. This is needed for compatibility with musl libc and with the forthcoming POSIX Issue 8.

12.70.21 `qecvt`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.70.22 qecvt_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.70.23 qfcvt
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.70.24 qfcvt_r
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.70.25 qgcvt
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.70.26 qsort_r
Gnulib module: —
Portability problems fixed by Gnulib:
• This function has an incompatible API on some platforms: FreeBSD 10.
• This function is missing on some platforms: glibc 2.7, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
Portability problems not fixed by Gnulib:

12.70.27 random_r

Gnulib module: random_r

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.
- This function has an incompatible declaration on some platforms: AIX 7.1, OSF/1 5.1.

Portability problems not fixed by Gnulib:

- This function has a slightly different (but compatible) declaration on some platforms: Haiku 2017.

12.70.28 rpmatch

Gnulib module: rpmatch

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

Portability problems not fixed by Gnulib:

12.70.29 secure_getenv

Gnulib module: secure_getenv

Portability problems fixed by Gnulib:

- This function is missing on some platforms: glibc 2.16, OS X 10.8, FreeBSD 9.1, NetBSD 6.0.1, OpenBSD 5.2, Minix 3.2.0, AIX 7.1, HP-UX 11, IRIX 6.5, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 6.1, BeOS, Android 9.0.

Portability problems not fixed by Gnulib:

12.70.30 seed48_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.70.31 setstate_r

Gnulib module: random_r

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.
• This function has an incompatible declaration on some platforms: AIX 7.1, OSF/1 5.1.

Portability problems not fixed by Gnulib:

• This function has a slightly different (but compatible) declaration on some platforms: Haiku 2017.

12.70.32 srand48_r
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.70.33 srandom_r
Gnulib module: random

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

Portability problems not fixed by Gnulib:

12.70.34 strtod_l
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.

12.70.35 strtof_l
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.
12.70.36 `strtol_l`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.

12.70.37 `strtold_l`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.70.38 `strtoll_l`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.70.39 `strtoq`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14.

- This function is not declared on some platforms: Android 9.0.

12.70.40 `strtoul_l`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.
12.70.41 strtoull_l
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.70.42 strtouq
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14.
- This function is not declared on some platforms: Android 9.0.

12.70.43 valloc
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Interix 3.5.

12.71 Glibc Extensions to <string.h>

12.71.1 explicit_bzero
Gnulib module: explicit_bzero

The explicit_bzero function is an approximation to what is needed, and does not suffice in general to erase information. Although calling explicit_bzero should clear the memory in question, the information that was in memory may still be available elsewhere on the machine. Proper implementation of information erasure requires support from levels below C code.

Portability problems fixed by Gnulib:
- This function is missing on some platforms: glibc 2.24, FreeBSD 10, NetBSD 7.1, OpenBSD 5.4, macOS 10.12, Solaris 11.4, Android 9.0, and many other systems.

Portability problems not fixed by Gnulib:
- Although the module’s implementation should clear the memory on platforms compatible with GCC and on platforms using traditional linkers, it may not clear the memory on non-GCC platforms that use whole-program optimization.
12.71.2 ffsl

Gnulib module: ffsl

Portability problems fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 5.2.1, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

Portability problems not fixed by Gnulib:

12.71.3 ffsll

Gnulib module: ffsll

Portability problems fixed by Gnulib:
- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

Portability problems not fixed by Gnulib:

12.71.4 memfrob

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.71.5 memmem

Gnulib module: memmem or memmem-simple

Both modules implement the same replacement for the memmem function with the memmem module providing a replacement on more platforms where the existing memmem function has a quadratic worst-case complexity.

Portability problems fixed by either Gnulib module memmem-simple or memmem:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 5.2.1, OpenBSD 4.0, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, Interix 3.5, BeOS.
- This function has reversed arguments on some older platforms: Linux libc 5.0.9
- This function can trigger false positives for long periodic needles on some platforms: glibc 2.12, Cygwin 1.7.7.
- This function returns incorrect values in some cases, such as when given an empty needle: glibc \( \leq 2.0 \), Solaris 11.4, Cygwin 1.5.x.

Performance problems fixed by Gnulib module memmem:
- This function has quadratic instead of linear worst-case complexity on some platforms: glibc 2.8, FreeBSD 6.2, NetBSD 5.0, AIX 5.1, Solaris 11.4, Cygwin 1.5.x. Note for small needles the replacement may be slower.
Portability problems not fixed by Gnulib:

12.71.6 mempcpy
Gnulib module: mempcpy
Portability problems fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

Portability problems not fixed by Gnulib:

12.71.7 memrchr
Gnulib module: memrchr
Portability problems fixed by Gnulib:
• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

Portability problems not fixed by Gnulib:

12.71.8 rawmemchr
Gnulib module: rawmemchr
Portability problems fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

Portability problems not fixed by Gnulib:

12.71.9 strcasestr
Gnulib module: strcasestr or strcasestr-simple
Portability problems fixed by either Gnulib module strcasestr-simple or strcasestr:
• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.5.x, mingw, MSVC 14, BeOS.
• This function can trigger memchr bugs on some platforms: glibc 2.10.
• This function can trigger false positives for long periodic needles on some platforms: glibc 2.12, Cygwin 1.7.7.
• This function may fail to find matches on some platforms: glibc 2.28.

Portability problems fixed by Gnulib module strcasestr:
• This function has quadratic instead of linear worst-case complexity on some platforms: glibc 2.8, FreeBSD 6.2, NetBSD 5.0, OpenBSD 4.0, Solaris 11.4.

Portability problems not fixed by Gnulib:
12.71.10 strchrnul

Gnulib module: strchrnul

Portability problems fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.7.8, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.
- This function crashes when no occurrence is found on some platforms: Cygwin 1.7.9.

Portability problems not fixed by Gnulib:

12.71.11 strfry

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.71.12 strsep

Gnulib module: strsep

Portability problems fixed by Gnulib:

- This function is missing on some platforms: AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, mingw, MSVC 14, BeOS.

Portability problems not fixed by Gnulib:

12.71.13 strverscmp

Gnulib module: strverscmp

Portability problems fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

Portability problems not fixed by Gnulib:

- On older glibc platforms, this function does not always properly treat digit strings with leading zeros as fractions (for example, strverscmp("B0075022800016.gbp.corp.com", "B007502357019.GBP.CORP.COM") does not yield a negative number as it should): glibc 2.9
12.72.1 capget
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.72.2 capset
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.73 Glibc <sys/epoll.h>

12.73.1 epoll_create
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.73.2 epoll_ctl
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.73.3 epoll_wait
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.
12.74 Glibc <sys/fanotify.h>

12.74.1 fanotify_init

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.12, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.74.2 fanotify_mark

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: glibc 2.12, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.75 Glibc <sys/file.h>

12.75.1 flock

Gnulib module: flock

Portability problems fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, HP-UX 11.23, Solaris 11.4, BeOS.

12.76 Glibc <sys/fsuid.h>

12.76.1 setfsgid

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
12.76.2 setfsuid

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.77 Glibc <sys/gmon.h>

12.77.1 monstartup

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.78 Glibc <sys/io.h>, <sys/perm.h>

12.78.1 ioperm

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.78.2 iopl

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.79 Glibc <sys/kdaemon.h>
12.79.1 bdflush

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.80 Glibc <sys/klog.h>

12.80.1 klogctl

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.81 Glibc Extensions to <sys/mman.h>

12.81.1 madvise

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Cygwin 1.7.7, mingw, MSVC 14, BeOS.

12.81.2 mincore

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.81.3 mremap

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 3.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.
12.81.4 remap_file_pages

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.82 Glibc <sys/mount.h>

12.82.1 mount

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, Interix 3.5.

12.82.2 umount

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, AIX 5.1, mingw, MSVC 14, Interix 3.5, BeOS.

12.82.3 umount2

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.23, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.83 Glibc <sys/personality.h>

12.83.1 personality

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.2.
12.84 Glibc <sys/prctl.h>

12.84.1 prctl

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.85 Glibc <sys/profil.h>

12.85.1 sprofil

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.11, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.86 Glibc <sys/ptrace.h>

12.86.1 ptrace

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.87 Glibc <sys/quota.h>

12.87.1 quotactl

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.
12.88 **Glibc <sys/reboot.h>**

12.88.1 **reboot**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.89 **Glibc Extensions to <sys/resource.h>**

12.89.1 **prlimit**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.12, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.

12.90 **Glibc Extensions to <sys/sem.h>**

12.90.1 **semtimedop**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.

12.91 **Glibc <sys/sendfile.h>**

12.91.1 **sendfile**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 4.0, Solaris 11 2010-11, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

- On platforms where `off_t` is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the `AC_SYS_LARGEFILE` macro.
12.92 Glibc Extensions to <sys/socket.h>

12.92.1 accept4

Gnulib module: accept4

Portability problems fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.7.1, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4. But the replacement function is not atomic; this matters in multi-threaded programs that spawn child processes.

Portability problems not fixed by Gnulib:

- SOCK_CLOEXEC and SOCK_NONBLOCK may not be defined as they’re also significant to the socket() function.

12.92.2 isfdtype

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 4.0, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.92.3 recvmsg

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.11, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.92.4 sendmmsg

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.13, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
12.93 Glibc Extensions to <sys/stat.h>

12.93.1 chmod

Gnulib module: chmod

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

Portability problems not fixed by Gnulib:

12.94 Glibc <sys/statfs.h>

12.94.1 fstatfs

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, mingw, MSVC 14, Interix 3.5, BeOS.
- On platforms where `f_blocks` in `struct statfs` is a 32-bit value, this function may not work correctly on files systems larger than 4 TiB. The fix is to use the `AC_SYS_LARGEFILE` macro. This affects Mac OS X.

12.94.2 statfs

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, mingw, MSVC 14, Interix 3.5, BeOS.
- On platforms where `f_blocks` in `struct statfs` is a 32-bit value, this function may not work correctly on files systems larger than 4 TiB. The fix is to use the `AC_SYS_LARGEFILE` macro. This affects Mac OS X.

12.95 Glibc <sys/swap.h>

12.95.1 swapoff

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.3.
12.95.2 swapon

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: OpenBSD 3.8, Minix 3.1.8, AIX 5.1, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.3.

12.96 Glibc <sys/sysctl.h>

12.96.1 sysctl

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 5.3, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.97 Glibc <sys/sysinfo.h>

12.97.1 get_avphys_pages

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.1, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.97.2 get_nprocs

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.7.1, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

Gnulib provides the module nproc that performs a similar function but is portable to more systems.
12.97.3 get_nprocs_conf
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 10, Cygwin 1.7.1, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.97.4 get_phys_pages
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.1, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.97.5 sysinfo
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS.

12.98 Glibc <sys/syslog.h>

12.98.1 vsyslog
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, mingw, MSVC 14, BeOS.

12.99 Glibc <sys/sysmacros.h>

12.99.1 gnu_dev_major
Gnulib module: —
Portability problems fixed by Gnulib:

- The AC_HEADER_MAJOR macro in Autoconf 2.69 and earlier fails to set MAJOR_IN_SYSMACROS when it detects namespace pollution in sys/types.h; which in turn provokes deprecation warnings in glibc 2.25.
Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.99.2 gnu_dev_makedev

Gnulib module: —

Portability problems fixed by Gnulib:
• The AC_HEADER_MAJOR macro in Autoconf 2.69 and earlier fails to set MAJOR_IN_SYSMACROS when it detects namespace pollution in sys/types.h; which in turn provokes deprecation warnings in glibc 2.25.

Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.99.3 gnu_dev_minor

Gnulib module: —

Portability problems fixed by Gnulib:
• The AC_HEADER_MAJOR macro in Autoconf 2.69 and earlier fails to set MAJOR_IN_SYSMACROS when it detects namespace pollution in sys/types.h; which in turn provokes deprecation warnings in glibc 2.25.

Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.100 Glibc Extensions to <sys/time.h>

12.100.1 adjtime

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.100.2 futimes

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.
• This function cannot set full timestamp resolution. Use futimens(fd,times) instead.
12.100.3 futimesat

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: glibc 2.3.6, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 8, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.
• On some platforms, this function mis-handles trailing slash: Solaris 9.
• This function cannot set full timestamp resolution. Use
  
  ```
  file ? utimensat(fd, file, times, 0)
  : futimens(fd, times)
  ```
  or the gnulib module fdutimensat, instead.

12.100.4 lutimes

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.4, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.
• This function cannot set full timestamp resolution. Use `utimensat(AT_FDCWD, file, times, AT_SYMLINK_NOFOLLOW)`, or the gnulib module utimens, instead.
• The mere act of using lstat modifies the access time of symlinks on some platforms, so lutimes can only effectively change modification time: Cygwin.

12.100.5 settimeofday

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: mingw, MSVC 14, BeOS.

12.101 Glibc <sys/timex.h>

12.101.1 adjtimex

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.
12.101.2 ntp_adjtime

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix
  3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix
  3.5, BeOS, Android 9.0.

12.101.3 ntp_gettime

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: Mac OS X 10.5, OpenBSD 3.8, Minix
  3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix
  3.5, BeOS, Android 9.0.

12.101.4 ntp_gettimeex

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: glibc 2.11, Mac OS X 10.5, FreeBSD
  6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11.31, IRIX 6.5, OSF/1
  5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.102 Glibc Extensions to <sys/uio.h>

12.102.1 preadv

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on some platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 5.2.1,
  Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw,
  MSVC 14, Interix 3.5, BeOS, Android 6.0.
• On platforms where off_t is a 32-bit type, this function may not work correctly on
  files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

12.102.2 process_vm_readv

Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
• This function is missing on many non-glibc platforms: glibc 2.14, Mac OS X 10.5,
  FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX
6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.102.3 process_vm_writev

Gnulib module: —

Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: glibc 2.14, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

12.102.4 pwritev

Gnulib module: —

Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: glibc 2.9, Mac OS X 10.5, FreeBSD 5.2.1, Minix 3.1.8, AIX 5.2, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.
- On platforms where off_t is a 32-bit type, this function may not work correctly on files larger than 2 GB. The fix is to use the AC_SYS_LARGEFILE macro.

12.103 Glibc <sys/ustat.h>

12.103.1 ustat

Gnulib module: —

Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.104 Glibc <sys/vlimit.h>

12.104.1 vlimit

Gnulib module: —

Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
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12.105 Glibc <sys/vm86.h>

12.105.1 vm86

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.106 Glibc <sys/vtimes.h>

12.106.1 vtimes

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.107 Glibc Extensions to <sys/wait.h>

12.107.1 wait3

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.107.2 wait4

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 4.3.2, HP-UX 11.11, IRIX 6.5, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.2.

12.108 Glibc <sys/xattr.h>
12.108.1 \texttt{fgetxattr}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

- This function has extra \texttt{offset} and \texttt{options} parameters: Mac OS X 10.4

12.108.2 \texttt{flistxattr}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

12.108.3 \texttt{fremovexattr}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

12.108.4 \texttt{fsetxattr}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

12.108.5 \texttt{getxattr}

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

- This function has extra \texttt{offset} and \texttt{options} parameters: Mac OS X 10.4
12.108.6 lgetxattr

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

12.108.7 listxattr

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

12.108.8 llistxattr

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

12.108.9 lremovexattr

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

12.108.10 lsetxattr

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.
12.108.11 removeXattr
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on many non-glibc platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

12.108.12 setxattr
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on many non-glibc platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.0.4.

12.109 Glibc Extensions to <termios.h>

12.109.1 cfmakeraw
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.109.2 cfsetspeed
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

12.110 Glibc Extensions to <time.h>

12.110.1 clock_adjtime
Gnulib module: —
Portability problems fixed by Gnulib:
Portability problems not fixed by Gnulib:
- This function is missing on many non-glibc platforms: glibc 2.13, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 6.0.
12.110.2 dysize

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.110.3 getdate_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.110.4 stime

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Cygwin, mingw, MSVC 14, Interix 3.5, Android 9.0.

12.110.5 strptime_l

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

12.110.6 timegm

Gnulib module: timegm

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, mingw, MSVC 14, Interix 3.5, BeOS, Android 3.0.
12.110.7 timelocal
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, mingw, MSVC 14, Interix 3.5, Android 3.0.

12.110.8 timespec_get
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on all non-glibc platforms: glibc 2.15, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.111 Glibc <ttyent.h>

12.111.1 endttyent
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.111.2 getttyent
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.111.3 getttynam
Gnulib module: —
Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
• This function is missing on some platforms: HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.111.4 **settyent**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.112 **Glibc Extensions to <unistd.h>**

12.112.1 **acct**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.112.2 **brk**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, Cygwin, mingw, MSVC 14.

12.112.3 **chroot**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, mingw, MSVC 14, BeOS.

12.112.4 **daemon**

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, mingw, MSVC 14, BeOS.

12.112.5 **dup3**

Gnulib module: dup3

Portability problems fixed by Gnulib:

- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.7.1, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
• This function can crash on some platforms: Cygwin 1.7.25.

Portability problems not fixed by GnuLib:

12.112.6 endusershell

GnuLib module: getusershell

Portability problems fixed by GnuLib:
• This function is missing on some platforms: Minix 3.1.8, AIX 4.3.2, IRIX 6.5, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
• This function is missing a declaration on some platforms: Solaris 9.

Portability problems not fixed by GnuLib:

12.112.7 euidaccess

GnuLib module: euidaccess

Portability problems fixed by GnuLib:
• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

Portability problems not fixed by GnuLib:
Other problems of this function:
• There is an inherent race between calling this function and performing some action based on the results; you should think twice before trusting this function, especially in a set-uid or set-gid program.
• This function does not have an option for not following symbolic links (like stat versus lstat). If you need this option, use the GnuLib module faccessat with the AT_EACCESS flag.

12.112.8 execvpe

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
• This function is missing on many non-glibc platforms: glibc 2.10, Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.3, Cygwin 1.5.x, mingw, Interix 3.5, BeOS, Android 4.4.

12.112.9 get_current_dir_name

GnuLib module: —

Portability problems fixed by GnuLib:

Portability problems not fixed by GnuLib:
• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin 1.7.9, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.112.10 getdomainname

Gnulib module: getdomainname

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Solaris 11.3, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.
- This function is declared in netdb.h, not in unistd.h, on some platforms: AIX 7.1.
- This function is declared in netdb.h and in sys/socket.h, not in unistd.h, on some platforms: OSF/1 5.1.
- The second argument is of type int, not size_t, on some platforms: Mac OS X 10.5, FreeBSD 6.4, AIX 7.1, IRIX 6.5.

Portability problems not fixed by Gnulib:

12.112.11 getdtablesize

SUSv2 specification: http://pubs.opengroup.org/onlinepubs/7908799/xsh/getdtablesize.html

Gnulib module: getdtablesize

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Android LP64, mingw, MSVC 14, Android 9.0.
- This function is not declared on some platforms: Android LP32.
- This function does not represent the true RLIMIT_NOFILE soft limit on some platforms: Android LP32, Cygwin 1.7.25.

Portability problems not fixed by Gnulib:

- On OpenVMS, this function returns the maximum number of open file descriptors in a process. The possible values of file descriptors are not constrained by this function.

12.112.12 getpagesize

Gnulib module: getpagesize

Portability problems fixed by Gnulib:

- This function is missing on some platforms: MSVC 14, BeOS, Android 4.4.
- This function is broken on some platforms: mingw.

Portability problems not fixed by Gnulib:

12.112.13 getpass

Gnulib module: getpass or getpass-gnu

Portability problems fixed by either Gnulib module getpass or getpass-gnu:

- This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 9.0.

Portability problems fixed by Gnulib module getpass-gnu:

- The returned password is truncated to PASS_MAX characters on some platforms: uClibc (256), musl (128), Mac OS X 10.5 (128), FreeBSD 6.2 (128), NetBSD 3.0 (128),
OpenBSD 4.0 (128), AIX 5.1 (32), HP-UX 11 (8), IRIX 6.5 (32), OSF/1 5.1 (80), Solaris 11 2010-11 (8, even less than PASS_MAX), Cygwin (128). The gnu.lib implementation returns the password untruncated.

Portability problems not fixed by GnuLib:

12.112.14 getresgid
GnuLib module: —
Portability problems fixed by GnuLib:
Portability problems not fixed by GnuLib:
- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11.00, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.112.15 getresuid
GnuLib module: —
Portability problems fixed by GnuLib:
Portability problems not fixed by GnuLib:
- This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, Minix 3.1.8, AIX 5.1, HP-UX 11.00, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.112.16 getusershell
GnuLib module: getusershell
Portability problems fixed by GnuLib:
- This function is missing on some platforms: Minix 3.1.8, AIX 4.3.2, IRIX 6.5, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- This function is missing a declaration on some platforms: Solaris 9.
Portability problems not fixed by GnuLib:

12.112.17 group_member
GnuLib module: group-member
Portability problems fixed by GnuLib:
- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
Portability problems not fixed by GnuLib:

12.112.18 pipe2
GnuLib module: pipe2
Portability problems fixed by GnuLib:
- This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1,
Solaris 11.3, Cygwin 1.7.1, mingw, MSVC 14, Interix 3.5, BeOS, Android 2.2. But the replacement function is not atomic; this matters in multi-threaded programs that spawn child processes.

Portability problems not fixed by Gnulib:

- This function crashes rather than failing with **EMFILE** if no resources are left on some platforms: Cygwin 1.7.9.

Note: This function portably supports the **O_NONBLOCK** flag only if the gnulib module **nonblocking** is also used.

12.112.19 profil

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.112.20 revoke

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.112.21 sbrk

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: AIX 5.1, mingw, MSVC 14.

12.112.22 setlogin

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.112.23 setdomainname

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 7.1.
12.112.24 sethostid

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.112.25 sethostname

Gnulib module: sethostname

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1. Note that the Gnulib replacement may fail with ENOSYS on some platforms.

• This function is not declared on some platforms: AIX 7.1, OSF/1 5.1, Solaris 10.

Portability problems not fixed by Gnulib:

• The first parameter is char * instead of const char * on some platforms: Solaris 11 2010-11.

• The second parameter is int instead of size_t on some platforms: Mac OS X 10.12, Solaris 11 2010-11.

12.112.26 setresgid

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.112.27 setresuid

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on some platforms: Mac OS X 10.5, NetBSD 5.0, Minix 3.1.8, AIX 5.1, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS.

12.112.28 setusershell

Gnulib module: getusershell

Portability problems fixed by Gnulib:

• This function is missing on some platforms: Minix 3.1.8, AIX 4.3.2, IRIX 6.5, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
• This function is missing a declaration on some platforms: Solaris 9.

Portability problems not fixed by Gliblib:

12.112.29 syncfs

Gnulib module: —

Portability problems fixed by Gnilub:

Portability problems not fixed by Gnilub:

• This function is missing on all non-glibc platforms: glibc 2.13, Mac OS X 10.5, FreeBSD 6.4, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

12.112.30 syscall

Gnulib module: —

Portability problems fixed by Gnilub:

Portability problems not fixed by Gnilub:

• This function is missing on some platforms: Minix 3.1.8, AIX 5.1, Cygwin, mingw, MSVC 14, BeOS.

12.112.31 ttyslot

Gnulib module: —

Portability problems fixed by Gnilub:

Portability problems not fixed by Gnilub:

• This function is missing on some platforms: mingw, MSVC 14, BeOS, Android 9.0.

