This manual is for GNU Datamash (version 1.3, 25 January 2018), which provides command-line computations on input files.

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1 Overview

The datamash program (https://www.gnu.org/software/datamash) performs calculation (e.g. sum, count, min, max, skewness, standard deviation) on input files.

Example: sum up the values in the first column of the input:

```bash
$ seq 10 | datamash sum 1
55
```

datamash can group input data and perform operations on each group. It can sort the file, and read header lines.

Example: Given a file with three fields (name, subject, score), find the average score in each subject:

```bash
$ cat scores.txt
Name Subject Score
Bryan Arts 68
Isaiah Arts 80
Gabriel Health-Medicine 100
Tysza Business 92
Zackery Engineering 54
...

$ datamash --sort --headers --group 2 mean 3 sstdev 3 < scores.txt

<table>
<thead>
<tr>
<th>GroupBy(Subject)</th>
<th>mean(Score)</th>
<th>sstdev(Score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts</td>
<td>68.9474</td>
<td>10.4215</td>
</tr>
<tr>
<td>Business</td>
<td>87.3636</td>
<td>5.18214</td>
</tr>
<tr>
<td>Engineering</td>
<td>66.5385</td>
<td>19.8814</td>
</tr>
<tr>
<td>Health-Medicine</td>
<td>90.6154</td>
<td>9.22441</td>
</tr>
<tr>
<td>Life-Sciences</td>
<td>55.3333</td>
<td>20.606</td>
</tr>
<tr>
<td>Social-Sciences</td>
<td>60.2667</td>
<td>17.2273</td>
</tr>
</tbody>
</table>
```

datamash is designed for interactive exploration of textual data and for automating tasks in shell scripts.

datamash has a rich set of statistical functions to quickly assess information in textual input files. An example of calculating basic statistic (mean, 1st quartile, median, 3rd quarile, IQR, sample-standard-deviation, and p-value of Jarque-Bera test for normal distribution:

```bash
$ datamash -H mean 1 q1 1 median 1 q3 1 iqr 1 sstdev 1 jarque 1 < FILE

<table>
<thead>
<tr>
<th>mean(x)</th>
<th>q1(x)</th>
<th>median(x)</th>
<th>q3(x)</th>
<th>iqr(x)</th>
<th>sstdev(x)</th>
<th>jarque(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45.32</td>
<td>23</td>
<td>37</td>
<td>61.5</td>
<td>38.5</td>
<td>30.4487</td>
<td>8.0113-09</td>
</tr>
</tbody>
</table>
```
2 Invoking datamash

The format for running the datamash program is:

```
datamash [option]... op1 column1  [op2 column2 ...]
```

Where `op1` is the operation to perform on the values in `column1`. datamash reads input from stdin and performs one or more operations on the input data. If `--group` is used, each operation is performed on every group. If `--group` is not used, each operation is performed on all the values in the input file.

datamash supports the following operations:

Primary operations:

- `groupby`, `crosstab`, `transpose`, `reverse`, `check`

Line-Filtering operations:

- `rmdup`

Per-Line operations:

- `base64`, `debase64`, `md5`, `sha1`, `sha256`, `sha512`, `bin`, `strbin`, `round`, `floor`, `ceil`, `trunc`, `frac`

Group-by Numeric operations:

- `sum`, `min`, `max`, `absmin`, `absmax`, `range`

Group-by Textual/Numeric operations:

- `count`, `first`, `last`, `rand`, `unique`, `collapse`, `countunique`

Group-by Statistical operations:

- `mean`, `mode`, `median`, `q1`, `q3`, `iqr`, `perc`, `antimode`, `pstdev`, `sstdev`, `pvar`, `svar`, `mad`, `madraw`, `sskew`, `pskew`, `skurt`, `pkurt`, `jarque`, `dpo`, `scov`, `pcov`, `spearson`, `ppearson`

Grouping options:

- `--full`
- `-f` Print entire input line before op results (default: print only the grouped keys).
- `--group=X[,Y,Z]`
- `-g X[,Y,Z]` Group input via fields `X[i,Y,Z]`. By default, fields are separated by TABs. Use `--field-separator` to change the delimiter character. Input file must be sorted by the same fields `X[i,Y,Z]`. Use `--sort` to automatically sort the input. If `--group` is not specified, each operation is performed in the entire input file.
- `--header-in` Indicates the first input line is column headers, and should not be used for any calculations.
Chapter 2: Invoking datamash

--header-out
Print column headers as first line. If the column header names are known (i.e. the input file had a header line, and the command was invoked with --header-in, -H or --headers), prints the operation and the name of the field (e.g. 'mean(X)'). Otherwise, prints the number operation and the field number (e.g. 'mean(field-3)').

--headers
-H Same as --header-in --header-out. A short option indicating the input file has a header line, and the output should contain a header line as well.

--ignore-case
-i Ignore upper/lower case when comparing text for grouping, sorting, and comparing unique values in the 'countunique' and 'unique' operations.

--sort
-s Sort the input before grouping. datamash requires sorted input. If the input is not sorted, using --sort will automatically sort the input before processing it further. Sorting will be performed based on the specified --group parameter, and respecting case --ignore-case option (if used). The following commands are equivalent:

```
$ cat FILE | sort -k1,1 | datamash --group 1 sum 1
$ cat FILE | datamash --sort --group 1 sum 1
```

File Operation options:

--no-strict
Allow lines with varying number of fields. By default, transpose and reverse will fail with an error message unless all input lines have the same number of fields.