12.112.32 vhangup

Gnulib module: —

Portability problems fixed by Gnilub:

Portability problems not fixed by Gnilub:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, OSF/1 5.1, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.113 Glibc <utmp.h>

12.113.1 endutent

Gnulib module: —

Portability problems fixed by Gnilub:

Portability problems not fixed by Gnilub:

• This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS.
12.113.2 getutent
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS.

12.113.3 getutent_r
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.113.4 getutid
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.113.5 getutid_r
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.113.6 getutline
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.113.7 getutline_r

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.113.8 pututline

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS.

12.113.9 setutent

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS.

12.113.10 updwtmp

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 4.3.2, HP-UX 11, OSF/1 5.1, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.113.11 utmpname

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, mingw, MSVC 14, Interix 3.5, BeOS.
12.113.12 login

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many non-glibc platforms: FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 7.1, HP-UX 11.31, IRIX 6.5, Solaris 11.4, mingw, MSVC 14, BeOS, Android 9.0.

12.113.13 login_tty

Gnulib module: login_tty

Portability problems fixed by Gnulib:

- This function is missing on some platforms: Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.3, Android 5.1.
- This function requires linking with -lutil on some platforms: glibc 2.3.6, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8. It is available without link options on other platforms: Mac OS X 10.5, OSF/1 5.1, Cygwin, Interix 3.5.

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: mingw, MSVC 14.
- This function is declared in <utmp.h> on glibc, Cygwin, in <util.h> on Mac OS X 10.5, NetBSD 5.0, OpenBSD 3.8, in <libutil.h> on FreeBSD 6.0, Haiku, and not declared at all on OSF/1 5.1, Interix 3.5. Also note that <sys/types.h> is a prerequisite of <utmp.h> on FreeBSD 8.0, OpenBSD 4.6 and of <libutil.h> on FreeBSD 8.0.

12.114 Glibc Extensions to <utmpx.h>

12.114.1 getutmp

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.114.2 getutmpx

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
12.114.3 updwtmpx

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, Cygwin 1.5.x, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.114.4 utmpxname

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on some platforms: Mac OS X 10.4, FreeBSD 6.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, OSF/1 5.1, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

12.115 Glibc Extensions to <wchar.h>

12.115.1 fgetwc_unlocked

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.2 fgetws_unlocked

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:
- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
12.115.3 *fputwc_unlocked*

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.4 *fputws_unlocked*

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.5 *getwc_unlocked*

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.6 *getwchar_unlocked*

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.
12.115.7 putwc_unlocked

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on some platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.8 putwchar_unlocked

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.9 wcschrnul

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.10 wcsftime_l

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
12.115.11 wcstod_l
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.12 wcstof_l
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.13 wcstol_l
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.

- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.14 wcstold_l
Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.

- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
12.115.15  wcstoll_l

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.16  wcstoq

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.17  wcstoul_l

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 8.1.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.18  wcstoull_l

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

- This function is missing on many platforms: Mac OS X 10.3, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 4.4.
- On AIX and Windows platforms, wchar_t is a 16-bit type and therefore cannot accommodate all Unicode characters.
12.115.19 `wcstouq`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on all non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 9.0.

• On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.

12.115.20 `wmempcpy`

Gnulib module: —

Portability problems fixed by Gnulib:

Portability problems not fixed by Gnulib:

• This function is missing on many non-glibc platforms: Mac OS X 10.5, FreeBSD 6.0, NetBSD 5.0, OpenBSD 3.8, Minix 3.1.8, AIX 5.1, HP-UX 11, IRIX 6.5, OSF/1 5.1, Solaris 11.4, Cygwin, mingw, MSVC 14, Interix 3.5, BeOS, Android 5.1.

• On AIX and Windows platforms, `wchar_t` is a 16-bit type and therefore cannot accommodate all Unicode characters.
13 Native Windows Support

There are three ways to create binaries that run on Microsoft Windows:

- Native binaries, built using the MinGW tool chain.
- Native binaries, built using the MSVC (MS Visual C/C++) tool chain.
- Binaries for the Cygwin environment.

This chapter deals with the MinGW and MSVC platforms, commonly called “native Windows” platforms. Cygwin, on the other hand, is close enough to POSIX that it can be treated like any other Unix-like platform.

13.1 Libtool and Windows

If you want it to be possible to compile your program for a native Windows platform and you use Libtool, you need to use the win32-dll option of LT_INIT. In other words, put:

```bash
LT_INIT([win32-dll])
```

in your configure.ac. This sets the correct names for the OBJDUMP, DLLTOOL, and AS tools for the build.

If you are building a library, you will also need to pass -no-undefined to make sure Libtool produces a DLL for your library. From a Makefile.am:

```makefile
libgsasl_la_LDFLAGS += -no-undefined
```

13.2 Large File Support

The module provides support for files larger than 2 GB. To this effect, it ensures that off_t is a 64-bit integer type at least on the following platforms: glibc, Mac OS X, FreeBSD, NetBSD, OpenBSD, AIX, HP-UX, IRIX, OSF/1, Solaris, Cygwin, mingw, MSVC.

13.3 Inode numbers on Windows

The module ‘windows-stat-inodes’ ensures that, on native Windows platforms, struct stat contains st_dev, st_ino fields that are able to distinguish different inodes.

Note: Such values can only be provided for most files on the file system. For a few files (such as inaccessible files), st_dev and st_ino are set to 0. Therefore, you should test whether st_dev != 0 && st_ino != 0, before going to make inferences based on the file identity based on st_dev and st_ino.

13.4 Precise file timestamps on Windows

The module ‘windows-stat-timespec’ ensures that, on native Windows platforms, struct stat contains st_atim, st_mtim, st_ctim fields of type struct timespec, providing 100 ns resolution for the timestamps of files.

Note: On some types of file systems, the timestamp resolution is limited by the file system. For example, on FAT file systems, st_mtim only has a resolution of 2 seconds. For more details, see https://msdn.microsoft.com/en-us/library/ms724290.aspx.
13.5 Avoiding the year 2038 problem

The “year 2038 problem” denotes unpredictable behaviour of programs that will likely occur in the year 2038, for programs that use a 32-bit ‘time_t’ type. See https://en.wikipedia.org/wiki/Year_2038_problem for details.

The gnulib module ‘year2038’ attempts to avoid this problem, by ensuring that time_t is a 64-bit type.

13.6 Windows sockets

One of the portability problems for native Windows are sockets and networking functions.

13.6.1 Getaddrinfo and WINVER

This was written for the getaddrinfo module, but may be applicable to other functions too.

The getaddrinfo function exists in ws2tcpip.h and -lws2_32 on Windows XP. The function declaration is present if WINVER >= 0x0501. Windows 2000 does not have getaddrinfo in its WS2_32.DLL.

Thus, if you want to assume Windows XP or later, you can add AC_DEFINE([WINVER], [0x0501]) to avoid compiling the (partial) getaddrinfo implementation.

If you want to support Windows 2000, don’t do anything. The replacement function will open WS2_32.DLL during run-time to see if there is a getaddrinfo function available, and use it when available.

13.7 Native Windows Support without MSVC Support

If your package does not desire to have MSVC support, that is, if MinGW shall be the only native Windows platform that you wish to get support for from Gnulib, and you wish to minimize the number of files imported from Gnulib accordingly, you can do so by passing the options ‘--avoid=msvc-inval --avoid=msvc-nothrow’ to gnulib-tool.
14 Particular Modules

14.1 alloca

The alloca module provides for a function alloca which allocates memory on the stack, where the system allows it. A memory block allocated with alloca exists only until the function that calls alloca returns or exits abruptly.

There are a few systems where this is not possible: HP-UX systems, and some other platforms when the C++ compiler is used. On these platforms the alloca module provides a malloc based emulation. This emulation will not free a memory block immediately when the calling function returns, but rather will wait until the next alloca call from a function with the same or a shorter stack length. Thus, in some cases, a few memory blocks will be kept although they are not needed any more.

The user can #include <alloca.h> and use alloca on all platforms. Note that the #include <alloca.h> must be the first one after the autoconf-generated config.h, for AIX 3 compatibility. Thanks to IBM for this nice restriction!

Note that GCC 3.1 and 3.2 can inline functions that call alloca. When this happens, the memory blocks allocated with alloca will not be freed until the end of the calling function. If this calling function runs a loop calling the function that uses alloca, the program easily gets a stack overflow and crashes. To protect against this compiler behaviour, you can mark the function that uses alloca with the following attribute:

```c
#ifdef __GNUC__
   __attribute__((__noinline__))
#endif
```

An alternative to this module is the ‘alloca-opt’ module.

14.2 alloca-opt

The alloca-opt module provides for a function alloca which allocates memory on the stack, where the system allows it. A memory block allocated with alloca exists only until the function that calls alloca returns or exits abruptly.

There are a few systems where this is not possible: HP-UX systems, and some other platforms when the C++ compiler is used. On these platforms the alloca-opt module provides no replacement, just a preprocessor macro HAVE_ALLOCA.

The user can #include <alloca.h> on all platforms, and use alloca on those platforms where the preprocessor macro HAVE_ALLOCA evaluates to true. If HAVE_ALLOCA is false, the code should use a heap-based memory allocation based on malloc or (in C++) new. Note that the #include <alloca.h> must be the first one after the autoconf-generated config.h, for AIX 3 compatibility. Thanks to IBM for this nice restriction!

Note that GCC 3.1 and 3.2 can inline functions that call alloca. When this happens, the memory blocks allocated with alloca will not be freed until the end of the calling function. If this calling function runs a loop calling the function that uses alloca, the program easily gets a stack overflow and crashes. To protect against this compiler behaviour, you can mark the function that uses alloca with the following attribute:

```c
#ifdef __GNUC__
   __attribute__((__noinline__))
#endif
```
14.3 Safe Allocation Macros

The standard C library malloc/realloc/calloc/free APIs are prone to a number of common coding errors. The safe-alloc module provides macros that make it easier to avoid many of them. It still uses the standard C allocation functions behind the scenes.

Some of the memory allocation mistakes that are commonly made are

- passing the incorrect number of bytes to malloc, especially when allocating an array,
- fail to check the return value of malloc and realloc for errors,
- forget to fully initialize memory just allocated with malloc,
- duplicate calls to free by forgetting to set the pointer variable to NULL,
- leaking memory in calls to realloc when that call fails.

The safe-alloc module addresses these problems in the following way:

- It defines macros that wrap around the standard C allocation functions. That makes it possible to use the compiler’s knowledge of the size of objects for allocation; it also allows setting pointers passed in as arguments when appropriate.
- It uses return values only for a success/failure error condition flag, and annotates them with GCC’s __warn_unused_result__ attribute.
- It uses calloc instead of malloc.

```c
[Macro] int ALLOC(ptr) Allocate sizeof(*ptr) bytes of memory and store the address of allocated memory in ptr. Fill the newly allocated memory with zeros. Returns −1 on failure, 0 on success.

[Macro] int ALLOC_N(ptr, count) Allocate an array of count elements, each sizeof(*ptr) bytes long, and store the address of allocated memory in ptr. Fill the newly allocated memory with zeros. Returns −1 on failure, 0 on success.

[Macro] int ALLOC_N_UNINITIALIZED(ptr, count) Allocate an array of count elements, each sizeof(*ptr) bytes long, and store the address of allocated memory in ptr. The allocated memory is not initialized. Returns −1 on failure, 0 on success.

[Macro] int REALLOC_N(ptr, count) Reallocate the memory pointed to by ptr to be big enough to hold at least count elements, each sizeof(*ptr) bytes long, and store the address of allocated memory in ptr. If reallocation fails, the ptr variable is not modified. Returns −1 on failure, 0 on success.

[Macro] void FREE(ptr) Free the memory stored in ptr and set ptr to NULL.
```
14.4 Compile-time Assertions

This module provides a header file `verify.h` that defines macros related to compile-time verification.

Two of these macros are `verify (V)` and `verify_expr (V, EXPR)`. Both accept an integer constant expression argument `V` and verify that it is nonzero. If not, a compile-time error results.

These two macros implement compile-time tests, as opposed to the standard `assert` macro which supports only runtime tests. Since the tests occur at compile-time, they are more reliable, and they require no runtime overhead.

`verify (V);` is a declaration; it can occur outside of functions. In contrast, `verify_expr (V, EXPR)` is an expression that returns the value of `EXPR`; it can be used in macros that expand to expressions. If `EXPR` is an integer constant expression, then `verify_expr (V, EXPR)` is also an integer constant expression. Although `EXPR` and `verify_expr (V, EXPR)` are guaranteed to have the same side effects and value and type (after integer promotion), they need not have the same type if `EXPR`'s type is an integer that is narrower than `int` or `unsigned int`.

`V` should be an integer constant expression in the sense of the C standard. Its leaf operands should be integer, enumeration, or character constants; or `sizeof` expressions that return constants; or floating constants that are the immediate operands of casts. Outside a `sizeof` subexpression, `V` should not contain any assignments, function calls, comma operators, casts to non-integer types, or subexpressions whose values are outside the representable ranges for their types. If `V` is not an integer constant expression, then a compiler might reject a usage like `verify (V);` even when `V` is nonzero.

Although the standard `assert` macro is a runtime test, C11 specifies a builtin _Static_ `assert (V, STRING-LITERAL)`, its `assert.h` header has a similar macro named `static_assert`, and C++11 has a similar `static_assert` builtin. These builtins and macros differ from `verify` in two major ways. First, they can also be used within a `struct` or `union` specifier, in place of an ordinary member declaration. Second, they require the programmer to specify a compile-time diagnostic as a string literal.

The `verify.h` header defines one more macro, `assume (E)`, which expands to an expression of type `void` that causes the compiler to assume that `E` yields a nonzero value. `E` should be a scalar expression, and should not have side effects; it may or may not be evaluated. The behavior is undefined if `E` would yield zero. The main use of `assume` is optimization, as the compiler may be able to generate better code if it assumes `E`. For best results, `E` should be simple enough that a compiler can determine that it has no side effects: if `E` calls an external function or accesses volatile storage the compiler may not be able to optimize `E` away and `assume (E)` may therefore slow down the program.

Here are some example uses of these macros.

```c
#include <verify.h>

#include <limits.h>
#include <time.h>

/* Verify that time_t is an integer type. */
verify ((time_t) 1.5 == 1);
```
/* Verify that time_t is no smaller than int. */
verify (sizeof (int) <= sizeof (time_t));

/* Verify that time_t is signed. */
verify ((time_t) -1 < 0);

/* Verify that time_t uses two’s complement representation. */
verify (~ (time_t) -1 == 0);

/* Return the maximum value of the integer type T,
verifying that T is an unsigned integer type.
The cast to (T) is outside the call to verify_expr
so that the result is of type T
even when T is narrower than unsigned int. */
#define MAX_UNSIGNED_VAL(t) 
  ((T) verify_expr (0 < (T) -1, -1))

/* Return T divided by CHAR_MAX + 1, where behavior is
undefined if T < 0. In the common case where CHAR_MAX
is 127 the compiler can therefore implement the division
by shifting T right 7 bits, an optimization that would
not be valid if T were negative. */
time_t
time_index (time_t t)
{
  assume (0 <= t);
  return t / (CHAR_MAX + 1);
}

14.5 Integer Properties

The intprops module consists of an include file <intprops.h> that defines several
macros useful for testing properties of integer types.

Integer overflow is a common source of problems in programs written in C and other
languages. In some cases, such as signed integer arithmetic in C programs, the resulting
behavior is undefined, and practical platforms do not always behave as if integers wrap
around reliably. In other cases, such as unsigned integer arithmetic in C, the resulting
behavior is well-defined, but programs may still misbehave badly after overflow occurs.

Many techniques have been proposed to attack these problems. These include precon-
dition testing, wraparound behavior where signed integer arithmetic is guaranteed to be
modular, saturation semantics where overflow reliably yields an extreme value, undefined
behavior sanitizers where overflow is guaranteed to trap, and various static analysis tech-
niques.
Gnulib supports wraparound arithmetic and precondition testing, as these are relatively easy to support portably and efficiently. There are two families of precondition tests: the first, for integer types, is easier to use, while the second, for integer ranges, has a simple and straightforward portable implementation.

### 14.5.1 Arithmetic Type Properties

TYPE_IS_INTEGER (t) is an arithmetic constant expression that is 1 if the arithmetic type t is an integer type. _Bool counts as an integer type.

TYPE_SIGNED (t) is an arithmetic constant expression that is 1 if the real type t is a signed integer type or a floating type. If t is an integer type, TYPE_SIGNED (t) is an integer constant expression.

EXPR_SIGNED (e) is 1 if the real expression e has a signed integer type or a floating type. If e is an integer constant expression or an arithmetic constant expression, EXPR_SIGNED (e) is likewise. Although e is evaluated, if e is free of side effects then EXPR_SIGNED (e) is typically optimized to a constant.

Example usage:
```c
#include <intprops.h>
#include <time.h>

enum {
    time_t_is_signed_integer = 
        TYPE_IS_INTEGER (time_t) && TYPE_SIGNED (time_t)
};

int
CLOCKS_PER_SEC_is_signed (void)
{
    return EXPR_SIGNED (CLOCKS_PER_SEC);
}
```

### 14.5.2 Integer Bounds

INT_BUFSIZE_BOUND (t) is an integer constant expression that is a bound on the size of the string representing an integer type or expression t in decimal notation, including the terminating null character and any leading - character. For example, if INT_STRLEN_BOUND (int) is 12, any value of type int can be represented in 12 bytes or less, including the terminating null. The bound is not necessarily tight.

Example usage:
```c
#include <intprops.h>
#include <stdio.h>

int
int_strlen (int i)
{
    char buf[INT_BUFSIZE_BOUND (int)];
    return sprintf (buf, "%d", i);
}```
INT_STRLEN_BOUND (t) is an integer constant expression that is a bound on the length of the string representing an integer type or expression t in decimal notation, including any leading - character. This is one less than INT_BUFSIZE_BOUND (t).

TYPE_MINIMUM (t) and TYPE_MAXIMUM (t) are integer constant expressions equal to the minimum and maximum values of the integer type t. These expressions are of the type t (or more precisely, the type t after integer promotions).

Example usage:

```c
#include <stdint.h>
#include <sys/types.h>
#include <intprops.h>
int
in_off_t_range (intmax_t a)
{
    return TYPE_MINIMUM (off_t) <= a && a <= TYPE_MAXIMUM (off_t);
}
```

14.5.3 Wraparound Arithmetic with Signed Integers

Signed integer arithmetic has undefined behavior on overflow in C. Although almost all modern computers use two’s complement signed arithmetic that is well-defined to wrap around, C compilers routinely optimize assuming that signed integer overflow cannot occur, which means that a C program cannot easily get at the underlying machine arithmetic. For example, on a typical machine with 32-bit two’s complement int the expression INT_MAX + 1 does not necessarily yield INT_MIN, because the compiler may do calculations with a 64-bit register, or may generate code that traps on signed integer overflow.

The following macros work around this problem by storing the wraparound value, i.e., the low-order bits of the correct answer, and by returning an overflow indication. For example, if i is of type int, INT_ADD_WRAPV (INT_MAX, 1, &i) sets i to INT_MIN and returns 1 on a two’s complement machine. On newer platforms, these macros are typically more efficient than the overflow-checking macros. See Section 14.5.4 [Integer Type Overflow], page 638.

Example usage:

```c
#include <intprops.h>
#include <stdio.h>
/* Print the low order bits of A * B, reporting whether overflow occurred. */

void
print_product (long int a, long int b)
{
    long int r;
    int overflow = INT_MULTIPLY_WRAPV (a, b, &r);
    printf ("result is %ld (%s)\n", r,
            (overflow
             ? "after overflow"
             : "no overflow"));
```
These macros have the following restrictions:

- Their first two arguments must be integer expressions.
- Their last argument must be a non-null pointer to a signed integer. To calculate a wraparound unsigned integer you can use ordinary C arithmetic; to tell whether it overflowed, you can use the overflow-checking macros.
- They may evaluate their arguments zero or multiple times, so the arguments should not have side effects.
- They are not necessarily constant expressions, even if all their arguments are constant expressions.

\[
\text{INT_ADD_WRAPV (} a, b, r \text{)}
\]
Store the low-order bits of the sum of \( a \) and \( b \) into \(*r\). Return true if overflow occurred, false if the low-order bits are the mathematically-correct sum. See above for restrictions.

\[
\text{INT_SUBTRACT_WRAPV (} a, b, r \text{)}
\]
Store the low-order bits of the difference between \( a \) and \( b \) into \(*r\). Return true if overflow occurred, false if the low-order bits are the mathematically-correct difference. See above for restrictions.

\[
\text{INT_MULTIPLY_WRAPV (} a, b, r \text{)}
\]
Store the low-order bits of the product of \( a \) and \( b \) into \(*r\). Return true if overflow occurred, false if the low-order bits are the mathematically-correct product. See above for restrictions.

### 14.5.4 Integer Type Overflow

Although unsigned integer arithmetic wraps around modulo a power of two, signed integer arithmetic has undefined behavior on overflow in C. Almost all modern computers use two’s complement signed arithmetic that is well-defined to wrap around, but C compilers routinely optimize based on the assumption that signed integer overflow cannot occur, which means that a C program cannot easily get at the underlying machine behavior. For example, the signed integer expression \((a + b < b) \neq (a < 0)\) is not a reliable test for whether \(a + b\) overflows, because a compiler can assume that signed overflow cannot occur and treat the entire expression as if it were false.

These macros yield 1 if the corresponding C operators might not yield numerically correct answers due to arithmetic overflow of an integer type. They work correctly on all known practical hosts, and do not rely on undefined behavior due to signed arithmetic overflow. They are integer constant expressions if their arguments are. They are typically easier to use than the integer range overflow macros (see Section 14.5.5 [Integer Range Overflow], page 640), and they support more operations and evaluation contexts than the wraparound macros (see Section 14.5.3 [Wraparound Arithmetic], page 637).

Example usage:

```c
#include <intprops.h>
#include <limits.h>
#include <stdio.h>
```
/ * Print A * B if in range, an overflow 
  indicator otherwise. */
void
print_product (long int a, long int b)
{
  if (INT_MULTIPLY_OVERFLOW (a, b))
    printf ("multiply would overflow");
  else
    printf ("product is %ld", a * b);
}
/* Does the product of two ints always fit 
in a long int? */
enum {
  INT_PRODUCTS_FIT_IN_LONG
    = ! (INT_MULTIPLY_OVERFLOW
      ((long int) INT_MIN, INT_MIN))
};
These macros have the following restrictions:
- Their arguments must be integer expressions.
- They may evaluate their arguments zero or multiple times, so the arguments should
  not have side effects.
These macros are tuned for their last argument being a constant.
INT_ADD_OVERFLOW (a, b)
Yield 1 if a + b would overflow. See above for restrictions.
INT_SUBTRACT_OVERFLOW (a, b)
Yield 1 if a - b would overflow. See above for restrictions.
INT_NEGATE_OVERFLOW (a)
Yields 1 if -a would overflow. See above for restrictions.
INT_MULTIPLY_OVERFLOW (a, b)
Yield 1 if a * b would overflow. See above for restrictions.
INT_DIVIDE_OVERFLOW (a, b)
Yields 1 if a / b would overflow. See above for restrictions. Division overflow
  can happen on two's complement hosts when dividing the most negative integer
  by -1. This macro does not check for division by zero.
INT_REMAINDER_OVERFLOW (a, b)
Yield 1 if a % b would overflow. See above for restrictions. Remainder over-
  flow can happen on two's complement hosts when dividing the most negative
  integer by -1; although the mathematical result is always 0, in practice some
  implementations trap, so this counts as an overflow. This macro does not check
  for division by zero.
INT_LEFT_SHIFT_OVERFLOW (a, b)
Yield 1 if a << b would overflow. See above for restrictions. The C standard
  says that behavior is undefined for shifts unless 0 ≤ b < w where w is a's word
width, and that when \( a \) is negative then \( a \ll b \) has undefined behavior, but this macro does not check these other restrictions.

### 14.5.5 Integer Range Overflow

These macros yield 1 if the corresponding C operators might not yield numerically correct answers due to arithmetic overflow. They do not rely on undefined or implementation-defined behavior. They are integer constant expressions if their arguments are. Their implementations are simple and straightforward, but they are typically harder to use than the integer type overflow macros. See Section 14.5.4 [Integer Type Overflow], page 638.

Although the implementation of these macros is similar to that suggested in Seacord R, The CERT C Secure Coding Standard (2009, revised 2011), in its two sections “INT30-C. Ensure that unsigned integer operations do not wrap” (https://www.securecoding.cert.org/confluence/display/c/INT30-C.+Ensure+that+unsigned+integer+operations+do+not+wrap) and “INT32-C. Ensure that operations on signed integers do not result in overflow” (https://www.securecoding.cert.org/confluence/display/c/INT32-C.+Ensure+that+operations+on+signed+integers+do+not+result+in+overflow), Gnulib's implementation was derived independently of CERT’s suggestions.

Example usage:

```c
#include <intprops.h>
#include <limits.h>
#include <stdio.h>

void print_product (long int a, long int b)
{
    if (INT_MULTIPLY_RANGE_OVERFLOW (a, b, LONG_MIN, LONG_MAX))
        printf ("multiply would overflow");
    else
        printf ("product is %ld", a * b);
}

/* Does the product of two ints always fit in a long int? */
enum {
    INT_PRODUCTS_FIT_IN_LONG
        = ! (INT_MULTIPLY_RANGE_OVERFLOW ((long int) INT_MIN, (long int) INT_MIN, LONG_MIN, LONG_MAX))
};
```

These macros have the following restrictions:

- Their arguments must be integer expressions.
- They may evaluate their arguments zero or multiple times, so the arguments should not have side effects.
The arithmetic arguments (including the \textit{min} and \textit{max} arguments) must be of the same integer type after the usual arithmetic conversions, and the type must have minimum value \textit{min} and maximum \textit{max}. Unsigned values should use a zero \textit{min} of the proper type, for example, (\texttt{unsigned int}) 0.

These macros are tuned for constant \textit{min} and \textit{max}. For commutative operations such as \texttt{a + b}, they are also tuned for constant \textit{b}.

\texttt{INT_ADD_RANGE_OVERFLOW (a, b, min, max)}

Yield 1 if \texttt{a + b} would overflow in \([\textit{min}, \textit{max}]\) integer arithmetic. See above for restrictions.

\texttt{INT_SUBTRACT_RANGE_OVERFLOW (a, b, min, max)}

Yield 1 if \texttt{a - b} would overflow in \([\textit{min}, \textit{max}]\) integer arithmetic. See above for restrictions.

\texttt{INT_NEGATE_RANGE_OVERFLOW (a, min, max)}

Yield 1 if \texttt{-a} would overflow in \([\textit{min}, \textit{max}]\) integer arithmetic. See above for restrictions.

\texttt{INT_MULTIPLY_RANGE_OVERFLOW (a, b, min, max)}

Yield 1 if \texttt{a \times b} would overflow in \([\textit{min}, \textit{max}]\) integer arithmetic. See above for restrictions.

\texttt{INT_DIVIDE_RANGE_OVERFLOW (a, b, min, max)}

Yield 1 if \texttt{a / b} would overflow in \([\textit{min}, \textit{max}]\) integer arithmetic. See above for restrictions. Division overflow can happen on two’s complement hosts when dividing the most negative integer by \texttt{-1}. This macro does not check for division by zero.

\texttt{INT_REMAINDER_RANGE_OVERFLOW (a, b, min, max)}

Yield 1 if \texttt{a \% b} would overflow in \([\textit{min}, \textit{max}]\) integer arithmetic. See above for restrictions. Remainder overflow can happen on two’s complement hosts when dividing the most negative integer by \texttt{-1}; although the mathematical result is always 0, in practice some implementations trap, so this counts as an overflow. This macro does not check for division by zero.

\texttt{INT_LEFT_SHIFT_RANGE_OVERFLOW (a, b, min, max)}

Yield 1 if \texttt{a \ll b} would overflow in \([\textit{min}, \textit{max}]\) integer arithmetic. See above for restrictions. Here, \textit{min} and \textit{max} are for \texttt{a} only, and \texttt{b} need not be of the same type as the other arguments. The C standard says that behavior is undefined for shifts unless \(0 \leq \texttt{b} < \texttt{w}\) where \(\text{w}\) is \texttt{a}'s word width, and that when \texttt{a} is negative then \texttt{a \ll b} has undefined behavior, but this macro does not check these other restrictions.

14.6 Extern inline functions

The \texttt{extern-inline} module supports the use of C99-style \texttt{extern inline} functions so that the code still runs on compilers that do not support this feature correctly.

C code ordinarily should not use \texttt{inline}. Typically it is better to let the compiler figure out whether to inline, as compilers are pretty good about optimization nowadays. In this sense, \texttt{inline} is like \texttt{register}, another keyword that is typically no longer needed.
Functions defined (not merely declared) in headers are an exception, as avoiding \texttt{inline} would commonly cause problems for these functions. Suppose \texttt{aaa.h} defines the function \texttt{aaa\_fun}, and \texttt{aaa.c}, \texttt{bbb.c} and \texttt{ccc.c} all include \texttt{aaa.h}. If code is intended to portable to non-C99 compilers, \texttt{aaa\_fun} cannot be declared with the C99 \texttt{inline} keyword. This problem cannot be worked around by making \texttt{aaa\_fun} an ordinary function, as it would be defined three times with external linkage and the definitions would clash. Although \texttt{aaa\_fun} could be a static function, with separate compilation if \texttt{aaa\_fun} is not inlined its code will appear in the executable three times.

To avoid this code bloat, \texttt{aaa.h} can do this:

```c
/* aaa.h */
/* #include any other headers here */
#ifndef _GL_INLINE_HEADER_BEGIN
    #error "Please include config.h first."
#endif
_GL_INLINE_HEADER_BEGIN
#ifndef AAA_INLINE
    #define AAA_INLINE _GL_INLINE
#endif
...
AAA_INLINE int
aaa_fun (int i)
{
    return i + 1;
}
...
_GL_INLINE_HEADER_END
```

and \texttt{aaa.c} can do this:

```c
/* aaa.c */
#include <config.h>
#define AAA_INLINE _GL_EXTERN_INLINE
#include <aaa.h>
```

whereas \texttt{bbb.c} and \texttt{ccc.c} can include \texttt{aaa.h} in the usual way. C99 compilers expand \texttt{AAA\_INLINE} to C99-style \texttt{inline} usage, where \texttt{aaa\_fun} is declared \texttt{extern inline} in \texttt{aaa.c} and plain \texttt{inline} in other modules. Non-C99 compilers that are compatible with GCC use GCC-specific syntax to accomplish the same ends. Other non-C99 compilers use \texttt{static inline} so they suffer from code bloat, but they are not mainline platforms and will die out eventually.

\texttt{ _GL_INLINE} is a portable alternative to C99 plain \texttt{inline}.

\texttt{ _GL_EXTERN_INLINE} is a portable alternative to C99 \texttt{extern inline}.

Invoke \texttt{ _GL_INLINE_HEADER_BEGIN} before all uses of \texttt{ _GL_INLINE} in an include file. This suppresses some bogus warnings in GCC versions before 5.1. If an include file includes other files, it is better to invoke this macro after including the other files.

Invoke \texttt{ _GL_INLINE_HEADER_END} after all uses of \texttt{ _GL_INLINE} in an include file.
14.7 Handling closed standard file descriptors

Usually, when a program gets invoked, its file descriptors 0 (for standard input), 1 (for standard output), and 2 (for standard error) are open. But there are situations when some of these file descriptors are closed. These situations can arise when

- The invoking process invokes `close()` on the file descriptor before `exec`, or
- The invoking process invokes `posix_spawn_file_actions_addclose()` for the file descriptor before `posix_spawn` or `posix_spawnp`, or
- The invoking process is a Bourne shell, and the shell script uses the POSIX syntax for closing the file descriptor: `<&-` for closing standard input, `>&-` for closing standard output, or `2>&-` for closing standard error.

When a closed file descriptor is accessed through a system call, such as `fcntl()`, `fstat()`, `read()`, or `write()`, the system calls fails with error `EBADF` ("Bad file descriptor").

When a new file descriptor is allocated, the operating system chooses the smallest non-negative integer that does not yet correspond to an open file descriptor. So, when a given fd (0, 1, or 2) is closed, opening a new file descriptor may assign the new file descriptor to this fd. This can have unintended effects, because now standard input/output/error of your process is referring to a file that was not meant to be used in that role.

This situation is a security risk because the behaviour of the program in this situation was surely never tested, therefore anything can happen then – from overwriting precious files of the user to endless loops.

To deal with this situation, you first need to determine whether your program is affected by the problem.

- Does your program invoke functions that allocate new file descriptors? These are the system calls
  - `open()`, `openat()`, `creat()`
  - `dup()`
  - `fopen()`, `freopen()`
  - `pipe()`, `pipe2()`, `popen()`
  - `opendir()`
  - `tmpfile()`, `mkstemp()`, `mkstemps()`, `mkostemp()`, `mkostemps()`

Note that you also have to consider the libraries that your program uses.

- If your program may open two or more file descriptors or FILE streams for reading at the same time, and some of them may reference standard input, your program is affected.
- If your program may open two or more file descriptors or FILE streams for writing at the same time, and some of them may reference standard output or standard error, your program is affected.
- If your program does not open new file descriptors or FILE streams, it is not affected.
- If your program opens only one new file descriptor or FILE stream at a time, it is not affected. This is often the case for programs that are structured in simple phases: first a phase where input is read from a file into memory, then a phase of processing in memory, finally a phase where the result is written to a file.
If your program opens only two new file descriptors or FILE streams at a time, out of which one is for reading and the one is for writing, it is not affected. This is because if the first file descriptor is allocated and the second file descriptor is picked as 0, 1, or 2, and both happen to be the same, writing to the one opened in O_RDONLY mode will produce an error EBADF, as desired.

If your program is affected, what is the mitigation?

Some operating systems install open file descriptors in place of the closed ones, either in the exec system call or during program startup. When such a file descriptor is accessed through a system call, it behaves like an open file descriptor opened for the “wrong” direction: the system calls fcntl() and fstat() succeed, whereas read() from fd 0 and write() to fd 1 or 2 fail with error EBADF (“Bad file descriptor”). The important point here is that when your program allocates a new file descriptor, it will have a value greater than 2.

This mitigation is enabled on HP-UX, for all programs, and on glibc, FreeBSD, NetBSD, OpenBSD, but only for setuid or setgid programs. Since it is operating system dependent, it is not a complete mitigation.

For a complete mitigation, GnuLib provides two alternative sets of modules:

- The xstdopen module.

The approach with the xstdopen module is simpler, but it adds three system calls to program startup. Whereas the approach with the *-safer modules is more complex, but adds no overhead (no additional system calls) in the normal case.

To use the approach with the xstdopen module:
1. Import the module xstdopen from GnuLib.
2. In the compilation unit that contains the main function, include "xstdopen.h".
3. In the main function, near the beginning, namely right after the i18n related initializations (setlocale, bindtextdomain, textdomain invocations, if any) and the closeout initialization (if any), insert the invocation:

   /* Ensure that stdin, stdout, stderr are open. */
   xstdopen ();

To use the approach with the *-safer modules:
1. Import the relevant modules from GnuLib.
2. In the compilation units that contain these function calls, include the replacement header file.

Do so according to this table:

<table>
<thead>
<tr>
<th>Function</th>
<th>Module</th>
<th>Header file</th>
</tr>
</thead>
<tbody>
<tr>
<td>open()</td>
<td>fcntl-safer</td>
<td>&quot;fcntl--.h&quot;</td>
</tr>
<tr>
<td>openat()</td>
<td>openat-safer</td>
<td>&quot;fcntl--.h&quot;</td>
</tr>
<tr>
<td>creat()</td>
<td>fcntl-safer</td>
<td>&quot;fcntl--.h&quot;</td>
</tr>
<tr>
<td>dup()</td>
<td>unistd-safer</td>
<td>&quot;unistd--.h&quot;</td>
</tr>
</tbody>
</table>
14.8 Container data types

Gnulib provides several generic container data types. They can be used to organize collections of application-defined objects.

<table>
<thead>
<tr>
<th>Data type</th>
<th>Details</th>
<th>Module</th>
<th>Main file for operations</th>
<th>Include file for out-of-memory checking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequential list</td>
<td>Can contain any number of objects in any given order. Duplicates are allowed, but can optionally be forbidden.</td>
<td>list</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;gl_{list}.h&quot;</td>
<td>&quot;gl_{list}.h&quot;</td>
</tr>
<tr>
<td>Set</td>
<td>Can contain any number of objects; the order does not matter. Duplicates (in the sense of the comparator) are forbidden.</td>
<td>set</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;gl_{set}.h&quot;</td>
<td>&quot;gl_{xlist}.h&quot;</td>
</tr>
<tr>
<td>Ordered set</td>
<td>Can contain any number of objects in the order of a given comparator function. Duplicates (in the sense of the comparator) are forbidden.</td>
<td>oset</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;gl_{oset}.h&quot;</td>
<td>&quot;gl_{xoset}.h&quot;</td>
</tr>
<tr>
<td>Map</td>
<td>Can contain any number of (key, value) pairs, where keys and values are objects; there are no (key, value1) and (key, value2) pairs with the same key (in the sense of a given comparator function).</td>
<td>map</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;gl_{map}.h&quot;</td>
<td>&quot;gl_{xmap}.h&quot;</td>
</tr>
<tr>
<td>Ordered map</td>
<td>Can contain any number of (key, value) pairs, where keys and values are objects; the (key, value) pairs are ordered by the key, in the order of a given comparator function; there are no (key, value1) and (key, value2) pairs with the same key (in the sense of the comparator function).</td>
<td>omap</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;gl_{omap}.h&quot;</td>
<td>&quot;gl_{xomap}.h&quot;</td>
</tr>
</tbody>
</table>
Operations without out-of-memory checking (suitable for use in libraries) are declared in the “main include file”. Whereas operations with out-of-memory checking (suitable only in programs) are declared in the “include file for operations with out-of-memory checking”.

For each of the data types, several implementations are available, with different performance profiles with respect to the available operations. This enables you to start with the simplest implementation (ARRAY) initially, and switch to a more suitable implementation after profiling your application. The implementation of each container instance is specified in a single place only: in the invocation of the function `gl_*_create_empty` that creates the instance.

The implementations and the guaranteed average performance for the operations for the “sequential list” data type are:

<table>
<thead>
<tr>
<th>Operation</th>
<th>ARRAY</th>
<th>CARRAY</th>
<th>LINKEDTREE</th>
<th>LINKEDLIST</th>
<th>HASHASHE</th>
<th>HASH WITH-</th>
<th>HASH WITH-</th>
<th>HASH WITH-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
</tr>
<tr>
<td><code>gl_list_size</code></td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
</tr>
<tr>
<td><code>gl_list_node_value</code></td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O((log n)O(1))</td>
<td></td>
</tr>
<tr>
<td><code>gl_list_node_set_value</code></td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(log n) O(log n)</td>
<td></td>
</tr>
<tr>
<td><code>gl_list_next_node</code></td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(log n) O(1)</td>
<td>O(1)</td>
<td>O(log n) O(log n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_previous_node</code></td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(log n) O(1)</td>
<td>O(1)</td>
<td>O(log n) O(log n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_set_at</code></td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(n)</td>
<td>O(log n) O(n)</td>
<td>O(n)</td>
<td>O((log n) O(log n))</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_search</code></td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O((log n) O(log n))</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_search_from</code></td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O((log n) O(log n))</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_search_from_to</code></td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O((log n) O(log n))</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_indexof</code></td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O((log n) O(log n))</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_indexof_from</code></td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O((log n) O(log n))</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_indexof_from_to</code></td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(n)</td>
<td>O((log n) O(log n))</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_add_first</code></td>
<td>O(n)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(log n) O(1)</td>
<td>O(1)</td>
<td>O((log n) O(log n))</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_add_last</code></td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(1)</td>
<td>O(log n) O(1)</td>
<td>O(1)</td>
<td>O((log n) O(log n))</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_add_before</code></td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(1)</td>
<td>O(log n) O(1)</td>
<td>O(1)</td>
<td>O((log n) O(log n))</td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>gl_list_add_after</code></td>
<td>O(n)</td>
<td>O(n)</td>
<td>O(1)</td>
<td>O(log n) O(1)</td>
<td>O(1)</td>
<td>O((log n) O(log n))</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The implementations and the guaranteed average performance for the operations for the “set” data type are:

<table>
<thead>
<tr>
<th>Operation</th>
<th>ARRAY</th>
<th>LINKEDHASH, HASH</th>
</tr>
</thead>
<tbody>
<tr>
<td>gl_set_size</td>
<td>O(1)</td>
<td>O(1)</td>
</tr>
<tr>
<td>gl_set_add</td>
<td>O(n)</td>
<td>O(1)</td>
</tr>
<tr>
<td>gl_set_remove</td>
<td>O(n)</td>
<td>O(1)</td>
</tr>
<tr>
<td>gl_set_search</td>
<td>O(n)</td>
<td>O(log n)</td>
</tr>
<tr>
<td>gl_set_iterator</td>
<td>O(1)</td>
<td>O(1)</td>
</tr>
<tr>
<td>gl_set_iterator_next</td>
<td>O(1)</td>
<td>O(1)</td>
</tr>
</tbody>
</table>

The implementations and the guaranteed average performance for the operations for the “ordered set” data type are:

<table>
<thead>
<tr>
<th>Operation</th>
<th>ARRAY</th>
<th>TREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>gl_oset_size</td>
<td>O(1)</td>
<td>O(1)</td>
</tr>
<tr>
<td>gl_oset_add</td>
<td>O(n)</td>
<td>O(log n)</td>
</tr>
<tr>
<td>gl_oset_remove</td>
<td>O(n)</td>
<td>O(log n)</td>
</tr>
<tr>
<td>gl_oset_search</td>
<td>O(log n)</td>
<td>O(log n)</td>
</tr>
<tr>
<td>gl_oset_search_atleast</td>
<td>O(log n)</td>
<td>O(log n)</td>
</tr>
<tr>
<td>gl_oset_iterator</td>
<td>O(1)</td>
<td>O(1)</td>
</tr>
</tbody>
</table>
gl_oset_iterator_next \quad O(1) \quad O(\log n)

The implementations and the guaranteed average performance for the operations for the “map” data type are:

<table>
<thead>
<tr>
<th>Operation</th>
<th>ARRAY</th>
<th>LINKEDHASH, HASH</th>
</tr>
</thead>
<tbody>
<tr>
<td>gl_map_size</td>
<td>(O(1))</td>
<td>(O(1))</td>
</tr>
<tr>
<td>gl_map_get</td>
<td>(O(n))</td>
<td>(O(1))</td>
</tr>
<tr>
<td>gl_map_put</td>
<td>(O(n))</td>
<td>(O(1))</td>
</tr>
<tr>
<td>gl_map_remove</td>
<td>(O(n))</td>
<td>(O(1))</td>
</tr>
<tr>
<td>gl_map_search</td>
<td>(O(n))</td>
<td>(O(1))</td>
</tr>
<tr>
<td>gl_map_iterator</td>
<td>(O(1))</td>
<td>(O(1))</td>
</tr>
<tr>
<td>gl_map_iterator_next</td>
<td>(O(1))</td>
<td>(O(1))</td>
</tr>
</tbody>
</table>

The implementations and the guaranteed average performance for the operations for the “ordered map” data type are:

<table>
<thead>
<tr>
<th>Operation</th>
<th>ARRAY</th>
<th>TREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>gl_omap_size</td>
<td>(O(1))</td>
<td>(O(1))</td>
</tr>
<tr>
<td>gl_omap_get</td>
<td>(O(\log n))</td>
<td>(O(\log n))</td>
</tr>
<tr>
<td>gl_omap_put</td>
<td>(O(n))</td>
<td>(O(\log n))</td>
</tr>
<tr>
<td>gl_omap_remove</td>
<td>(O(n))</td>
<td>(O(\log n))</td>
</tr>
<tr>
<td>gl_omap_search</td>
<td>(O(\log n))</td>
<td>(O(\log n))</td>
</tr>
<tr>
<td>gl_omap_search_atleast</td>
<td>(O(\log n))</td>
<td>(O(\log n))</td>
</tr>
<tr>
<td>gl_omap_iterator</td>
<td>(O(1))</td>
<td>(O(\log n))</td>
</tr>
<tr>
<td>gl_omap_iterator_next</td>
<td>(O(1))</td>
<td>(O(\log n))</td>
</tr>
</tbody>
</table>

14.9 Character and String Functions in C Locale

The functions in this section are similar to the generic string functions from the standard C library, except that

- They behave as if the locale was set to the "C" locale, even when the locale is different, and/or
- They are specially optimized for the case where all characters are plain ASCII characters.

14.9.1 c-ctype

The c-ctype module contains functions operating on single-byte characters, like the functions in `<ctype.h>`, that operate as if the locale encoding was ASCII. (The "C" locale on many systems has the locale encoding "ASCII").

The functions are:

```c
extern bool c_isascii (int c);
extern bool c_isalnum (int c);
extern bool c_isalpha (int c);
extern bool c_isblank (int c);
extern bool c_iscntrl (int c);
extern bool cisdigit (int c);
extern bool c_islower (int c);
```
extern bool c_isgraph (int c);
extern bool c_isprint (int c);
extern bool c_ispunct (int c);
extern bool c_isspace (int c);
extern bool c_isupper (int c);
extern bool c_isxdigit (int c);
extern int c_tolower (int c);
extern int c_toupper (int c);

These functions assign properties only to ASCII characters.

The c argument can be a char or unsigned char value, whereas the corresponding functions in <ctype.h> take an argument that is actually an unsigned char value.

The c_is* functions return 'bool', where the corresponding functions in <ctype.h> return 'int' for historical reasons.

Note: The <ctype.h> functions support only unibyte locales.

14.9.2 c-strcase

The c-strcase module contains case-insensitive string comparison functions operating on single-byte character strings, like the functions in <strings.h>, that operate as if the locale encoding was ASCII. (The "C" locale on many systems has the locale encoding "ASCII").

The functions are:

extern int c_strcasecmp (const char *s1, const char *s2);
extern int c_strncasecmp (const char *s1, const char *s2, size_t n);

For case conversion here, only ASCII characters are considered to be upper case or lower case.

Note: The functions strcasecmp, strncasecmp from <strings.h> support only unibyte locales; for multibyte locales, you need the functions mbscasecmp, mbsncasecmp, mbspcasecmp.

14.9.3 c-strcaseeq

The c-strcaseeq module contains an optimized case-insensitive string comparison function operating on single-byte character strings, that operate as if the locale encoding was ASCII. (The "C" locale on many systems has the locale encoding "ASCII").

The functions is actually implemented as a macro:

extern int STRCASEEQ (const char *s1, const char *s2,
    int s20, int s21, int s22, int s23, int s24, int s25,
    int s26, int s27, int s28);

s2 should be a short literal ASCII string, and s20, s21, ... the individual characters of s2.

For case conversion here, only ASCII characters are considered to be upper case or lower case.

14.9.4 c-strcasestr

The c-strcasesstr module contains a case-insensitive string search function operating on single-byte character strings, that operate as if the locale encoding was ASCII. (The "C" locale on many systems has the locale encoding "ASCII").
The function is:

```c
extern char *c_strcasestr (const char *haystack, const char *needle);
```

For case conversion here, only ASCII characters are considered to be upper case or lower case.

Note: The function `strcasestr` from `<string.h>` supports only unibyte locales; for multibyte locales, you need the function `mbstrcasestr`.

### 14.9.5 c-strstr

The `c-strstr` module contains a substring search function operating on single-byte character strings, that operate as if the locale encoding was ASCII. (The "C" locale on many systems has the locale encoding "ASCII").

The function is:

```c
extern char *c_strstr (const char *haystack, const char *needle);
```

Note: The function `strstr` from `<string.h>` supports only unibyte locales; for multibyte locales, you need the function `mbsstr`.

### 14.9.6 cstrtod

The `cstrtod` module contains a string to number (double) conversion function operating on single-byte character strings, that operates as if the locale encoding was ASCII. (The "C" locale on many systems has the locale encoding "ASCII").

The function is:

```c
extern double c_strtod (const char *string, char **endp);
```

In particular, only a period '.' is accepted as decimal point, even when the current locale's notion of decimal point is a comma ',', and no characters outside the basic character set are accepted.

On platforms without `strtod_l`, this function is not safe for use in multi-threaded applications since it calls `setlocale`.

### 14.9.7 cstrtold

The `cstrtold` module contains a string to number (long double) conversion function operating on single-byte character strings, that operates as if the locale encoding was ASCII. (The "C" locale on many systems has the locale encoding "ASCII").

The function is:

```c
extern long double c_strtold (const char *string, char **endp);
```

In particular, only a period '.' is accepted as decimal point, even when the current locale's notion of decimal point is a comma ','. 

### 14.10 Quoting

Gnulib provides `quote` and `quotearg` modules to help with quoting text, such as file names, in messages to the user. Here's an example of using `quote`:

```c
#include <quote.h>
...
error (0, errno, _("cannot change owner of %s"), quote (fname));
```
This differs from

```c
    error (0, errno, _("cannot change owner of '%s'"), fname);
```

in that `quote` escapes unusual characters in `fname`, e.g., `"'` and control characters like `\n`.

However, a caveat: `quote` reuses the storage that it returns. Hence if you need more than one thing quoted at the same time, you need to use `quote_n`.

Also, the `quote` module is not suited for multithreaded applications. In that case, you have to use `quotearg_alloc`, defined in the `quotearg` module, which is decidedly less convenient.

### 14.11 progame and getprogame

Gnulib has two modules for retrieving the name of the currently executing program: `progame` and `getprogame`.

The `progame` module defines a variable `program_name`. It contains the name of the currently executing program, on all platforms. But it cannot be used implicitly: It requires that every `main` function be modified to invoke `set_program_name (argv[0])` as one of its first actions.

The `getprogame` module defines a function `getprogame()`. It returns the name of the currently executing program, on most platforms. The advantage of this module is that it can be used without prior initializations. But it has limitations: In some rare situations, it cannot determine the name; then it returns "?" instead. And on some platforms, it returns a truncated program name.

The `error` function uses the `getprogame` module.

### 14.12 gcd: greatest common divisor

The `gcd` function returns the greatest common divisor of two numbers \( a > 0 \) and \( b > 0 \). It is the caller’s responsibility to ensure that the arguments are non-zero.

If you need a gcd function for an integer type larger than `'unsigned long'`, you can include the `gcd.c` implementation file with parametrization. The parameters are:

- `WORD_T` Define this to the unsigned integer type that you need this function for.
- `GCD` Define this to the name of the function to be created.

The created function has the prototype

```c
    WORD_T GCD (WORD_T a, WORD_T b);
```

If you need the least common multiple of two numbers, it can be computed like this: \( \text{lcm}(a,b) = (a / \text{gcd}(a,b)) \times b \) or \( \text{lcm}(a,b) = a \times (b / \text{gcd}(a,b)) \). Avoid the formula \( \text{lcm}(a,b) = (a \times b) / \text{gcd}(a,b) \) because—although mathematically correct—it can yield a wrong result, due to integer overflow.

In some applications it is useful to have a function taking the gcd of two signed numbers. In this case, the gcd function result is usually normalized to be non-negative (so that two gcd results can be compared in magnitude or compared against 1, etc.). Note that in this case the prototype of the function has to be

```c
    unsigned long gcd (long a, long b);
```

and not

```c
    long gcd (long a, long b);
```
because \( \text{gcd} \text{ (LONG_MIN, LONG_MIN)} = -\text{LONG_MIN} = \text{LONG_MAX} + 1 \) does not fit into a signed ‘long’.

14.13 Profiling of program phases

The module ‘timevar’ provides a simple self-profiling facility, based on timers.

Execution times (seconds)

<table>
<thead>
<tr>
<th></th>
<th>usr</th>
<th>sys</th>
<th>wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>read</td>
<td>0.09 (19%)</td>
<td>0.08 (80%)</td>
<td>0.09 (18%)</td>
</tr>
<tr>
<td>read: scan</td>
<td>0.04 (9%)</td>
<td>0.08 (80%)</td>
<td>0.12 (26%)</td>
</tr>
<tr>
<td>read: parse</td>
<td>0.05 (10%)</td>
<td>0.00 (0%)</td>
<td>0.05 (10%)</td>
</tr>
<tr>
<td>work</td>
<td>0.33 (70%)</td>
<td>0.00 (0%)</td>
<td>0.35 (71%)</td>
</tr>
<tr>
<td>work: phase 1</td>
<td>0.30 (64%)</td>
<td>0.00 (0%)</td>
<td>0.30 (64%)</td>
</tr>
<tr>
<td>work: phase 2</td>
<td>0.13 (28%)</td>
<td>0.00 (0%)</td>
<td>0.14 (29%)</td>
</tr>
<tr>
<td>output</td>
<td>0.04 (9%)</td>
<td>0.02 (20%)</td>
<td>0.04 (8%)</td>
</tr>
<tr>
<td>total time</td>
<td>0.47</td>
<td>0.10</td>
<td>0.49</td>
</tr>
</tbody>
</table>

To set up timevar, copy the stub file gnulib/lib/timevar.def next to where timevar.h and timevar.c were imported in your project, and define your timers there. For instance:

```c
/* The total execution time. Mandatory. */
DEFTIMEVAR (tv_total, "total time")

/* Examples. */
DEFTIMEVAR (tv_read, "read")
DEFTIMEVAR (tv_work, "work")
DEFTIMEVAR (tv_work_1, "work: phase 1")
DEFTIMEVAR (tv_work_2, "work: phase 2")
DEFTIMEVAR (tv_output, "output")
```

Do not remove tv_total, it is mandatory. You may change its associated string.

Use timevar_push/timevar_pop to start/stop timers, as in the following example.

```c
#include <config.h>
#include "timevar.h"
#include <stdio.h>
#include "read.h"
#include "work.h"
#include "output.h"

int main (void)
{
    timevar_enabled = true;
    timevar_init ();
    timevar_start (tv_total);

    timevar_push (tv_read);
    reader ();
    timevar_pop (tv_read);

    timevar_push (tv_work);
    work ();
    timevar_pop (tv_work);

    timevar_push (tv_output);
    output ();
```
timevar_pop (tv_output);

    timevar_stop (tv_total);
    timevar_print (stderr);
  }

with, for instance, in work.c

#include <config.h>
#include "work.h"

void
work (void)
{
    timevar_push (tv_work_phase1);
    work1 ()
    timevar_pop (tv_work_phase1);

    timevar_push (tv_work_phase2);
    work2 ()
    timevar_pop (tv_work_phase2);
}

14.14 Library version handling

The module ‘check-version’ can be useful when your gnulib application is a system library. You will typically wrap the call to the \texttt{check\_version} function through a library API, your library header file may contain:

\begin{verbatim}
#define STRINGPREP_VERSION "0.5.18"
...
    extern const char *stringprep_check_version (const char *req_version);
\end{verbatim}

To avoid ELF symbol collisions with other libraries that use the ‘check-version’ module, add to \texttt{config.h} through a \texttt{ACDEFINE} something like:

\begin{verbatim}
AC_DEFINE(check_version, stringprep_check_version, [Rename check_version.])
\end{verbatim}

The stringprep\_check\_version function will thus be implemented by the check\_version module.

There are two uses of the interface. The first is a way to provide for applications to find out the version number of the library it uses. The application may contain diagnostic code such as:

\begin{verbatim}
printf ("Stringprep version: header %s library %s",
    STRINGPREP_VERSION,
    stringprep_check_version (NULL));
\end{verbatim}

Separating the library and header file version can be useful when searching for version mismatch related problems.

The second uses is as a rudimentary test of proper library version, by making sure the application get a library version that is the same, or newer, than the header file used when building the application. This doesn’t catch all problems, libraries may change backwards incompatibly in later versions, but enable applications to require a certain minimum version before it may proceed.
Typical uses look like:

```c
/* Check version of libgcrypt. */
if (!gcry_check_version (GCRYPT_VERSION))
die ("version mismatch\n");
```

### 14.15 Supporting Relocation

It has been a pain for many users of GNU packages for a long time that packages are not relocatable. It means a user cannot copy a program, installed by another user on the same machine, to his home directory, and have it work correctly (including i18n). So many users need to go through `configure; make; make install` with all its dependencies, options, and hurdles.

Red Hat, Debian, and other binary distributions solve the “ease of installation” problem, but they hardwire path names, usually to `/usr` or `/usr/local`. This means that users need root privileges to install a binary package, and prevents installing two different versions of the same binary package.

A relocatable program can be moved or copied to a different location on the file system. It is possible to make symlinks to the installed and moved programs, and invoke them through the symlink. It is possible to do the same thing with a hard link only if the hard link file is in the same directory as the real program.

The `relocatable-prog` module aims to ease the process of making a GNU program relocatable. It helps overcome two obstacles. First, it aids with relocating the hard-coded references to absolute file names that GNU programs often contain. These references must be fixed up at runtime if a program is to be successfully relocated. The `relocatable-prog` module provides a function `relocate` that does this job.

Second, the loader must be able to find shared libraries linked to relocatable executables or referenced by other shared libraries linked to relocatable executables. The `relocatable-prog` module helps out here in a platform-specific way:

- On most operating systems, it adds a linker option (`-rpath`) that causes the dynamic linker to search for libraries in a directory relative to the location of the invoked executable. This works on GNU/Linux and modern versions of GNU/Hurd, GNU/kFreeBSD, FreeBSD, NetBSD, OpenBSD, Solaris, Haiku.
- On macOS, it modifies the installed executables after installation in a way that causes the dynamic linker to search for libraries in a directory relative to the location of the invoked executable.
- On other Unix systems, it installs a trampoline executable. The trampoline sets the environment variable that controls shared library searching (usually `LD_LIBRARY_PATH`) and then invokes the real executable. This applies to operating systems such as AIX, HP-UX, or Minix.
- On Windows, the executable’s own directory is searched for libraries, so installing shared libraries into the executable’s directory is sufficient.

You can make your program relocatable by following these steps:

1. Import the `relocatable-prog` module. For libraries, use the `relocatable-lib` or `relocatable-lib-lgpl` module. If you need more than one module, or you need to
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2.

3.
4.

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use them with different settings, you will need multiple copies of gnulib (see Section 3.9
[Multiple instances], page 22).
In every program, add to main as the first statement (even before setting the locale or
doing anything related to libintl):
set_program_name (argv[0]);
The prototype for this function is in progname.h.
If you want your code to be portable to platforms that do not support automatic
initialization, call set_relocation_prefix.
Everywhere where you use a constant pathname from installation-time, wrap it in
relocate so it gets translated to the run-time situation. Example:
bindtextdomain (PACKAGE, LOCALEDIR);
becomes:
bindtextdomain (PACKAGE, relocate (LOCALEDIR));
The prototype for this function is in relocatable.h.
There is also a variant of this function, named relocate2, that makes it easy to reclaim
the memory allocated by the call.
The set_program_name function can also configure some additional libraries to relocate
files that they access, by defining corresponding C preprocessor symbols to 1. The
libraries for which this is supported and the corresponding preprocessor symbols are:
libcharset

DEPENDS_ON_LIBCHARSET

libiconv

DEPENDS_ON_LIBICONV

libintl

DEPENDS_ON_LIBINTL

Defining the symbol for a library makes every program in the package depend on that
library, whether the program really uses the library or not, so this feature should be
used with some caution.
6. If your package installs shell scripts, also import the relocatable-script module.
Then, near the beginning of each shell script that your package installs, add the following:
@relocatable_sh@
prefix="@prefix@"
exec_prefix="@exec_prefix@"
datarootdir="@datarootdir@"

# usually needs $prefix.
# usually needs $prefix.

if test "@RELOCATABLE@" = yes; then
bindir="@bindir@"
orig_installdir="$bindir" # see Makefile.am’s *_SCRIPTS variables
func_find_curr_installdir # determine curr_installdir
func_find_prefixes
relocate () {
echo "$1/" \
| sed -e "s%^${orig_installprefix}/%${curr_installprefix}/%" \
| sed -e ’s,/$,,’
}
else
relocate () {


echo "$1"
}

# Get some relocated directory names.
# (The gnulib module 'configmake' can help with this.)
$sysconfdir = relocate("@sysconfdir@")
$some_datadir = relocate("@datadir@/something"");
$bindir = relocate("@bindir@")

You must adapt the definition of orig_installdir, depending on where the script
gets installed. Also, at the end, instead of sysconfdir and some_datadir, transform
those variables that you need.

7. If your package installs Perl scripts, also import the relocatable-perl module. Then,
near the beginning of each Perl script that your package installs, add the following:

@relocatable_pl@
if (@"RELOCATABLE" eq "yes") {
    my $exec_prefix = "@exec_prefix@";
    my $orig_installdir = "@bindir@";
    my ($orig_installprefix, $curr_installprefix) =
        find_prefixes($orig_installdir, find_curr_installdir());

    sub relocate {
        my ($dir) = @_; 
        if (@"RELOCATABLE" eq "yes") {
            $dir =~ s%^$orig_installprefix/%$curr_installprefix/%;
            $dir =~ s,,/,,;
        }
        return $dir;
    }
}

# Get some relocated directory names.
# (The gnulib module 'configmake' can help with this.)
$sysconfdir = relocate("@sysconfdir@");
$some_datadir = relocate("@datadir@/something");

You must adapt the definition of $orig_installdir, depending on where the script
gets installed. Also, at the end, instead of sysconfdir and some_datadir, transform
those variables that you need.

8. In your Makefile.am, for every program foo that gets installed in, say, $(bindir),
you add:

    foo_CPPFLAGS = -DINSTALLDIR="$(bindir)"
    if RELOCATABLE_VIA_LD
        foo_LDFLAGS = "$(RELOCATABLE_LDFLAGS) $(bindir)"
    endif

When building gnulib to use with a relocatable library, you need to define the pre-
processor symbol IN_LIBRARY. You may also want to build with ENABLE_COSTLY_-
RELOCATABLE, in which case you will also need to define INSTALLDIR. The following
fragment can be added to an override Makefile.am used to build gnulib (see Section 3.8
[Modifed build rules], page 21).

    AM_CPPFLAGS += -DIN_LIBRARY -DENABLE_COSTLY_RELOCATABLE
if SHLIBS_IN_BINDIR
AM_CPPFLAGS += -DINSTALLDIR="$(bindir)"
else
AM_CPPFLAGS += -DINSTALLDIR="$(libdir)"
endif

SHLIBS_IN_BINDIR is defined in configure.ac as follows:
AM_CONDITIONAL([SHLIBS_IN_BINDIR],
    [case "$host_os" in mingw* | cygwin*) true;; *) false;; esac])

9. You may also need to add a couple of variable assignments to your configure.ac.
   If your package (or any package you rely on, e.g. gettext-runtime) will be
   relocated together with a set of installed shared libraries, then set RELOCAT-
   ABLE_LIBRARY_PATH to a colon-separated list of those libraries’ directories,
   e.g.
   
   RELOCATABLE_LIBRARY_PATH='$(libdir)'
   
   If your config.h is not in $(top_builddir), then set RELOCAT-
   ABLE_CONFIG_H_DIR to its directory, e.g.
   
   RELOCATABLE_CONFIG_H_DIR='$(top_builddir)/src'

14.16 func

The func module makes sure that you can use the predefined identifier __func__ as
   defined by C99 in your code.
   
   A small example is:
   
   #include <config.h>
   #include <stdio.h> /* for printf */
   
   int main (void)
   {
       printf ("%s: hello world\n", __func__);
   }

   Note that sizeof cannot be applied to __func__: On SunPRO C compiler, sizeof
   __func__ evaluates to 0.

14.17 stat-size

The stat-size module provides a small number of macros intended for interpreting the
file size information in an instance of struct stat.

On POSIX systems, the st_blocks member of struct stat contains the number of
disk blocks occupied by a file. The ST_NBLOCKS macro is used to estimate this quantity on
systems which don’t actually have st_blocks. Each of these blocks contains ST_NBLOCKSIZE
bytes.

The value of ST_NBLOCKSIZE is often quite small, small enough that performing I/O in
chunks that size would be inefficient. ST_BLKSIZE is the I/O block size recommended for
I/O to this file. This is not guaranteed to give optimum performance, but it should be
reasonably efficient.
15 Regular expressions

15.1 Overview

A regular expression (or regexp, or pattern) is a text string that describes some (mathematical) set of strings. A regexp \( r \) matches a string \( s \) if \( s \) is in the set of strings described by \( r \).

Using the Regex library, you can:

• see if a string matches a specified pattern as a whole, and
• search within a string for a substring matching a specified pattern.

Some regular expressions match only one string, i.e., the set they describe has only one member. For example, the regular expression ‘foo’ matches the string ‘foo’ and no others. Other regular expressions match more than one string, i.e., the set they describe has more than one member. For example, the regular expression ‘f*’ matches the set of strings made up of any number (including zero) of ‘f’ s. As you can see, some characters in regular expressions match themselves (such as ‘f’) and some don’t (such as ‘*’); the ones that don’t match themselves instead let you specify patterns that describe many different strings.

To either match or search for a regular expression with the Regex library functions, you must first compile it with a Regex pattern compiling function. A compiled pattern is a regular expression converted to the internal format used by the library functions. Once you’ve compiled a pattern, you can use it for matching or searching any number of times.

The Regex library is used by including `regex.h`. Regex provides three groups of functions with which you can operate on regular expressions. One group—the GNU group—is more powerful but not completely compatible with the other two, namely the POSIX and Berkeley Unix groups; its interface was designed specifically for GNU.

We wrote this chapter with programmers in mind, not users of programs—such as Emacs—that use Regex. We describe the Regex library in its entirety, not how to write regular expressions that a particular program understands.

15.2 Regular Expression Syntax

Characters are things you can type. Operators are things in a regular expression that match one or more characters. You compose regular expressions from operators, which in turn you specify using one or more characters.

Most characters represent what we call the match-self operator, i.e., they match themselves; we call these characters ordinary. Other characters represent either all or parts of fancier operators; e.g., ‘.’ represents what we call the match-any-character operator (which, no surprise, matches (almost) any character); we call these characters special. Two different things determine what characters represent what operators:

1. the regular expression syntax your program has told the Regex library to recognize, and
2. the context of the character in the regular expression.

In the following sections, we describe these things in more detail.
15.2.1 Syntax Bits

In any particular syntax for regular expressions, some characters are always special, others are sometimes special, and others are never special. The particular syntax that Regex recognizes for a given regular expression depends on the current syntax (as set by re_set_syntax) when the pattern buffer of that regular expression was compiled.

You get a pattern buffer by compiling a regular expression. See Section 15.7.1.1 [GNU Pattern Buffers], page 674, for more information on pattern buffers. See Section 15.7.1.2 [GNU Regular Expression Compiling], page 674, and Section 15.7.2.1 [BSD Regular Expression Compiling], page 681, for more information on compiling.

Regex considers the current syntax to be a collection of bits; we refer to these bits as syntax bits. In most cases, they affect what characters represent what operators. We describe the meanings of the operators to which we refer in Section 15.3 [Common Operators], page 664, Section 15.4 [GNU Operators], page 671, and Section 15.5 [GNU Emacs Operators], page 673.

For reference, here is the complete list of syntax bits, in alphabetical order:

**RE_BACKSLASH_ESCAPE_IN_LISTS**

If this bit is set, then ‘\’ inside a list (see Section 15.3.6 [List Operators], page 667, quotes (makes ordinary, if it’s special) the following character; if this bit isn’t set, then ‘\’ is an ordinary character inside lists. (See Section 15.2.4 [The Backslash Character], page 663, for what ‘\’ does outside of lists.)

**RE_BK_PLUS_QM**

If this bit is set, then ‘\+’ represents the match-one-or-more operator and ‘\?’ represents the match-zero-or-more operator; if this bit isn’t set, then ‘+’ represents the match-one-or-more operator and ‘?’ represents the match-zero-or-one operator. This bit is irrelevant if RE_LIMITED_OPS is set.

**RE_CHAR_CLASSES**

If this bit is set, then you can use character classes in lists; if this bit isn’t set, then you can’t.

**RE_CONTEXT_INDEP_ANCHORS**

If this bit is set, then ‘^’ and ‘$’ are special anywhere outside a list; if this bit isn’t set, then these characters are special only in certain contexts. See Section 15.3.9.1 [Match-beginning-of-line Operator], page 671, and Section 15.3.9.2 [Match-end-of-line Operator], page 671.

**RE_CONTEXT_INDEP_OPS**

If this bit is set, then certain characters are special anywhere outside a list; if this bit isn’t set, then those characters are special only in some contexts and are ordinary elsewhere. Specifically, if this bit isn’t set then ‘*’, and (if the syntax bit RE_LIMITED_OPS isn’t set) ‘+’ and ‘?’ (or ‘\+’ and ‘\?’), depending on the syntax bit RE_BK_PLUS_QM) represent repetition operators only if they’re not first in a regular expression or just after an open-group or alternation operator. The same holds for ‘{’ (or ‘\{’, depending on the syntax bit RE_NO_BK_BRACES) if it is the beginning of a valid interval and the syntax bit RE_INTERVALS is set.
RECONTEXT_INVALID_DUP
If this bit is set, then an open-interval operator cannot occur at the start of a regular expression, or immediately after an alternation, open-group or close-interval operator.

RECONTEXT_INVALID_OPS
If this bit is set, then repetition and alternation operators can’t be in certain positions within a regular expression. Specifically, the regular expression is invalid if it has:

- a repetition operator first in the regular expression or just after a match-beginning-of-line, open-group, or alternation operator; or
- an alternation operator first or last in the regular expression, just before a match-end-of-line operator, or just after an alternation or open-group operator.

If this bit isn’t set, then you can put the characters representing the repetition and alternation characters anywhere in a regular expression. Whether or not they will in fact be operators in certain positions depends on other syntax bits.

RE_DEBUG
If this bit is set, and the regex library was compiled with `-DDDEBUG`, then internal debugging is turned on; if unset, then it is turned off.

RE_DOT_NEWLINE
If this bit is set, then the match-any-character operator matches a newline; if this bit isn’t set, then it doesn’t.

RE_DOT_NOT_NULL
If this bit is set, then the match-any-character operator doesn’t match a null character; if this bit isn’t set, then it does.

RE_HAT_LISTS_NOT_NEWLINE
If this bit is set, nonmatching lists ‘[^...]’ do not match newline; if not set, they do.

RE_ICASE
If this bit is set, then ignore case when matching; otherwise, case is significant.

RE_INTERVALS
If this bit is set, then Regex recognizes interval operators; if this bit isn’t set, then it doesn’t.

RE_INVALID_INTERVAL_ORD
If this bit is set, a syntactically invalid interval is treated as a string of ordinary characters. For example, the extended regular expression ‘a{1’ is treated as ‘a\{1’.

RE_LIMITED_OPS
If this bit is set, then Regex doesn’t recognize the match-one-or-more, match-zero-or-one or alternation operators; if this bit isn’t set, then it does.

RE_NEWLINE_ALT
If this bit is set, then newline represents the alternation operator; if this bit isn’t set, then newline is ordinary.
RE_NO_BK_BRAACES
If this bit is set, then ‘{’ represents the open-interval operator and ‘}’ represents the close-interval operator; if this bit isn’t set, then ‘\{’ represents the open-interval operator and ‘\}’ represents the close-interval operator. This bit is relevant only if RE_INTERVALS is set.

RE_NO_BK_PARENS
If this bit is set, then ‘(’ represents the open-group operator and ‘)’ represents the close-group operator; if this bit isn’t set, then ‘\(’ represents the open-group operator and ‘\)’ represents the close-group operator.

RE_NO_BK_REFS
If this bit is set, then Regex doesn’t recognize ‘\digit as the back reference operator; if this bit isn’t set, then it does.

RE_NO_BK_VBAR
If this bit is set, then ‘|’ represents the alternation operator; if this bit isn’t set, then ‘\|’ represents the alternation operator. This bit is irrelevant if RE_LIMITED_OPS is set.

RE_NO_EMPTY_RANGES
If this bit is set, then a regular expression with a range whose ending point collates lower than its starting point is invalid; if this bit isn’t set, then Regex considers such a range to be empty.

RE_NO_GNU_OPS
If this bit is set, GNU regex operators are not recognized; otherwise, they are.

RE_NO_POSIX_BACKTRACKING
If this bit is set, succeed as soon as we match the whole pattern, without further backtracking. This means that a match may not be the leftmost longest; see Section 15.6 [What Gets Matched?], page 673, for what this means.

RE_NO_SUB
If this bit is set, then no_sub will be set to one during re_compile_pattern. This causes matching and searching routines not to record substring match information.

RE_UNMATCHED_RIGHT_PAREN_ORD
If this bit is set and the regular expression has no matching open-group operator, then Regex considers what would otherwise be a close-group operator (based on how RE_NO_BK_PARENS is set) to match ‘)’.

15.2.2 Predefined Syntaxes
If you’re programming with Regex, you can set a pattern buffer’s (see Section 15.7.1.1 [GNU Pattern Buffers], page 674) syntax either to an arbitrary combination of syntax bits (see Section 15.2.1 [Syntax Bits], page 659) or else to the configurations defined by Regex. These configurations define the syntaxes used by certain programs—GNU Emacs, POSIX Awk, traditional Awk, Grep, Egrep—in addition to syntaxes for POSIX basic and extended regular expressions.

The predefined syntaxes—taken directly from regex.h—are:
#define RE_SYNTAX_EMACS 0
#define RE_SYNTAX_AWK
  (RE_BACKSLASH_ESCAPE_IN_LISTS | RE_DOT_NOT_NULL |
   RE_NO_BK_PARENS | RE_NO_BK_REFS |
   RE_NO_BK_VBAR | RE_NO_EMPTY_RANGES |
   RE_UNMATCHED_RIGHT_PAREN_ORD)

#define RE_SYNTAX_POSIX_AWK
  (RE_SYNTAX_POSIX_EXTENDED | RE_BACKSLASH_ESCAPE_IN_LISTS)

#define RE_SYNTAX_GREP
  (RE_BK_PLUS_QM | RE_CHAR_CLASSES |
   RE_HAT_LISTS_NOT_NEWLINE | RE_INTERVALS |
   RE_NEWLINE_ALT)

#define RE_SYNTAX_EGREP
  (RE_CHAR_CLASSES | RE_CONTEXT_INDEP_ANCHORS |
   RE_CONTEXT_INDEP_OPS | RE_HAT_LISTS_NOT_NEWLINE |
   RE_NEWLINE_ALT | RE_NO_BK_PARENS |
   RE_NO_BK_VBAR)

#define RE_SYNTAX_POSIX_EGREP
  (RE_SYNTAX_EGREP | RE_INTERVALS | RE_NO_BK_BRACES)

/* P1003.2/D11.2, section 4.20.7.1, lines 5078ff. */
#define RE_SYNTAX_ED RE_SYNTAX_POSIX_BASIC

#define RE_SYNTAX_SED RE_SYNTAX_POSIX_BASIC

/* Syntax bits common to both basic and extended POSIX regex syntax. */
#define _RE_SYNTAX_POSIX_COMMON
  (RE_CHAR_CLASSES | RE_DOT_NEWLINE | RE_DOT_NOT_NULL |
   RE_INTERVALS | RE_NO_EMPTY_RANGES)

#define RE_SYNTAX_POSIX_BASIC
  (_RE_SYNTAX_POSIX_COMMON | RE_BK_PLUS_QM)

/* Differs from ..._POSIX_BASIC only in that RE_BK_PLUS_QM becomes
RE_LIMITED_OPS, i.e., \? \+ |\ are not recognized. Actually, this
isn't minimal, since other operators, such as \', aren't disabled. */
#define RE_SYNTAX_POSIX_MINIMAL_BASIC
  (_RE_SYNTAX_POSIX_COMMON | RE_LIMITED_OPS)

#define RE_SYNTAX_POSIX_EXTENDED
  (_RE_SYNTAX_POSIX_COMMON | RE_CONTEXT_INDEP_ANCHORS |
   RE_CONTEXT_INDEP_OPS | RE_NO_BK_BRACES |
   RE_NO_BK_PARENS | RE_NO_BK_VBAR |
   RE_UNMATCHED_RIGHT_PAREN_ORD)

/* Differs from ..._POSIX_EXTENDED in that RE_CONTEXT_INVALID_OPS
replaces RE_CONTEXT_INDEP_OPS and RE_NO_BK_REFS is added. */
#define RE_SYNTAX_POSIX_MINIMAL_EXTENDED
  (_RE_SYNTAX_POSIX_COMMON | RE_CONTEXT_INDEP_ANCHORS |
   RE_CONTEXT_INVALID_OPS | RE_NO_BK_BRACES |
   RE_NO_BK_PARENS | RE_NO_BK_REFS |
   RE_NO_BK_VBAR | RE_UNMATCHED_RIGHT_PAREN_ORD)
15.2.3 Collating Elements vs. Characters

POSIX generalizes the notion of a character to that of a collating element. It defines a *collating element* to be “a sequence of one or more bytes defined in the current collating sequence as a unit of collation.”

This generalizes the notion of a character in two ways. First, a single character can map into two or more collating elements. For example, the German ‘ß’ collates as the collating element ‘s’ followed by another collating element ‘s’. Second, two or more characters can map into one collating element. For example, the Spanish ‘ll’ collates after ‘l’ and before ‘m’.

Since POSIX’s “collating element” preserves the essential idea of a “character,” we use the latter, more familiar, term in this document.

15.2.4 The Backslash Character

The ‘\’ character has one of four different meanings, depending on the context in which you use it and what syntax bits are set (see Section 15.2.1 [Syntax Bits], page 659). It can: 1) stand for itself, 2) quote the next character, 3) introduce an operator, or 4) do nothing.

1. It stands for itself inside a list (see Section 15.3.6 [List Operators], page 667) if the syntax bit RE_BACKSLASH_ESCAPE_IN_LISTS is not set. For example, ‘[\]’ would match ‘\’.

2. It quotes (makes ordinary, if it’s special) the next character when you use it either:
   - outside a list, or
   - inside a list and the syntax bit RE_BACKSLASH_ESCAPE_IN_LISTS is set.

3. It introduces an operator when followed by certain ordinary characters—sometimes only when certain syntax bits are set. See the cases RE_BK_PLUS_QM, RE_NO_BK_BRACES, RE_NO_BK_VAR, RE_NO_BK_PARENS, RE_NO_BK_REF in Section 15.2.1 [Syntax Bits], page 659. Also:
   - ‘\b’ represents the match-word-boundary operator (see Section 15.4.1.2 [Match-word-boundary Operator], page 672).
   - ‘\B’ represents the match-within-word operator (see Section 15.4.1.3 [Match-within-word Operator], page 672).
   - ‘\<’ represents the match-beginning-of-word operator (see Section 15.4.1.4 [Match-beginning-of-word Operator], page 672).
   - ‘\>’ represents the match-end-of-word operator (see Section 15.4.1.5 [Match-end-of-word Operator], page 672).
   - ‘\w’ represents the match-word-constituent operator (see Section 15.4.1.6 [Match-word-constituent Operator], page 672).

---

1 Sometimes you don’t have to explicitly quote special characters to make them ordinary. For instance, most characters lose any special meaning inside a list (see Section 15.3.6 [List Operators], page 667). In addition, if the syntax bits RE_CONTEXT_INVALID_OPS and RE_CONTEXT_INDEP_OPS aren’t set, then (for historical reasons) the matcher considers special characters ordinary if they are in contexts where the operations they represent make no sense; for example, then the match-zero-or-more operator (represented by ‘*’) matches itself in the regular expression ‘*foo’ because there is no preceding expression on which it can operate. It is poor practice, however, to depend on this behavior; if you want a special character to be ordinary outside a list, it’s better to always quote it, regardless.
• ‘\W’ represents the match-non-word-constituent operator (see Section 15.4.1.7 [Match-non-word-constituent Operator], page 672).
• ‘\‘’ represents the match-beginning-of-buffer operator and ‘\‘’ represents the match-end-of-buffer operator (see Section 15.4.2 [Buffer Operators], page 672).
• If Regex was compiled with the C preprocessor symbol emacs defined, then ‘\sclass’ represents the match-syntactic-class operator and ‘\Sclass’ represents the match-not-syntactic-class operator (see Section 15.5.1 [Syntactic Class Operators], page 673).

4. In all other cases, Regex ignores ‘\’. For example, ‘\n’ matches ‘n’.

15.3 Common Operators

You compose regular expressions from operators. In the following sections, we describe the regular expression operators specified by POSIX; GNU also uses these. Most operators have more than one representation as characters. See Section 15.2 [Regular Expression Syntax], page 658, for what characters represent what operators under what circumstances.

For most operators that can be represented in two ways, one representation is a single character and the other is that character preceded by ‘\’. For example, either ‘(’ or ‘\(’ represents the open-group operator. Which one does depends on the setting of a syntax bit, in this case RE_NO_BK_PARENS. Why is this so? Historical reasons dictate some of the varying representations, while POSIX dictates others.

Finally, almost all characters lose any special meaning inside a list (see Section 15.3.6 [List Operators], page 667).

15.3.1 The Match-self Operator (ordinary character)

This operator matches the character itself. All ordinary characters (see Section 15.2 [Regular Expression Syntax], page 658) represent this operator. For example, ‘f’ is always an ordinary character, so the regular expression ‘f’ matches only the string ‘f’. In particular, it does not match the string ‘ff’.

15.3.2 The Match-any-character Operator (.)

This operator matches any single printing or nonprinting character except it won’t match a:

cnewline if the syntax bit RE_DOT_NEWLINE isn’t set.
null if the syntax bit RE_DOT_NOT_NULL is set.

The ‘.’ (period) character represents this operator. For example, ‘a.b’ matches any three-character string beginning with ‘a’ and ending with ‘b’.

15.3.3 The Concatenation Operator

This operator concatenates two regular expressions a and b. No character represents this operator; you simply put b after a. The result is a regular expression that will match a string if a matches its first part and b matches the rest. For example, ‘xy’ (two match-self operators) matches ‘xy’.
15.3.4 Repetition Operators

Repetition operators repeat the preceding regular expression a specified number of times.

15.3.4.1 The Match-zero-or-more Operator (*)

This operator repeats the smallest possible preceding regular expression as many times as necessary (including zero) to match the pattern. ‘*’ represents this operator. For example, ‘o*’ matches any string made up of zero or more ‘o’s. Since this operator operates on the smallest preceding regular expression, ‘fo*’ has a repeating ‘o’, not a repeating ‘fo’. So, ‘fo*’ matches ‘f’, ‘fo’, ‘foo’, and so on.

Since the match-zero-or-more operator is a suffix operator, it may be useless as such when no regular expression precedes it. This is the case when it:

- is first in a regular expression, or
- follows a match-beginning-of-line, open-group, or alternation operator.

Three different things can happen in these cases:

1. If the syntax bit RE_CONTEXT_INVALID_OPS is set, then the regular expression is invalid.
2. If RE_CONTEXT_INVALID_OPS isn’t set, but RE_CONTEXT_INDEP_OPS is, then ‘*’ represents the match-zero-or-more operator (which then operates on the empty string).
3. Otherwise, ‘*’ is ordinary.

The matcher processes a match-zero-or-more operator by first matching as many repetitions of the smallest preceding regular expression as it can. Then it continues to match the rest of the pattern.

If it can’t match the rest of the pattern, it backtracks (as many times as necessary), each time discarding one of the matches until it can either match the entire pattern or be certain that it cannot get a match. For example, when matching ‘ca*ar’ against ‘caaar’, the matcher first matches all three ‘a’s of the string with the ‘a*’ of the regular expression. However, it cannot then match the final ‘ar’ of the regular expression against the final ‘r’ of the string. So it backtracks, discarding the match of the last ‘a’ in the string. It can then match the remaining ‘ar’.

15.3.4.2 The Match-one-or-more Operator (+ or \+)

If the syntax bit RE_LIMITED_OPS is set, then Regex doesn’t recognize this operator. Otherwise, if the syntax bit RE_BK_PLUS_QM isn’t set, then ‘+’ represents this operator; if it is, then ‘\+’ does.

This operator is similar to the match-zero-or-more operator except that it repeats the preceding regular expression at least once; see Section 15.3.4.1 [Match-zero-or-more Operator], page 665, for what it operates on, how some syntax bits affect it, and how Regex backtracks to match it.

For example, supposing that ‘+’ represents the match-one-or-more operator; then ‘ca+r’ matches, e.g., ‘car’ and ‘caaaar’, but not ‘cr’.

15.3.4.3 The Match-zero-or-one Operator (? or \?)

If the syntax bit RE_LIMITED_OPS is set, then Regex doesn’t recognize this operator. Otherwise, if the syntax bit RE_BK_PLUS_QM isn’t set, then ‘?’ represents this operator; if it is, then ‘\?’ does.
This operator is similar to the match-zero-or-more operator except that it repeats the preceding regular expression once or not at all; see Section 15.3.4.1 [Match-zero-or-more Operator], page 665, to see what it operates on, how some syntax bits affect it, and how Regex backtracks to match it.

For example, supposing that ‘?’ represents the match-zero-or-one operator; then ‘ca?r’ matches both ‘car’ and ‘cr’, but nothing else.

### 15.3.4.4 Interval Operators ({ . . . } or \{ . . . \})

If the syntax bit RE_INTERVALS is set, then Regex recognizes interval expressions. They repeat the smallest possible preceding regular expression a specified number of times.

If the syntax bit RE_NO_BK_BRACES is set, ‘{’ represents the open-interval operator and ‘}’ represents the close-interval operator; otherwise, ‘\{’ and ‘\}’ do.

Specifically, supposing that ‘{’ and ‘}’ represent the open-interval and close-interval operators; then:

- `{count}` matches exactly `count` occurrences of the preceding regular expression.
- `{min,}` matches `min` or more occurrences of the preceding regular expression.
- `{min, max}` matches at least `min` but no more than `max` occurrences of the preceding regular expression.

The interval expression (but not necessarily the regular expression that contains it) is invalid if:
- `min` is greater than `max`, or
- any of `count`, `min`, or `max` are outside the range zero to `RE_DUP_MAX` (which symbol `regex.h` defines).

If the interval expression is invalid and the syntax bit RE_NO_BK_BRACES is set, then Regex considers all the characters in the would-be interval to be ordinary. If that bit isn’t set, then the regular expression is invalid.

If the interval expression is valid but there is no preceding regular expression on which to operate, then if the syntax bit RE_CONTEXT_INVALID_OPS is set, the regular expression is invalid. If that bit isn’t set, then Regex considers all the characters—other than backslashes, which it ignores—in the would-be interval to be ordinary.

### 15.3.5 The Alternation Operator (| or \|)

If the syntax bit RE_LIMITED_OPS is set, then Regex doesn’t recognize this operator. Otherwise, if the syntax bit RE_NO_BK_VBAR is set, then ‘|’ represents this operator; otherwise, ‘\|’ does.

Alternatives match one of a choice of regular expressions: if you put the character(s) representing the alternation operator between any two regular expressions `a` and `b`, the result matches the union of the strings that `a` and `b` match. For example, supposing that ‘|’ is the alternation operator, then ‘foo|bar|quux’ would match any of ‘foo’, ‘bar’ or ‘quux’.

The alternation operator operates on the largest possible surrounding regular expressions. (Put another way, it has the lowest precedence of any regular expression operator.) Thus, the only way you can delimit its arguments is to use grouping. For example, if ‘(|’ and
are the open and close-group operators, then ‘fo(o|b)ar’ would match either ‘fooar’ or ‘fobar’. (‘fo|o|b’ar would match ‘foo’ or ‘bar’.)

The matcher usually tries all combinations of alternatives so as to match the longest possible string. For example, when matching ‘(foo|lfou)*qbarqux|bar)’ against ‘foobbarqux’, it cannot take, say, the first (‘depth-first’) combination it could match, since then it would be content to match just ‘foobbar’.

Note that since the default behavior is to return the leftmost longest match, when more than one of a series of alternatives matches the actual match will be the longest matching alternative, not necessarily the first in the list.

15.3.6 List Operators ([ . . . ] and [^ . . . ])

Lists, also called bracket expressions, are a set of one or more items. An item is a character, a collating symbol, an equivalence class expression, a character class expression, or a range expression. The syntax bits affect which kinds of items you can put in a list. We explain the last four items in subsections below. Empty lists are invalid.

A matching list matches a single character represented by one of the list items. You form a matching list by enclosing one or more items within an open-matching-list operator (represented by ‘[’ ) and a close-list operator (represented by ‘]’). For example, ‘[a|b]’ matches either ‘a’ or ‘b’. ‘[ad]*’ matches the empty string and any string composed of just ‘a’ s and ‘d’ s in any order. Regex considers invalid a regular expression with a ‘[’ but no matching ‘]’.

Nonmatching lists are similar to matching lists except that they match a single character not represented by one of the list items. You use an open-nonmatching-list operator (represented by ‘[^’ ) instead of an open-matching-list operator to start a nonmatching list.

For example, ‘[^a|b]’ matches any character except ‘a’ or ‘b’.

If the syntax bit RE_HAT_LISTS_NOT_NEWLINE is set, then nonmatching lists do not match a newline.

Most characters lose any special meaning inside a list. The special characters inside a list follow.

‘]’ ends the list if it’s not the first list item. So, if you want to make the ‘]’ character a list item, you must put it first.

‘\’ quotes the next character if the syntax bit RE_BACKSLASH_ESCAPE_IN_LISTS is set.

‘[.’ represents the open-collating-symbol operator (see Section 15.3.6.1 [Collating Symbol Operators], page 668).

‘.]’ represents the close-collating-symbol operator.

‘[=’ represents the open-equivalence-class operator (see Section 15.3.6.2 [Equivalence Class Operators], page 668).

‘=]’ represents the close-equivalence-class operator.

2 Regex therefore doesn’t consider the ‘^’ to be the first character in the list. If you put a ‘^’ character first in (what you think is) a matching list, you’ll turn it into a nonmatching list.
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‘[:’ represents the open-character-class operator (see Section 15.3.6.3 [Character Class Operators], page 668) if the syntax bit RE_CHAR_CLASSES is set and what follows is a valid character class expression.

‘:]’ represents the close-character-class operator if the syntax bit RE_CHAR_CLASSES is set and what precedes it is an open-character-class operator followed by a valid character class name.

‘-’ represents the range operator (see Section 15.3.6.4 [Range Operator], page 669) if it's not first or last in a list or the ending point of a range.

All other characters are ordinary. For example, ‘[.+]’ matches ‘.’ and ‘*’.

15.3.6.1 Collating Symbol Operators ([. . . ])

Collating symbols can be represented inside lists. You form a collating symbol by putting a collating element between an open-collating-symbol operator and a close-collating-symbol operator. ‘[.]’ represents the open-collating-symbol operator and ‘.]’ represents the close-collating-symbol operator. For example, if ‘11’ is a collating element, then ‘[[.11.]’ would match ‘11’.

15.3.6.2 Equivalence Class Operators ([= . . . =])

Regex recognizes equivalence class expressions inside lists. A equivalence class expression is a set of collating elements which all belong to the same equivalence class. You form an equivalence class expression by putting a collating element between an open-equivalence-class operator and a close-equivalence-class operator. ‘ [=’ represents the open-equivalence-class operator and ‘=]’ represents the close-equivalence-class operator. For example, if ‘a’ and ‘A’ were an equivalence class, then both ‘[[=a=]]’ and ‘[[=A=]]’ would match both ‘a’ and ‘A’. If the collating element in an equivalence class expression isn’t part of an equivalence class, then the matcher considers the equivalence class expression to be a collating symbol.

15.3.6.3 Character Class Operators ([: . . . :])

If the syntax bit RE_CHAR_CLASSES is set, then Regex recognizes character class expressions inside lists. A character class expression matches one character from a given class. You form a character class expression by putting a character class name between an open-character-class-operator (represented by ‘[:’) and a close-character-class-operator (represented by ‘:]’). The character class names and their meanings are:

- alnum letters and digits
- alpha letters
- blank system-dependent; for GNU, a space or tab
- cntrl control characters (in the ASCII encoding, code 0177 and codes less than 040)
- digit digits
- graph same as print except omits space
- lower lowercase letters
- print printable characters (in the ASCII encoding, space tilde—codes 040 through 0176)
The Range Operator (−)

Regex recognizes range expressions inside a list. They represent those characters that fall between two elements in the current collating sequence. You form a range expression by putting a range operator between two of any of the following: characters, collating elements, collating symbols, and equivalence class expressions. The starting point of the range and the ending point of the range don’t have to be the same kind of item, e.g., the starting point could be a collating element and the ending point could be an equivalence class expression. If a range’s ending point is an equivalence class, then all the collating elements in that class will be in the range.3 ‘−’ represents the range operator. For example, ‘a−f’ within a list represents all the characters from ‘a’ through ‘f’ inclusively.

If the syntax bit RE_NO_EMPTY_RANGES is set, then if the range’s ending point collates less than its starting point, the range (and the regular expression containing it) is invalid. For example, the regular expression ‘[z–a]’ would be invalid. If this bit isn’t set, then Regex considers such a range to be empty.

Since ‘−’ represents the range operator, if you want to make a ‘−’ character itself a list item, you must do one of the following:

• Put the ‘−’ either first or last in the list.
• Include a range whose starting point collates strictly lower than ‘−’ and whose ending point collates equal or higher. Unless a range is the first item in a list, a ‘−’ can’t be its starting point, but can be its ending point. That is because Regex considers ‘−’ to be the range operator unless it is preceded by another ‘−’. For example, in the ASCII encoding, ‘), ’, ‘,’ and ‘/’ are contiguous characters in the collating sequence. You might think that ‘[)-+/]’ has two ranges: ‘)−+’ and ‘−/’. Rather, it has the ranges ‘)−+’ and ‘+−/’, plus the character ‘/’, so it matches, e.g., ‘,’ not ‘.’.
• Put a range whose starting point is ‘−’ first in the list.

For example, ‘[−a–z]’ matches a lowercase letter or a hyphen (in English, in ASCII).

Grouping Operators (( . . . ) or \( . . . \))

A group, also known as a subexpression, consists of an open-group operator, any number of other operators, and a close-group operator. Regex treats this sequence as a unit, just as mathematics and programming languages treat a parenthesized expression as a unit.

3 You can’t use a character class for the starting or ending point of a range, since a character class is not a single character.
Therefore, using groups, you can:

- delimit the argument(s) to an alternation operator (see Section 15.3.5 [Alternation Operator], page 666) or a repetition operator (see Section 15.3.4 [Repetition Operators], page 665).
- keep track of the indices of the substring that matched a given group. See Section 15.7.1.8 [Using Registers], page 678, for a precise explanation. This lets you:
  - use the back-reference operator (see Section 15.3.8 [Back-reference Operator], page 670).
  - use registers (see Section 15.7.1.8 [Using Registers], page 678).

If the syntax bit `RE_NO_BK_PARENS` is set, then ‘(’ represents the open-group operator and ‘)’ represents the close-group operator; otherwise, ‘(‘ and ‘\)’ do.

If the syntax bit `RE_UNMATCHED_RIGHT_PAREN_ORD` is set and a close-group operator has no matching open-group operator, then Regex considers it to match ‘)’.

15.3.8 The Back-reference Operator (`\digit`)

If the syntax bit `RE_NO_BK_REF` isn’t set, then Regex recognizes back references. A back reference matches a specified preceding group. The back reference operator is represented by ‘\digit’ anywhere after the end of a regular expression’s digit-th group (see Section 15.3.7 [Grouping Operators], page 669).

digit must be between ‘1’ and ‘9’. The matcher assigns numbers 1 through 9 to the first nine groups it encounters. By using one of ‘\1’ through ‘\9’ after the corresponding group’s close-group operator, you can match a substring identical to the one that the group does.

Back references match according to the following (in all examples below, ‘(‘ represents the open-group, ‘)’ the close-group, ‘{‘ the open-interval and ‘}’ the close-interval operator):

- If the group matches a substring, the back reference matches an identical substring. For example, ‘(a)\1’ matches ‘aa’ and ‘(bana)na\1’ matches ‘bananabananabana’. Likewise, ‘(.*)\1’ matches any (newline-free if the syntax bit `RE_DOT_NEWLINE` isn’t set) string that is composed of two identical halves; the ‘(.*)’ matches the first half and the ‘\1’ matches the second half.
- If the group matches more than once (as it might if followed by, e.g., a repetition operator), then the back reference matches the substring the group last matched. For example, ‘((a*)b)*\1\2’ matches ‘aabababa’; first group 1 (the outer one) matches ‘aab’ and group 2 (the inner one) matches ‘aa’. Then group 1 matches ‘ab’ and group 2 matches ‘a’. So, ‘\1’ matches ‘ab’ and ‘\2’ matches ‘a’.
- If the group doesn’t participate in a match, i.e., it is part of an alternative not taken or a repetition operator allows zero repetitions of it, then the back reference makes the whole match fail. For example, ‘(one()|two())-and-(three\2|four\3)’ matches ‘one-and-three’ and ‘two-and-four’, but not ‘one-and-four’ or ‘two-and-three’. For example, if the pattern matches ‘one-and-\’*, then its group 2 matches the empty string and its group 3 doesn’t participate in the match. So, if it then matches ‘four’, then when it tries to back reference group 3—which it will attempt to do because ‘\3’ follows the ‘four’—the match will fail because group 3 didn’t participate in the match.
You can use a back reference as an argument to a repetition operator. For example, 
\((a(b))\)\(2\) matches ‘a’ followed by two or more ‘b’s. Similarly, \((a(b))\)\(2\(3\)’ matches ‘abbbb’.

If there is no preceding digit-th subexpression, the regular expression is invalid.

15.3.9 Anchoring Operators

These operators can constrain a pattern to match only at the beginning or end of the entire string or at the beginning or end of a line.

15.3.9.1 The Match-beginning-of-line Operator (\(\^\) )

This operator can match the empty string either at the beginning of the string or after a newline character. Thus, it is said to anchor the pattern to the beginning of a line.

In the cases following, ‘\(^\)’ represents this operator. (Otherwise, ‘\(^\)’ is ordinary.)

• It (the ‘\(^\)’) is first in the pattern, as in ‘\(^\)foo’.
• The syntax bit RE_CONTEXT_INDEP_ANCHORS is set, and it is outside a bracket expression.
• It follows an open-group or alternation operator, as in ‘a\(\^b\)’ and ‘a\||\~b’. See Section 15.3.7 [Grouping Operators], page 669, and Section 15.3.5 [Alternation Operator], page 666.

These rules imply that some valid patterns containing ‘\(^\)’ cannot be matched; for example, ‘foo\^bar’ if RE_CONTEXT_INDEP_ANCHORS is set.

If the not_bol field is set in the pattern buffer (see Section 15.7.1.1 [GNU Pattern Buffers], page 674), then ‘\(^\)’ fails to match at the beginning of the string. This lets you match against pieces of a line, as you would need to if, say, searching for repeated instances of a given pattern in a line; it would work correctly for patterns both with and without match-beginning-of-line operators.

15.3.9.2 The Match-end-of-line Operator (\($\) )

This operator can match the empty string either at the end of the string or before a newline character in the string. Thus, it is said to anchor the pattern to the end of a line.

It is always represented by ‘\($\)’. For example, ‘foo\$’ usually matches, e.g., ‘foo’ and, e.g., the first three characters of ‘foo\nbar’.

Its interaction with the syntax bits and pattern buffer fields is exactly the dual of ‘\(^\)’s; see the previous section. (That is, “\(^\)” becomes “\($\)”, “beginning” becomes “end”, “next” becomes “previous”, “after” becomes “before”, and “not_bol” becomes “not_eol”.)

15.4 GNU Operators

Following are operators that GNU defines (and POSIX doesn’t).

15.4.1 Word Operators

The operators in this section require Regexp to recognize parts of words. Regexp uses a syntax table to determine whether or not a character is part of a word, i.e., whether or not it is word-constituent.
15.4.1.1 Non-Emacs Syntax Tables

A syntax table is an array indexed by the characters in your character set. In the ASCII encoding, therefore, a syntax table has 256 elements. Regex always uses a char * variable re_syntax_table as its syntax table. In some cases, it initializes this variable and in others it expects you to initialize it.

- If Regex is compiled with the preprocessor symbols emacs and SYNTAX_TABLE both undefined, then Regex allocates re_syntax_table and initializes an element i either to Sword (which it defines) if i is a letter, number, or '_', or to zero if it’s not.
- If Regex is compiled with emacs undefined but SYNTAX_TABLE defined, then Regex expects you to define a char * variable re_syntax_table to be a valid syntax table.
- See Section 15.5.1.1 [Emacs Syntax Tables], page 673, for what happens when Regex is compiled with the preprocessor symbol emacs defined.

15.4.1.2 The Match-word-boundary Operator (\b)

This operator (represented by '\b') matches the empty string at either the beginning or the end of a word. For example, ‘\brat\b’ matches the separate word ‘rat’.

15.4.1.3 The Match-within-word Operator (\B)

This operator (represented by '\B') matches the empty string within a word. For example, ‘c\Brat\Be’ matches ‘crate’, but ‘dirty \Brat’ doesn’t match ‘dirty rat’.

15.4.1.4 The Match-beginning-of-word Operator (\<)

This operator (represented by '\<') matches the empty string at the beginning of a word.

15.4.1.5 The Match-end-of-word Operator (\>)

This operator (represented by '\>') matches the empty string at the end of a word.

15.4.1.6 The Match-word-constituent Operator (\w)

This operator (represented by '\w') matches any word-constituent character.

15.4.1.7 The Match-non-word-constituent Operator (\W)

This operator (represented by '\W') matches any character that is not word-constituent.

15.4.2 Buffer Operators

Following are operators which work on buffers. In Emacs, a buffer is, naturally, an Emacs buffer. For other programs, Regex considers the entire string to be matched as the buffer.

15.4.2.1 The Match-beginning-of-buffer Operator (\')

This operator (represented by '\') matches the empty string at the beginning of the buffer.

15.4.2.2 The Match-end-of-buffer Operator (\')

This operator (represented by '\') matches the empty string at the end of the buffer.
15.5 GNU Emacs Operators

Following are operators that GNU defines (and POSIX doesn’t) that you can use only when Regex is compiled with the preprocessor symbol `emacs` defined.

15.5.1 Syntactic Class Operators

The operators in this section require Regex to recognize the syntactic classes of characters. Regex uses a syntax table to determine this.

15.5.1.1 Emacs Syntax Tables

A syntax table is an array indexed by the characters in your character set. In the ASCII encoding, therefore, a syntax table has 256 elements.

If Regex is compiled with the preprocessor symbol `emacs` defined, then Regex expects you to define and initialize the variable `re_syntax_table` to be an Emacs syntax table. Emacs’ syntax tables are more complicated than Regex’s own (see Section 15.4.1.1 [Non-Emacs Syntax Tables], page 672). See Section “Syntax” in The GNU Emacs User’s Manual, for a description of Emacs’ syntax tables.

15.5.1.2 The Match-syntactic-class Operator (\s_class)

This operator matches any character whose syntactic class is represented by a specified character. ‘\s_class’ represents this operator where `class` is the character representing the syntactic class you want. For example, ‘w’ represents the syntactic class of word-constituent characters, so ‘\sw’ matches any word-constituent character.

15.5.1.3 The Match-not-syntactic-class Operator (\S_class)

This operator is similar to the match-syntactic-class operator except that it matches any character whose syntactic class is not represented by the specified character. ‘\S_class’ represents this operator. For example, ‘w’ represents the syntactic class of word-constituent characters, so ‘\Sw’ matches any character that is not word-constituent.

15.6 What Gets Matched?

Regex usually matches strings according to the “leftmost longest” rule; that is, it chooses the longest of the leftmost matches. This does not mean that for a regular expression containing subexpressions that it simply chooses the longest match for each subexpression, left to right; the overall match must also be the longest possible one.

For example, ‘(ac*)(c*d[ac]*)\1’ matches ‘acd*acaaaa’, not ‘acdac’, as it would if it were to choose the longest match for the first subexpression.

15.7 Programming with Regex

Here we describe how you use the Regex data structures and functions in C programs. Regex has three interfaces: one designed for GNU, one compatible with POSIX (as specified by POSIX, draft 1003.2/D11.2), and one compatible with Berkeley Unix. The POSIX interface is not documented here; see the documentation of GNU libc, or the POSIX man pages. The Berkeley Unix interface is documented here for convenience, since its documentation is not otherwise readily available on GNU systems.
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15.7.1 GNU Regex Functions

If you’re writing code that doesn’t need to be compatible with either POSIX or Berkeley Unix, you can use these functions. They provide more options than the other interfaces.

15.7.1.1 GNU Pattern Buffers

To compile, match, or search for a given regular expression, you must supply a pattern buffer. A pattern buffer holds one compiled regular expression.\footnote{Regular expressions are also referred to as “patterns,” hence the name “pattern buffer.”}

You can have several different pattern buffers simultaneously, each holding a compiled pattern for a different regular expression.

`regex.h` defines the pattern buffer `struct` with the following public fields:

```
unsigned char *buffer;
unsigned long allocated;
char *fastmap;
char *translate;
size_t re_nsub;
unsigned no_sub : 1;
unsigned not_bol : 1;
unsigned not_eol : 1;
```

15.7.1.2 GNU Regular Expression Compiling

In GNU, you can both match and search for a given regular expression. To do either, you must first compile it in a pattern buffer (see Section 15.7.1.1 [GNU Pattern Buffers], page 674).

Regular expressions match according to the syntax with which they were compiled; with GNU, you indicate what syntax you want by setting the variable `re_syntax_options` (declared in `regex.h`) before calling the compiling function, `re_compile_pattern` (see below). See Section 15.2.1 [Syntax Bits], page 659, and Section 15.2.2 [Predefined Syntaxes], page 661.

You can change the value of `re_syntax_options` at any time. Usually, however, you set its value once and then never change it.

`re_compile_pattern` takes a pattern buffer as an argument. You must initialize the following fields:

- `translate` initialization
- `translate`
  Initialize this to point to a translate table if you want one, or to zero if you don’t. We explain translate tables in Section 15.7.1.7 [GNU Translate Tables], page 678.
- `fastmap` Initialize this to nonzero if you want a fastmap, or to zero if you don’t.
- `buffer`
- `allocated`
  If you want `re_compile_pattern` to allocate memory for the compiled pattern, set both of these to zero. If you have an existing block of memory (allocated
with malloc) you want Regex to use, set buffer to its address and allocated to its size (in bytes).

`re_compile_pattern` uses realloc to extend the space for the compiled pattern as necessary.

To compile a pattern buffer, use:

```c
char *
re_compile_pattern (const char *regex, const int regex_size, 
struct re_pattern_buffer *pattern_buffer)
```

regex is the regular expression's address, regex_size is its length, and pattern_buffer is the pattern buffer's address.

If `re_compile_pattern` successfully compiles the regular expression, it returns zero and sets *pattern_buffer to the compiled pattern. It sets the pattern buffer’s fields as follows:

- **buffer** to the compiled pattern.
- **syntax** to the current value of re_syntax_options.
- **re_nsub** to the number of subexpressions in regex.

If `re_compile_pattern` can’t compile regex, it returns an error string corresponding to a POSIX error code.

### 15.7.1.3 GNU Matching

Matching the GNU way means trying to match as much of a string as possible starting at a position within it you specify. Once you’ve compiled a pattern into a pattern buffer (see Section 15.7.1.2 [GNU Regular Expression Compiling], page 674), you can ask the matcher to match that pattern against a string using:

```c
int
re_match (struct re_pattern_buffer *pattern_buffer, 
const char *string, const int size, 
const int start, struct re_registers *regs)
```

pattern_buffer is the address of a pattern buffer containing a compiled pattern. string is the string you want to match; it can contain newline and null characters. size is the length of that string. start is the string index at which you want to begin matching; the first character of string is at index zero. See Section 15.7.1.8 [Using Registers], page 678, for an explanation of regs; you can safely pass zero.

`re_match` matches the regular expression in pattern_buffer against the string string according to the syntax of pattern_buffer. (See Section 15.7.1.2 [GNU Regular Expression Compiling], page 674, for how to set it.) The function returns -1 if the compiled pattern does not match any part of string and -2 if an internal error happens; otherwise, it returns how many (possibly zero) characters of string the pattern matched.

An example: suppose pattern_buffer points to a pattern buffer containing the compiled pattern for ‘a*’, and string points to ‘aaaaab’ (whereupon size should be 6). Then if start is 2, re_match returns 3, i.e., ‘a*’ would have matched the last three ‘a’s in string. If start is 0, re_match returns 5, i.e., ‘a*’ would have matched all the ‘a’s in string. If start is either 5 or 6, it returns zero.

If start is not between zero and size, then re_match returns -1.

```c
```
15.7.1.4 GNU Searching

Searching means trying to match starting at successive positions within a string. The function `re_search` does this.

Before calling `re_search`, you must compile your regular expression. See Section 15.7.1.2 [GNU Regular Expression Compiling], page 674.

Here is the function declaration:

```c
int re_search (struct re_pattern_buffer *pattern_buffer,
               const char *string, const int size,
               const int start, const int range,
               struct re_registers *regs)
```

whose arguments are the same as those to `re_match` (see Section 15.7.1.3 [GNU Matching], page 675) except that the two arguments `start` and `range` replace `re_match`'s argument `start`.

If `range` is positive, then `re_search` attempts a match starting first at index `start`, then at `start + 1` if that fails, and so on, up to `start + range`; if `range` is negative, then it attempts a match starting first at index `start`, then at `start - 1` if that fails, and so on.

If `start` is not between zero and `size`, then `re_search` returns −1. When `range` is positive, `re_search` adjusts `range` so that `start + range - 1` is between zero and `size`, if necessary; that way it won’t search outside of `string`. Similarly, when `range` is negative, `re_search` adjusts `range` so that `start + range + 1` is between zero and `size`, if necessary.

If the `fastmap` field of `pattern_buffer` is zero, `re_search` matches starting at consecutive positions; otherwise, it uses `fastmap` to make the search more efficient. See Section 15.7.1.6 [Searching with Fastmaps], page 677.

If no match is found, `re_search` returns −1. If a match is found, it returns the index where the match began. If an internal error happens, it returns −2.

15.7.1.5 Matching and Searching with Split Data

Using the functions `re_match_2` and `re_search_2`, you can match or search in data that is divided into two strings.

The function:

```c
int re_match_2 (struct re_pattern_buffer *buffer,
                const char *string1, const int size1,
                const char *string2, const int size2,
                const int start,
                struct re_registers *regs,
                const int stop)
```

is similar to `re_match` (see Section 15.7.1.3 [GNU Matching], page 675) except that you pass two data strings and sizes, and an index `stop` beyond which you don’t want the matcher to try matching. As with `re_match`, if it succeeds, `re_match_2` returns how many characters of `string` it matched. Regard `string1` and `string2` as concatenated when you set the arguments `start` and `stop` and use the contents of `regs`; `re_match_2` never returns a value larger than `size1 + size2`. 
The function:

```c
typedef int re_search_2 (struct re_pattern_buffer *buffer,
    const char *string1, const int size1,
    const char *string2, const int size2,
    const int start, const int range,
    struct re_registers *regs,
    const int stop)
```

is similarly related to `re_search`.

### 15.7.1.6 Searching with Fastmaps

If you’re searching through a long string, you should use a fastmap. Without one, the searcher tries to match at consecutive positions in the string. Generally, most of the characters in the string could not start a match. It takes much longer to try matching at a given position in the string than it does to check in a table whether or not the character at that position could start a match. A fastmap is such a table.

More specifically, a fastmap is an array indexed by the characters in your character set. Under the ASCII encoding, therefore, a fastmap has 256 elements. If you want the searcher to use a fastmap with a given pattern buffer, you must allocate the array and assign the array’s address to the pattern buffer’s `fastmap` field. You either can compile the fastmap yourself or have `re_search` do it for you; when `fastmap` is nonzero, it automatically compiles a fastmap the first time you search using a particular compiled pattern.

By setting the buffer’s `fastmap` field before calling `re_compile_pattern`, you can reuse a buffer data structure across multiple searches with different patterns, and allocate the fastmap only once. Nonetheless, the fastmap must be recompiled each time the buffer has a new pattern compiled into it.

To compile a fastmap yourself, use:

```c
typedef int re_compile_fastmap (struct re_pattern_buffer *pattern_buffer)
```

`pattern_buffer` is the address of a pattern buffer. If the character `c` could start a match for the pattern, `re_compile_fastmap` makes `pattern_buffer->fastmap[c]` nonzero. It returns 0 if it can compile a fastmap and −2 if there is an internal error. For example, if ‘|’ is the alternation operator and `pattern_buffer` holds the compiled pattern for ‘a|b’, then `re_compile_fastmap` sets `fastmap[‘a’]` and `fastmap[‘b’]` (and no others).

`re_search` uses a fastmap as it moves along in the string: it checks the string’s characters until it finds one that’s in the fastmap. Then it tries matching at that character. If the match fails, it repeats the process. So, by using a fastmap, `re_search` doesn’t waste time trying to match at positions in the string that couldn’t start a match.

If you don’t want `re_search` to use a fastmap, store zero in the `fastmap` field of the pattern buffer before calling `re_search`.

Once you’ve initialized a pattern buffer’s `fastmap` field, you need never do so again—even if you compile a new pattern in it—provided the way the field is set still reflects whether or not you want a fastmap. `re_search` will still either do nothing if `fastmap` is null or, if it isn’t, compile a new fastmap for the new pattern.
15.7.1.7 GNU Translate Tables

If you set the `translate` field of a pattern buffer to a translate table, then the GNU Regex functions to which you’ve passed that pattern buffer use it to apply a simple transformation to all the regular expression and string characters at which they look.

A translate table is an array indexed by the characters in your character set. Under the ASCII encoding, therefore, a translate table has 256 elements. The array’s elements are also characters in your character set. When the Regex functions see a character c, they use `translate[c]` in its place, with one exception: the character after a ‘\’ is not translated. (This ensures that, the operators, e.g., ‘\B’ and ‘\b’, are always distinguishable.)

For example, a table that maps all lowercase letters to the corresponding uppercase ones would cause the matcher to ignore differences in case.\(^5\) Such a table would map all characters except lowercase letters to themselves, and lowercase letters to the corresponding uppercase ones. Under the ASCII encoding, here’s how you could initialize such a table (we’ll call it `case_fold`):

```c
for (i = 0; i < 256; i++)
    case_fold[i] = i;
for (i = 'a'; i <= 'z'; i++)
    case_fold[i] = i - ('a' - 'A');
```

You tell Regex to use a translate table on a given pattern buffer by assigning that table’s address to the `translate` field of that buffer. If you don’t want Regex to do any translation, put zero into this field. You’ll get weird results if you change the table’s contents anytime between compiling the pattern buffer, compiling its fastmap, and matching or searching with the pattern buffer.

15.7.1.8 Using Registers

A group in a regular expression can match a (possibly empty) substring of the string that regular expression as a whole matched. The matcher remembers the beginning and end of the substring matched by each group.

To find out what they matched, pass a nonzero regs argument to a GNU matching or searching function (see Section 15.7.1.3 [GNU Matching], page 675, and Section 15.7.1.4 [GNU Searching], page 676), i.e., the address of a structure of this type, as defined in `regex.h`:

```c
struct re_registers
 {
     unsigned num_regs;
     regoff_t *start;
     regoff_t *end;
};
```

Except for (possibly) the `num_regs`’th element (see below), the i\(^{th}\) element of the `start` and `end` arrays records information about the i\(^{th}\) group in the pattern. (They’re declared as C pointers, but this is only because not all C compilers accept zero-length arrays; conceptually, it is simplest to think of them as arrays.)

\(^5\) A table that maps all uppercase letters to the corresponding lowercase ones would work just as well for this purpose.
The `start` and `end` arrays are allocated in one of two ways. The simplest and perhaps most useful is to let the matcher (re)allocate enough space to record information for all the groups in the regular expression. If `re_set_registers` is not called before searching or matching, then the matcher allocates two arrays each of \(1 + \text{re}_\text{nsub}\) elements (`\text{re}_\text{nsub}` is another field in the pattern buffer; see Section 15.7.1.1 [GNU Pattern Buffers], page 674). The extra element is set to \(-1\). Then on subsequent calls with the same pattern buffer and `regs` arguments, the matcher reallocates more space if necessary.

The function:

```c
void re_set_registers (struct re_pattern_buffer *buffer, 
                      struct re_registers *regs, 
                      size_t num_regs, 
                      regoff_t *starts, regoff_t *ends)
```

sets `regs` to hold `num_regs` registers, storing them in `starts` and `ends`. Subsequent matches using `buffer` and `regs` will use this memory for recording register information. `starts` and `ends` must be allocated with `malloc`, and must each be at least \(\text{numRegs} \times \text{sizeof}(\text{regoff_t})\) bytes long.

If `num_regs` is zero, then subsequent matches should allocate their own register data.

Unless this function is called, the first search or match using `buffer` will allocate its own register data, without freeing the old data.

The following examples illustrate the information recorded in the `re_registers` structure. (In all of them, ‘(‘ represents the open-group and ‘)’ the close-group operator. The first character in the string `string` is at index 0.)

- If the regular expression has an \(i\)-th group that matches a substring of `string`, then the function sets `regs->start[i]` to the index in `string` where the substring matched by the \(i\)-th group begins, and `regs->end[i]` to the index just beyond that substring’s end. The function sets `regs->start[0]` and `regs->end[0]` to analogous information about the entire pattern.

For example, when you match ‘`((a)(b))`’ against ‘ab’, you get:

- 0 in `regs->start[0]` and 2 in `regs->end[0]`
- 0 in `regs->start[1]` and 2 in `regs->end[1]`
- 0 in `regs->start[2]` and 1 in `regs->end[2]`
- 1 in `regs->start[3]` and 2 in `regs->end[3]`

- If a group matches more than once (as it might if followed by, e.g., a repetition operator), then the function reports the information about what the group last matched.

For example, when you match the pattern ‘`(a)*`’ against the string ‘aa’, you get:

- 0 in `regs->start[0]` and 2 in `regs->end[0]`
- 1 in `regs->start[1]` and 2 in `regs->end[1]`

- If the \(i\)-th group does not participate in a successful match, e.g., it is an alternative not taken or a repetition operator allows zero repetitions of it, then the function sets `regs->start[i]` and `regs->end[i]` to \(-1\).

For example, when you match the pattern ‘`(a)*b`’ against the string ‘b’, you get:

- 0 in `regs->start[0]` and 1 in `regs->end[0]`
• −1 in \texttt{regs->start[1]} and −1 in \texttt{regs->end[1]}

• If the \textit{i}-th group matches a zero-length string, then the function sets \texttt{regs->start[i]} and \texttt{regs->end[i]} to the index just beyond that zero-length string.

For example, when you match the pattern ‘(a*)b’ against the string ‘b’, you get:

• 0 in \texttt{regs->start[0]} and 1 in \texttt{regs->end[0]}
• 0 in \texttt{regs->start[1]} and 0 in \texttt{regs->end[1]}

• If an \textit{i}-th group contains a \textit{j}-th group in turn not contained within any other group within group \textit{i} and the function reports a match of the \textit{i}-th group, then it records in \texttt{regs->start[j]} and \texttt{regs->end[j]} the last match (if it matched) of the \textit{j}-th group.

For example, when you match the pattern ‘((a*)b)*’ against the string ‘abb’, group 2 last matches the empty string, so you get what it previously matched:

• 0 in \texttt{regs->start[0]} and 3 in \texttt{regs->end[0]}
• 2 in \texttt{regs->start[1]} and 3 in \texttt{regs->end[1]}
• 2 in \texttt{regs->start[2]} and 2 in \texttt{regs->end[2]}

When you match the pattern ‘((a)*b)*’ against the string ‘abb’, group 2 doesn’t participate in the last match, so you get:

• 0 in \texttt{regs->start[0]} and 3 in \texttt{regs->end[0]}
• 2 in \texttt{regs->start[1]} and 3 in \texttt{regs->end[1]}
• 0 in \texttt{regs->start[2]} and 1 in \texttt{regs->end[2]}

• If an \textit{i}-th group contains a \textit{j}-th group in turn not contained within any other group within group \textit{i} and the function sets \texttt{regs->start[i]} and \texttt{regs->end[i]} to −1, then it also sets \texttt{regs->start[j]} and \texttt{regs->end[j]} to −1.

For example, when you match the pattern ‘((a)*b)*c’ against the string ‘c’, you get:

• 0 in \texttt{regs->start[0]} and 1 in \texttt{regs->end[0]}
• −1 in \texttt{regs->start[1]} and −1 in \texttt{regs->end[1]}
• −1 in \texttt{regs->start[2]} and −1 in \texttt{regs->end[2]}

\textbf{15.7.1.9 Freeing GNU Pattern Buffers}

To free any allocated fields of a pattern buffer, use the POSIX function \texttt{regfree}:

\begin{verbatim}
void
regfree (regex_t *preg)
\end{verbatim}

\texttt{preg} is the pattern buffer whose allocated fields you want freed; this works because since the type \texttt{regex_t}—the type for POSIX pattern buffers—is equivalent to the type \texttt{re_pattern_buffer}.

\texttt{regfree} also sets \texttt{preg}’s \texttt{allocated} field to zero. After a buffer has been freed, it must have a regular expression compiled in it before passing it to a matching or searching function.

\textbf{15.7.2 BSD Regex Functions}

If you’re writing code that has to be Berkeley Unix compatible, you’ll need to use these functions whose interfaces are the same as those in Berkeley Unix.
15.7.2.1 BSD Regular Expression Compiling

With Berkeley Unix, you can only search for a given regular expression; you can’t match one. To search for it, you must first compile it. Before you compile it, you must indicate the regular expression syntax you want it compiled according to by setting the variable `re_syntax_options` (declared in `regex.h` to some syntax (see Section 15.2 [Regular Expression Syntax], page 658).

To compile a regular expression use:

```c
char *
re_comp (char *regex)
```

`regex` is the address of a null-terminated regular expression. `re_comp` uses an internal pattern buffer, so you can use only the most recently compiled pattern buffer. This means that if you want to use a given regular expression that you’ve already compiled—but it isn’t the latest one you’ve compiled—you’ll have to recompile it. If you call `re_comp` with the null string (not the empty string) as the argument, it doesn’t change the contents of the pattern buffer.

If `re_comp` successfully compiles the regular expression, it returns zero. If it can’t compile the regular expression, it returns an error string. `re_comp`’s error messages are identical to those of `re_compile_pattern` (see Section 15.7.1.2 [GNU Regular Expression Compiling], page 674).

15.7.2.2 BSD Searching

Searching the Berkeley Unix way means searching in a string starting at its first character and trying successive positions within it to find a match. Once you’ve compiled a pattern using `re_comp` (see Section 15.7.2.1 [BSD Regular Expression Compiling], page 681), you can ask Regex to search for that pattern in a string using:

```c
int
re_exec (char *string)
```

`string` is the address of the null-terminated string in which you want to search.

`re_exec` returns either 1 for success or 0 for failure. It automatically uses a GNU fastmap (see Section 15.7.1.6 [Searching with Fastmaps], page 677).

15.8 Regular expression syntaxes

Gnulib supports many different types of regular expressions; although the underlying features are the same or identical, the syntax used varies. The descriptions given here for the different types are generated automatically.

15.8.1 ‘awk’ regular expression syntax

The character ‘.’ matches any single character except the null character.

‘+’ indicates that the regular expression should match one or more occurrences of the previous atom or regexp.

‘?’ indicates that the regular expression should match zero or one occurrence of the previous atom or regexp.

‘\+’ matches a ‘+’
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`\?` matches a `?`.

Bracket expressions are used to match ranges of characters. Bracket expressions where the range is backward, for example `[z-a]`, are invalid. Within square brackets, `\` can be used to quote the following character. Character classes are supported; for example `[:digit:]` will match a single decimal digit.

GNU extensions are not supported and so `\w`, `\W`, `\<`, `\>`, `\b`, `\B`, `\'`, and `\'` match `w`, `W`, `<`, `>`, `b`, `B`, `'`, and `'` respectively.

Grouping is performed with parentheses `( )`. An unmatched `)` matches just itself. A backslash followed by a digit matches that digit.

The alternation operator is `|`.

The characters `^` and `$` always represent the beginning and end of a string respectively, except within square brackets. Within brackets, `^` can be used to invert the membership of the character class being specified.

`*`, `+` and `?` are special at any point in a regular expression except:
1. At the beginning of a regular expression
2. After an open-group, signified by `(`
3. After the alternation operator `|`

The longest possible match is returned; this applies to the regular expression as a whole and (subject to this constraint) to subexpressions within groups.

15.8.2 `egrep` regular expression syntax

The character `.` matches any single character.

`+` indicates that the regular expression should match one or more occurrences of the previous atom or regexp.

`?` indicates that the regular expression should match zero or one occurrence of the previous atom or regexp.

`\+` matches a `+`

`\?` matches a `?`.

Bracket expressions are used to match ranges of characters. Bracket expressions where the range is backward, for example `[z-a]`, are invalid. Within square brackets, `\` is taken literally. Character classes are supported; for example `[:digit:]` will match a single decimal digit.

GNU extensions are supported:
1. `\w` matches a character within a word
2. `\W` matches a character which is not within a word
3. `\<` matches the beginning of a word
4. `\>` matches the end of a word
5. `\b` matches a word boundary
6. `\B` matches characters which are not a word boundary
7. `\'` matches the beginning of the whole input
8. ‘\’ matches the end of the whole input

Grouping is performed with parentheses ‘(’) . An unmatched ‘\’ matches just itself. A backslash followed by a digit acts as a back-reference and matches the same thing as the previous grouped expression indicated by that number. For example ‘\2’ matches the second group expression. The order of group expressions is determined by the position of their opening parenthesis ‘(‘.

The alternation operator is ‘|’.

The characters ‘^’ and ‘$’ always represent the beginning and end of a string respectively, except within square brackets. Within brackets, ‘^’ can be used to invert the membership of the character class being specified.

The characters ‘*’, ‘+’ and ‘?’ are special anywhere in a regular expression.

Intervals are specified by ‘{’ and ‘}’. Invalid intervals are treated as literals, for example ‘a{1’ is treated as ‘a\{1’

The longest possible match is returned; this applies to the regular expression as a whole and (subject to this constraint) to subexpressions within groups.

15.8.3 ‘ed’ regular expression syntax

The character ‘.’ matches any single character except the null character.

‘\+’ indicates that the regular expression should match one or more occurrences of the previous atom or regexp.

‘\?’ indicates that the regular expression should match zero or one occurrence of the previous atom or regexp.

‘+ and ?’ match themselves.

Bracket expressions are used to match ranges of characters. Bracket expressions where the range is backward, for example ‘[z-a]’, are invalid. Within square brackets, ‘\’ is taken literally. Character classes are supported; for example ‘[[[:digit:]]]’ will match a single decimal digit.

GNU extensions are supported:
1. ‘\w’ matches a character within a word
2. ‘\W’ matches a character which is not within a word
3. ‘\<’ matches the beginning of a word
4. ‘\>’ matches the end of a word
5. ‘\b’ matches a word boundary
6. ‘\B’ matches characters which are not a word boundary
7. ‘\’ matches the beginning of the whole input
8. ‘\’ matches the end of the whole input

Grouping is performed with backslashes followed by parentheses ‘(‘, ‘\)’. A backslash followed by a digit acts as a back-reference and matches the same thing as the previous grouped expression indicated by that number. For example ‘\2’ matches the second group expression. The order of group expressions is determined by the position of their opening parenthesis ‘(‘.
The alternation operator is ‘\|’.
The character ‘\^’ only represents the beginning of a string when it appears:
1. At the beginning of a regular expression
2. After an open-group, signified by ‘\(’
3. After the alternation operator ‘\|’
The character ‘\$’ only represents the end of a string when it appears:
1. At the end of a regular expression
2. Before a close-group, signified by ‘\)’
3. Before the alternation operator ‘\|’

‘\*’, ‘\+’ and ‘\?’ are special at any point in a regular expression except:
1. At the beginning of a regular expression
2. After an open-group, signified by ‘\(’
3. After the alternation operator ‘\|’

Intervals are specified by ‘\{’ and ‘\}’. Invalid intervals such as ‘a\{1z’ are not accepted.
The longest possible match is returned; this applies to the regular expression as a whole and (subject to this constraint) to subexpressions within groups.

15.8.4 ‘emacs’ regular expression syntax

The character ‘.’ matches any single character except newline.
‘+’ indicates that the regular expression should match one or more occurrences of
the previous atom or regexp.
‘?’ indicates that the regular expression should match zero or one occurrence of
the previous atom or regexp.
‘\+’ matches a ‘+’
‘\?’ matches a ‘?’. Bracket expressions are used to match ranges of characters. Bracket expressions where the range is backward, for example ‘[z-a]’, are ignored. Within square brackets, ‘\’ is taken literally. Character classes are not supported, so for example you would need to use
‘[0-9]’ instead of ‘[[:digit:]’.

GNU extensions are supported:
1. ‘\w’ matches a character within a word
2. ‘\W’ matches a character which is not within a word
3. ‘\<’ matches the beginning of a word
4. ‘\>’ matches the end of a word
5. ‘\b’ matches a word boundary
6. ‘\B’ matches characters which are not a word boundary
7. ‘\‘’ matches the beginning of the whole input
8. ‘\’’ matches the end of the whole input
Grouping is performed with backslashes followed by parentheses \(\langle, \rangle\). A backslash followed by a digit acts as a back-reference and matches the same thing as the previous grouped expression indicated by that number. For example \(\backslash 2\) matches the second group expression. The order of group expressions is determined by the position of their opening parenthesis \(\langle\).

The alternation operator is \(\|\).

The character \(^\^\) only represents the beginning of a string when it appears:

1. At the beginning of a regular expression
2. After an open-group, signified by \(\langle\)
3. After the alternation operator \(\|\)

The character \(\$$\) only represents the end of a string when it appears:

1. At the end of a regular expression
2. Before a close-group, signified by \(\rangle\)
3. Before the alternation operator \(\|\)

\(\star\), \(+\) and \(\?\) are special at any point in a regular expression except:

1. At the beginning of a regular expression
2. After an open-group, signified by \(\langle\)
3. After the alternation operator \(\|\)

The longest possible match is returned; this applies to the regular expression as a whole and (subject to this constraint) to subexpressions within groups.

15.8.5 ‘gnu-awk’ regular expression syntax

The character \(\:\) matches any single character.

\(\star\) indicates that the regular expression should match one or more occurrences of the previous atom or regexp.

\(\?\) indicates that the regular expression should match zero or one occurrence of the previous atom or regexp.

\(\\star\) matches a \(\star\)

\(\\?\) matches a \(\?\).

Bracket expressions are used to match ranges of characters. Bracket expressions where the range is backward, for example \([z-a]\), are invalid. Within square brackets, \(\\) can be used to quote the following character. Character classes are supported; for example \([[:digit:]]\) will match a single decimal digit.

GNU extensions are supported:

1. \(\w\) matches a character within a word
2. \(\W\) matches a character which is not within a word
3. \(\<\) matches the beginning of a word
4. \(\>\) matches the end of a word
5. \(\b\) matches a word boundary
6. ‘\B’ matches characters which are not a word boundary
7. ‘\t’ matches the beginning of the whole input
8. ‘\’’ matches the end of the whole input

Grouping is performed with parentheses ‘()’. An unmatched ‘)’ matches just itself. A backslash followed by a digit acts as a back-reference and matches the same thing as the previous grouped expression indicated by that number. For example ‘\2’ matches the second group expression. The order of group expressions is determined by the position of their opening parenthesis ‘(’.

The alternation operator is ‘|’.

The characters ‘^’ and ‘$’ always represent the beginning and end of a string respectively, except within square brackets. Within brackets, ‘^’ can be used to invert the membership of the character class being specified.
‘*’, ‘+’ and ‘?’ are special at any point in a regular expression except:
1. At the beginning of a regular expression
2. After an open-group, signified by ‘(’
3. After the alternation operator ‘|’

Intervals are specified by ‘{’ and ‘}’. Invalid intervals are treated as literals, for example ‘a{1’ is treated as ‘a\{1’

The longest possible match is returned; this applies to the regular expression as a whole and (subject to this constraint) to subexpressions within groups.

15.8.6 ‘grep’ regular expression syntax

The character ‘.’ matches any single character.
‘\+’ indicates that the regular expression should match one or more occurrences of the previous atom or regexp.
‘\?’ indicates that the regular expression should match zero or one occurrence of the previous atom or regexp.
‘+ and ?’ match themselves.

Bracket expressions are used to match ranges of characters. Bracket expressions where the range is backward, for example ‘[z-a]’, are invalid. Within square brackets, ‘\’ is taken literally. Character classes are supported; for example ‘[[[:digit:]]]’ will match a single decimal digit.

GNU extensions are supported:
1. ‘\w’ matches a character within a word
2. ‘\W’ matches a character which is not within a word
3. ‘\<’ matches the beginning of a word
4. ‘\>’ matches the end of a word
5. ‘\b’ matches a word boundary
6. ‘\B’ matches characters which are not a word boundary
7. ‘\t’ matches the beginning of the whole input
8. ‘\’ matches the end of the whole input

Grouping is performed with backslashes followed by parentheses ‘\(, \)’. A backslash followed by a digit acts as a back-reference and matches the same thing as the previous grouped expression indicated by that number. For example ‘\2’ matches the second group expression. The order of group expressions is determined by the position of their opening parenthesis ‘\(’.

The alternation operator is ‘\|’.

The character ‘^’ only represents the beginning of a string when it appears:
1. At the beginning of a regular expression
2. After an open-group, signified by ‘\(’
3. After a newline
4. After the alternation operator ‘\|’

The character ‘$’ only represents the end of a string when it appears:
1. At the end of a regular expression
2. Before a close-group, signified by ‘\)’
3. Before a newline
4. Before the alternation operator ‘\|’

‘\*', ‘\+' and ‘\?' are special at any point in a regular expression except:
1. At the beginning of a regular expression
2. After an open-group, signified by ‘\(’
3. After a newline
4. After the alternation operator ‘\|’

Intervals are specified by ‘\{’ and ‘\}'. Invalid intervals such as ‘a\{1z’ are not accepted.

The longest possible match is returned; this applies to the regular expression as a whole and (subject to this constraint) to subexpressions within groups.

15.8.7 ‘posix-awk’ regular expression syntax

The character ‘.’ matches any single character except the null character.

‘+’ indicates that the regular expression should match one or more occurrences of the previous atom or regexp.

‘?’ indicates that the regular expression should match zero or one occurrence of the previous atom or regexp.

‘\+’ matches a ‘+’

‘\?’ matches a ‘?’.

Bracket expressions are used to match ranges of characters. Bracket expressions where the range is backward, for example ‘[z-a]’, are invalid. Within square brackets, ‘\’ can be used to quote the following character. Character classes are supported; for example ‘[[[:digit:]]]’ will match a single decimal digit.

Grouping is performed with parentheses ‘()’. An unmatched ‘)’ matches just itself. A backslash followed by a digit acts as a back-reference and matches the same thing as the previous grouped expression indicated by that number. For example ‘\2’ matches the second group expression. The order of group expressions is determined by the position of their opening parenthesis ‘(’.

The alternation operator is ‘|’.

The characters ‘^’ and ‘$’ always represent the beginning and end of a string respectively, except within square brackets. Within brackets, ‘^’ can be used to invert the membership of the character class being specified.

‘*’, ‘+’ and ‘?’ are special at any point in a regular expression except the following places, where they are not allowed:

1. At the beginning of a regular expression
2. After an open-group, signified by ‘(‘
3. After the alternation operator ‘|’

Intervals are specified by ‘{’ and ‘}’. Invalid intervals are treated as literals, for example ‘a{1’ is treated as ‘a\{1’

The longest possible match is returned; this applies to the regular expression as a whole and (subject to this constraint) to subexpressions within groups.

15.8.8 ‘posix-basic’ regular expression syntax

This is a synonym for ed.

15.8.9 ‘posix-egrep’ regular expression syntax

This is a synonym for egrep.

15.8.10 ‘posix-extended’ regular expression syntax

The character ‘.’ matches any single character except the null character.

‘+’ indicates that the regular expression should match one or more occurrences of the previous atom or regexp.

‘?’ indicates that the regular expression should match zero or one occurrence of the previous atom or regexp.

‘\+’ matches a ‘+’

‘\?’ matches a ‘?’. Bracket expressions are used to match ranges of characters. Bracket expressions where the range is backward, for example ‘[z-a]’, are invalid. Within square brackets, ‘\’ is taken literally. Character classes are supported; for example ‘[[[:digit:]]]’ will match a single decimal digit.

GNU extensions are supported:

1. ‘\w’ matches a character within a word
2. ‘\W’ matches a character which is not within a word
3. ‘\<’ matches the beginning of a word
4. ‘\>’ matches the end of a word
5. ‘\b’ matches a word boundary
6. ‘\B’ matches characters which are not a word boundary
7. ‘\’ matches the beginning of the whole input
8. ‘\’ matches the end of the whole input

Grouping is performed with parentheses ‘()’. An unmatched ‘)’ matches just itself. A backslash followed by a digit acts as a back-reference and matches the same thing as the previous grouped expression indicated by that number. For example ‘\2’ matches the second group expression. The order of group expressions is determined by the position of their opening parenthesis ‘(’.

The alternation operator is ‘|’.

The characters ‘^’ and ‘$’ always represent the beginning and end of a string respectively, except within square brackets. Within brackets, ‘^’ can be used to invert the membership of the character class being specified.

‘*’, ‘+’, and ‘?’ are special at any point in a regular expression except the following places, where they are not allowed:
1. At the beginning of a regular expression
2. After an open-group, signified by ‘(’
3. After the alternation operator ‘|’

Intervals are specified by ‘{’ and ‘}’. Invalid intervals such as ‘a{1z’ are not accepted.

The longest possible match is returned; this applies to the regular expression as a whole and (subject to this constraint) to subexpressions within groups.

**15.8.11 ‘posix-minimal-basic’ regular expression syntax**

The character ‘.’ matches any single character except the null character.

Bracket expressions are used to match ranges of characters. Bracket expressions where the range is backward, for example ‘[z-a]’, are invalid. Within square brackets, ‘\’ is taken literally. Character classes are supported; for example ‘[[:digit:]]’ will match a single decimal digit.

GNU extensions are supported:
1. ‘\w’ matches a character within a word
2. ‘\W’ matches a character which is not within a word
3. ‘\<’ matches the beginning of a word
4. ‘\>’ matches the end of a word
5. ‘\b’ matches a word boundary
6. ‘\B’ matches characters which are not a word boundary
7. ‘\’ matches the beginning of the whole input
8. ‘\’ matches the end of the whole input

Grouping is performed with backslashes followed by parentheses ‘(‘, ‘)’. A backslash followed by a digit acts as a back-reference and matches the same thing as the previous grouped expression indicated by that number. For example ‘\2’ matches the second group
expression. The order of group expressions is determined by the position of their opening parenthesis ‘\(‘.

The character ‘\(^\)’ only represents the beginning of a string when it appears:

1. At the beginning of a regular expression
2. After an open-group, signified by ‘\(‘

The character ‘\($\)’ only represents the end of a string when it appears:

1. At the end of a regular expression
2. Before a close-group, signified by ‘\)’

Intervals are specified by ‘\{’ and ‘\}\’. Invalid intervals such as ‘a\{1z’ are not accepted.

The longest possible match is returned; this applies to the regular expression as a whole and (subject to this constraint) to subexpressions within groups.

15.8.12 ‘sed’ regular expression syntax

This is a synonym for ed.
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Gnulib has a couple of modules that don’t provide code, but rather extend the GNU Build System. That is, they are convenience facilities for use with GNU Automake (in particular).

16.1 Searching for Libraries

The following macros check for the presence or location of certain C, C++, or Fortran library archive files.

Simple Library Tests

The macros AC_CHECK_LIB, AC_SEARCH_LIBS from GNU Autoconf check for the presence of certain C, C++, or Fortran library archive files. The libraries are looked up in the default linker path—a system dependent list of directories, that usually contains the /usr/lib directory—and those directories given by -L options in the LDFLAGS variable.

Locating Libraries

The following macros, defined in the Gnulib module havelib, search for the location of certain C, C++, or Fortran library archive files and make the found location available to the compilation process and to further Autoconf tests.

AC_LIB_LINKFLAGS(name, [dependencies])

[Macro]
Searches for lib<name> and the libraries corresponding to explicit and implicit dependencies. Sets and AC_SUBSTs the LIB<NAME> and LTLIB<NAME> variables (with <NAME> in upper case) and augments the CPPFLAGS variable by -I options.

This macro should be used when lib<name> is expected to be found.

AC_LIB_HAVE_LINKFLAGS(name, [dependencies], [includes], [testcode], [missing-message])

[Macro]
Searches for lib<name> and the libraries corresponding to explicit and implicit dependencies, together with the specified include files and the ability to compile and link the specified testcode. The missing-message defaults to no and may contain additional hints for the user. If found, it sets and AC_SUBSTs HAVE_LIB<NAME>=yes and the LIB<NAME> and LTLIB<NAME> variables (with <NAME> in upper case) and augments the CPPFLAGS variable by -I options, and #defines HAVE_LIB<NAME> to 1. Otherwise, it sets and AC_SUBSTs HAVE_LIB<NAME>=no and LIB<NAME> and LTLIB<NAME> to empty.

These macros assume that when a library is installed in some_directory/lib, its include files are installed in some_directory/include.

The complexities that AC_LIB_LINKFLAGS and AC_LIB_HAVE_LINKFLAGS deal with are the following:

- The library is not necessarily already in the search path (CPPFLAGS for the include file search path, LDFLAGS for the library search path). The macro provides a ‘--with-lib<name>’ option. The user of the ‘configure’ script can use this option to indicate the location of the library and its include files. If not provided, the --prefix directory is searched as well.
• The library is not necessarily already in the run time library search path. To avoid the need for setting an environment variable like \texttt{LD\_LIBRARY\_PATH}, the macro adds the appropriate run time search path options to the \texttt{LIB\:<NAME>} variable. This works on most systems. It can also be inhibited: The user of \texttt{configure} can use the \texttt{--disable-rpath} option to force an installation that doesn’t contain hardcoded library search paths but instead may require the use of an environment variable like \texttt{LD\_LIBRARY\_PATH}.

The macros also set a variable \texttt{LTLIB\:<NAME>}, that should be used when linking with libtool. Both \texttt{LTLIB\:<NAME>} and \texttt{LIB\:<NAME>} contain essentially the same option, but where \texttt{LIB\:<NAME>} contains platform dependent flags like ‘-Wl,-rpath’, \texttt{LTLIB\:<NAME>} contains platform independent flags like ‘-R’.

**Example of using \texttt{AC\_LIB\_LINKFLAGS}**

Suppose you want to use libz, the compression library.

1. In configure.ac you add the line
   \begin{verbatim}
   AC_CONFIG_AUX_DIR([build-aux])
   AC_LIB_LINKFLAGS([z])
   \end{verbatim}
   Note that since the \texttt{AC\_LIB\_LINKFLAGS} invocation modifies the CPPFLAGS, it should precede all tests that check for header files, declarations, structures or types.

2. To the package’s build-aux directory you add the file \texttt{config.rpath}, also part of the Gnulib havelib module. (\texttt{gnulib-tool} will usually do this for you automatically.)

3. In Makefile.in you add \texttt{@LIBZ@} to the link command line of your program. Or, if you are using Automake, you add \texttt{$(LIBZ)} to the LDADD variable that corresponds to your program.

**Dependencies**

The dependencies list is a space separated list of library names that \texttt{libname} is known to depend upon. Example: If \texttt{libfooy} depends on \texttt{libfoox}, and \texttt{libfooz} depends on \texttt{libfoox} and \texttt{libfooy}, you can write:

\begin{verbatim}
AC_LIB_LINKFLAGS([foox])
AC_LIB_LINKFLAGS([fooy], [foox])
AC_LIB_LINKFLAGS([fooz], [foox fooy])
\end{verbatim}

Explicit dependencies are necessary if you cannot assume that a .la file, created by libtool, is installed. If you can assume that \texttt{libfooy.la} is installed by libtool (and has not been omitted by the package distributor!), you can omit the explicit dependency and just write

\begin{verbatim}
AC_LIB_LINKFLAGS([fooy])
\end{verbatim}

This way, you don’t need to know in advance which libraries the needed library depends upon.

**Static vs. shared**

The macros find the libraries regardless whether they are installed as shared or static libraries.

**CPPFLAGS vs. LDFLAGS**

The macros determine the directories that should be added to the compiler preprocessor’s search path and to the linker’s search path. For the compiler preprocessor, -I options
with the necessary directories are added to the CPPFLAGS variable, for use by the whole package. For the linker, appropriate options are added to the LIB<NAME> and LTLIB<NAME> variables, for use during linking by those programs and libraries that need the dependency on lib<name>. You need to use the value of LIB<NAME> or LTLIB<NAME> in the Makefiles. LTLIB<NAME> is for use with libtool, whereas LIB<NAME> is for when libtool is not involved in linking.

The macros do not check whether the include files and the library found match. If you want to verify this at configure time, one technique is to have a version number in the include files and a version number in the library, like this:

```
#define LIBNAME_VERSION 10203
extern int libname_version; /* initialized to LIBNAME_VERSION */
```

and use a test like

```
AC_TRY_RUN(int main () { return libname_version != LIBNAME_VERSION; })
```

## Bi-arch systems

A bi-arch system is one where

- the processor has a 32-bit execution mode and a 64-bit execution mode (for example, x86_64, ia64, sparc64, powerpc64), and
- 32-bit mode libraries and executables and 64-bit mode libraries are both installed, and
- 32-bit mode libraries and object files cannot be mixed with 64-bit mode ones.

On several types of such systems, for historical reasons, the 32-bit libraries are installed in `prefix/lib`, whereas the 64-bit libraries are installed in

- `prefix/lib64` on many glibc systems,
- `prefix/lib/64` on Solaris systems.

On such systems, in 64-bit mode, configure will search for the libraries in `prefix/lib64` or `prefix/lib/64`, respectively, not in `prefix/lib`. A user can adhere to these system-wide conventions by using the `--libdir` option when installing packages. When a user has already installed packages in 64-bit mode using the GNU default `--libdir=prefix/lib`, he can make this directory adhere to the system-wide convention by placing a symbolic link:

On glibc systems:

```
ln -s lib prefix/lib64
```

On Solaris systems:

```
ln -s . prefix/lib/64
```

### 16.2 Controlling the Exported Symbols of Shared Libraries

The lib-symbol-visibility module allows precise control of the symbols exported by a shared library. This is useful because

- It prevents abuse of undocumented APIs of your library. Symbols that are not exported from the library cannot be used. This eliminates the problem that when the maintainer of the library changes internals of the library, maintainers of other projects cry “breakage”. Instead, these maintainers are forced to negotiate the desired API from the maintainer of the library.
It reduces the risk of symbol collision between your library and other libraries. For example, the symbol `readline` is defined in several libraries, most of which don’t have the same semantics and the same calling convention as the GNU readline library.

It reduces the startup time of programs linked to the library. This is because the dynamic loader has less symbols to process.

It allows the compiler to generate better code. Within a shared library, a call to a function that is a global symbol costs a “call” instruction to a code location in the so-called PLT (procedure linkage table) which contains a “jump” instruction to the actual function’s code. (This is needed so that the function can be overridden, for example by a function with the same name in the executable or in a shared library interposed with `LD_PRELOAD`.) Whereas a call to a function for which the compiler can assume that it is in the same shared library is just a direct “call” instructions. Similarly for variables: A reference to a global variable fetches a pointer in the so-called GOT (global offset table); this is a pointer to the variable’s memory. So the code to access it is two memory load instructions. Whereas for a variable which is known to reside in the same shared library, it is just a direct memory access: one memory load instruction.

There are traditionally three ways to specify the exported symbols of a shared library.

- The programmer specifies the list of symbols to be exported when the shared library is created. Usually a command-line option is passed to the linker, with the name of a file containing the symbols.

  The upside of this approach is flexibility: it allows the same code to be used in different libraries with different export lists. The downsides are: 1. it’s a lot of maintenance overhead when the symbol list is platform dependent, 2. it doesn’t work well with C++, due to name mangling.

- The programmer specifies a “hidden” attribute for every variable and function that shall not be exported.

  The drawbacks of this approach are: Symbols are still exported from the library by default. It’s a lot of maintenance work to mark every non-exported variable and function. But usually the exported API is quite small, compared to the internal API of the library. And it’s the wrong paradigm: It doesn’t force thinking when introducing new exported API.

- The programmer specifies a “hidden” attribute for all files that make up the shared library, and an “exported” attribute for those symbols in these files that shall be exported.

  This is perfect: It burdens the maintainer only for exported API, not for library-internal API. And it keeps the annotations in the source code.

GNU libtool’s `-export-symbols` option implements the first approach. The script `declared.sh` from GnuLib can help to produce the list of symbols.

This gnuLib module implements the third approach. For this it relies on GNU GCC 4.0 or newer, namely on its `-fvisibility=hidden` command-line option and the “visibility” attribute. (The “visibility” attribute was already supported in GCC 3.4, but without the command line option, introduced in GCC 4.0, the third approach could not be used.)

More explanations on this subject can be found in https://gcc.gnu.org/wiki/Visibility, which contains more details on the GCC features and additional advice for C++
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libraries, and in Ulrich Drepper’s paper https://www.akkadia.org/drepper/dsohowto.
pdf, which also explains other tricks for reducing the startup time impact of shared libraries.
The gnulib autoconf macro gl_VISIBILITY tests for GCC 4.0 or newer. It defines a
Makefile variable @CFLAG_VISIBILITY@ containing ‘-fvisibility=hidden’ or nothing. It
also defines as a C macro and as a substituted variable: @HAVE VISIBILITY@. Its value
is 1 when symbol visibility control is supported, and 0 otherwise.
To use this module in a library, say libfoo, you will do these steps:
1. Add @CFLAG_VISIBILITY@ or (in a Makefile.am) $(CFLAG_VISIBILITY) to the
CFLAGS for the compilation of the sources that make up the library.
2. Add a C macro definition, say ‘-DBUILDING_LIBFOO’, to the CPPFLAGS for the compilation of the sources that make up the library.
3. Define a macro specific to your library like this.
#if BUILDING_LIBFOO && HAVE_VISIBILITY
#define LIBFOO_DLL_EXPORTED __attribute__((__visibility__("default")))
#else
#define LIBFOO_DLL_EXPORTED
#endif

This macro should be enabled in all public header files of your library.
4. Annotate all variable, function and class declarations in all public header files of your
library with ‘LIBFOO_DLL_EXPORTED’. This annotation can occur at different locations:
between the ‘extern’ and the type or return type, or just before the entity being
declared, or after the entire declarator. My preference is to put it right after ‘extern’,
so that the declarations in the header files remain halfway readable.
Note that the precise control of the exported symbols will not work with other compilers
than GCC >= 4.0, and will not work on systems where the assembler or linker lack the
support of “hidden” visibility. Therefore, it’s good if, in order to reduce the risk of collisions
with symbols in other libraries, you continue to use a prefix specific to your library for all
non-static variables and functions and for all C++ classes in your library.
Note about other compilers: MSVC support can be added easily, by extending the
definition of the macro mentioned above, to something like this:
#if BUILDING_LIBFOO && HAVE_VISIBILITY
#define LIBFOO_DLL_EXPORTED __attribute__((__visibility__("default")))
#elif BUILDING_LIBFOO && defined _MSC_VER
#define LIBFOO_DLL_EXPORTED __declspec(dllexport)
#elif defined _MSC_VER
#define LIBFOO_DLL_EXPORTED __declspec(dllimport)
#else
#define LIBFOO_DLL_EXPORTED
#endif

16.3 LD Version Scripts
The lib-symbol-versions module can be used to add shared library versioning support.
Currently, only GNU LD and the Solaris linker supports this.
Version scripts provides information that can be used by GNU/Linux distribution packaging tools. For example, Debian has a tool dpkg-shlibdeps that can determine the
minimal required version of each dependency (by looking at the symbol list) and stuff the
information into the Debian specific packaging files.


For more information and other uses of version scripts, see Ulrich Drepper's paper https://www.akkadia.org/drepper/dsohowto.pdf

You use the module by importing it to your library, and then add the following lines to the Makefile.am that builds the library:

```makefile
if HAVE_LD_VERSION_SCRIPT
    libfoo_la_LDFLAGS += -Wl,--version-script=$(srcdir)/libfoo.map
endif
```

The version script file format is documented in the GNU LD manual, but a small example would be:

```plaintext
LIBFOO_1.0 {
    global:
        libfoo_init; libfoo_doit; libfoo_done;

    local:
        *;
};
```

If you target platforms that do not support linker scripts (i.e., all platforms that doesn’t use GNU LD) you may want to consider a more portable but less powerful alternative: libtool -export-symbols. It will hide internal symbols from your library, but will not add ELF versioning symbols. Your usage would then be something like:

```makefile
if HAVE_LD_VERSION_SCRIPT
    libfoo_la_LDFLAGS += -Wl,--version-script=$(srcdir)/libfoo.map
else
    libfoo_la_LDFLAGS += -export-symbols $(srcdir)/libfoo.sym
endif
```

See the Libtool manual for the file syntax, but a small example would be:

```plaintext
libfoo_init
libfoo_doit
libfoo_done
```

To avoid the need for a *.sym file if your symbols are easily expressed using a regular expression, you may use -export-symbols-regex:

```makefile
if HAVE_LD_VERSION_SCRIPT
    libfoo_la_LDFLAGS += -Wl,--version-script=$(srcdir)/libfoo.map
else
    libfoo_la_LDFLAGS += -export-symbols-regex '^libfoo_.*'
endif
```

For more discussions about symbol visibility, rather than shared library versioning, see the visibility module (see Section 16.2 Exported Symbols of Shared Libraries, page 693).

### 16.4 Visual Studio Compatibility

The lib-msvc-compat module detects whether the linker supports --output-def when building a library. That parameter is used to generate a DEF file for a shared library (DLL). DEF files are useful for developers that use Visual Studio to develop programs that links to your library. See the GNU LD manual for more information.

There are other ways to create a DEF file, but we believe they are all sub-optimal to using --output-def during the build process. The variants we have considered include:

- Use DUMPBIN /EXPORTS. This is explained in https://support.microsoft.com/kb/131313/en-us. The tool does not generate DEF files directly, so its output needs to be post processed manually:
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$ { echo EXPORTS; 
    dumpbin /EXPORTS libfoo-0.dll | tail -n+20 | awk '{ print $4 }'; 
 } > libfoo-0.def
$ lib /def:libfoo-0.def

- Use IMPDEF. There is a tool called IMPDEF that can generate DEF files. However, it is not part of a standard Visual Studio installation. Further, it is documented as being an unreliable process.

- Use DLLTOOL. The dlltool is part of the MinGW suite, and thus not part of a standard Visual Studio installation. The documentation for the IMPDEF tool claims that DLLTOOL is the wrong tool for this job. Finally, DLLTOOL does not generate DEF files directly, so it requires post-processing of the output.

If you are using libtool to build your shared library, here is how to use this module. Import lib-msvc-compat to your project, and then add the following lines to the Makefile.am that builds the library:

```makefile
if HAVE_LD_OUTPUT_DEF
    libfoo_la_LDFLAGS += -Wl,--output-def,libfoo-$(_DLL_VERSION).def
defexecdir = $(bindir)
defexec_DATA = libfoo-$(DLL_VERSION).def
DISTCLEANFILES += $(defexec_DATA)
endif
```

The DLL_VERSION variable needs to be defined. It should be the shared library version number used in the DLL filename. For Windows targets you compute this value from the values you pass to Libtool’s -version-info. Assuming you have variables LT_CURRENT and LT_AGE defined for the CURRENT and AGE libtool version integers, you compute DLL_VERSION as follows:

```plaintext
DLL_VERSION='expr ${LT_CURRENT} - ${LT_AGE}'
AC_SUBST(DLL_VERSION)
```

### 16.5 configmake

The configmake module builds a C include file named configmake.h containing the usual installation directory values; for example, those specified by --prefix or --libdir to configure. Each variable is given a #define with an all-uppercase macro name, such as PREFIX and LIBDIR. (Automake cannot create this file directly because the user might override directory values at make time.)

Specifically, the module retrieves values of the variables through `configure` followed by `make`, not directly through `configure`, so that a user who sets some of these variables consistently on the `make` command line gets correct results.

One advantage of this approach, compared to the classical approach of adding -DLIBDIR="$(libdir)" etc. to AM_CPPFLAGS, is that it protects against the use of undefined variables. That is, if, say, $(libdir) is not set in the Makefile, LIBDIR is not defined by this module, and code using LIBDIR gives a compilation error.

Another advantage is that `make` output is shorter.

For the complete list of variables which are #defined this way, see the file gnulib/modules/configmake, or inspect your resulting gnulib Makefile.
16.6 warnings

The warnings module allows to regularly build a package with more GCC warnings than the default warnings emitted by GCC.

It provides the following functionality:

- You can select some warning options, such as `'-Wall'`, to be enabled whenever building with a GCC version that supports these options. The user can choose to override these warning options by providing the opposite options in the CFLAGS variable at configuration time.
- You can make these warnings apply to selected directories only. In projects where subprojects are maintained by different people, or where parts of the source code are imported from external sources (for example from gnulib), it is useful to apply different warning options to different directories.
- It lets you use `'-Werror'` at `make distcheck` time, to verify that on the maintainer's system, no warnings remain. (Note that use of `'-Werror'` in CFLAGS does not work in general, because it may break autoconfiguration.)
- Similarly, it lets you use `'-Werror'` when the builder runs configure with an option such as `--enable-gcc-warnings`.

To use this module, you need the following:

1. In configure.ac, use for example
   
   ```
   gl_WARN_ADD(['-Wall'], [WARN_CFLAGS])
   gl_WARN_ADD(['-Wpointer-arith'], [WARN_CFLAGS])
   ```

2. In the directories which shall use WARN_CFLAGS, use it in the definition of AM_CFLAGS, like this:
   
   ```
   AM_CFLAGS = $(WARN_CFLAGS)
   ```

   Note that the AM_CFLAGS is used in combination with CFLAGS and before CFLAGS in build rules emitted by Automake. This allows the user to provide CFLAGS that override the WARN_CFLAGS.

   `gl_WARN_ADD(['-Werror'])` is intended for developers, and should be avoided in contexts where it would affect ordinary installation builds. The warnings emitted by GCC depend, to some extent, on the contents of the system header files, on the size and signedness of built-in types, etc. Use of `'-Werror'` would cause frustration to all users on platforms that the maintainer has not tested before the release. It is better if `'-Werror'` is off by default, and is enabled only by developers. For example, `'-Werror'` could affect `make distcheck` or `configure --enable-gcc-warnings` as mentioned above.

16.7 manywarnings

The manywarnings module allows you to enable as many GCC warnings as possible for your package. The purpose is to protect against introducing new code that triggers warnings that weren’t already triggered by the existing code base.

An example use of the module is as follows:

```
gl_MANYWARN_ALL_GCC([warnings])
# Set up the list of the pointless, undesired warnings.

nw=

nw="$nw -Ws"system-headers"      # Don’t let system headers trigger warnings
```
nw="$nw -Wundef"          # All compiler preprocessors support #if UNDEF
nw="$nw -Wtraditional"    # All compilers nowadays support ANSI C
nw="$nw -Wconversion"     # These warnings usually don't point to mistakes.
nw="$nw -Wsign-conversion" # Likewise.
# Enable all GCC warnings not in this list.
gl_MANYWARN_COMPLEMENT([warnings], [$warnings], [$nw])
for w in $warnings; do
gl_WARN_ADD([$w])
done

This module is meant to be used by developers who are not very experienced regarding the various GCC warning options. In the beginning you will set the list of undesired warnings (‘nw’ in the example above) to empty, and compile the package with all possible warnings enabled. The GCC option `-fdiagnostics-show-option`, available in GCC 4.1 or newer, helps understanding which warnings originated from which option. Then you will go through the list of warnings. You will likely deactivate warnings that occur often and don’t point to mistakes in the code, by adding them to the ‘nw’ variable, then reconfiguring and recompiling. When warnings point to real mistakes and bugs in the code, you will of course not disable them.

There are also many GCC warning options which usually don’t point to mistakes in the code; these warnings enforce a certain programming style. It is a project management decision whether you want your code to follow any of these styles. Note that some of these programming styles are conflicting. You cannot have them all; you have to choose among them.

When a new version of GCC is released, you can add the new warning options that it introduces into the `gl_MANYWARN_ALL_GCC` macro (and submit your modification to the Gnulib maintainers :-)), and enjoy the benefits of the new warnings, while adding the undesired ones to the ‘nw’ variable.
Appendix A GNU Free Documentation License

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https://fsf.org/

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