--filler=x
When use --no-strict option, missing fields will be filled with this value.

General options:

--format=FORMAT
print numeric values with printf style floating-point FORMAT.

--field-separator=x
-t x Use character X instead of TAB as input and output field delimiter. If --output-delimiter is also used, it will override the output field delimiter.

--narm
Skip NA or NaN values.

--output-delimiter=x
Use character X instead as output field delimiter. This option overrides --field-separator/-t/ --whitespace/-W.
--round=N
-R N Round numeric output to N decimal places.

--whitespace
-W Use whitespace (one or more spaces and/or tabs) for field delimiters. TAB character will be used as output field separator. If --output-delimiter is also used, it will override the output field delimiter.

--zero-terminated
-z End lines with a 0 byte, not newline.

--help Print an informative help message on standard output and exit successfully.

--version Print the version number and licensing information of Datamash on standard output and then exit successfully.
3 Available operations in datamash

Primary operations:

- **groupby**: alternative syntax for --group
- **crosstab**: cross-tabulate two fields (also known as 'pivot-tables')
- **transpose**: transpose rows, columns of a text file
- **reverse**: reverse fields in each line of a text file
- **check**: verify tabular structure of input (ensure same number of fields in all lines)

Line-Filtering operation:

- **rmdup**: remove lines with duplicated key value

Per-Line operations:

- **base64**: encode the field as base64
- **debase64**: decode the field as base64. Exit with an error if the field is invalid base64 value which cannot be decoded.
- **md5**: calculates md5 hash of the field
- **sha1**: calculates sha1 hash of the field
- **sha256**: calculates sha256 hash of the field
- **sha512**: calculates sha512 hash of the field

Group-by Numeric operations:

- **sum**: sum the of values
- **min**: minimum value
- **max**: maximum value
- **absmin**: minimum of the absolute values
- **absmax**: maximum of the absolute values
- **range**: range of values (maximum - minimum)

Group-By Textual/Numeric operations:

- **count**: count number of elements in the group
- **first**: the first value of the group
- **last**: the last value of the group
- **rand**: one random value from the group
- **unique**: comma-separated sorted list of unique values
- **collapse**: comma-separated list of all input values
- **countunique**: number of unique/distinct values
Group-By Statistical operations:

- **mean** mean of the values
- **trimmean** trimmed mean of the values
- **median** median value
- **q1** 1st quartile value
- **q3** 3rd quartile value
- **iqr** inter-quartile range
- **perc** percentile value
- **mode** mode value (most common value)
- **antimode** anti-mode value (least common value)
- **pstdev** population standard deviation
- **sstdev** sample standard deviation
- **pvar** population variance
- **svar** sample variance
- **mad** Median Absolute Deviation, scaled by a constant 1.4826 for normal distributions
- **madraw** Median Absolute Deviation, unscaled
- **sskew** skewness of the (sample) group
- **pskew** skewness of the (population) group
- **skurt** Excess Kurtosis of the (sample) group
- **pkurt** Excess Kurtosis of the (population) group
- **jarque** p-value of the Jarque-Beta test for normality
- **dpo** p-value of the D’Agostino-Pearson Omnibus test for normality.
4 Statistical Operations

Equivalent R functions

GNU Datamash is designed to closely follow R project’s (https://www.r-project.org/) statistical functions. See the files/operators.R file for the R equivalent code for each of datamash’s operators. When building datamash from source code on your local computer, operators are compared to known results of the equivalent R functions.
5 Usage Examples

5.1 Summary Statistics

The following are examples of using datamash to quickly calculate summary statistics. The examples will use a file with three fields (name, subject, score) representing grades of students:

```
$ cat scores.txt
Shawn  Arts  65
Marques Arts  58
Fernando Arts  78
Paul    Arts  63
Walter  Arts  75
...
```

Counting how many students study each subject (subject is the second field in the input file, thus `groupby 2`):

```
$ datamash --sort groupby 2 count 2 < scores.txt
Arts 19
Business 11
Engineering 13
Health-Medicine 13
Life-Sciences 12
Social-Sciences 15
```

Similary, find the minimum and maximum score in each subject:

```
$ datamash --sort groupby 2 min 3 max 3 < scores.txt
Arts 46 88
Business 79 94
Engineering 39 99
Health-Medicine 72 100
Life-Sciences 14 91
Social-Sciences 27 90
```

find the mean and (population) standard deviation in each subject:

```
$ datamash --sort groupby 2 mean 3 pstdev 3 < scores.txt
Arts 68.947 10.143
Business 87.363 4.940
Engineering 66.538 19.101
Health-Medicine 90.615 8.862
Life-Sciences 55.333 19.728
Social-Sciences 60.266 16.643
```

Find the median, first, third quartiles and the inter-quartile range in each subject:

```
$ datamash --sort groupby 2 median 3 q1 3 q3 3 iqr 3 < scores.txt
Arts 71 61.5 75.5 14
Business 87 83 92 9
Engineering 56 51 83 32
```
Health-Medicine  91  84  100   16
Life-Sciences  58.5  44.25  67.75  23.5
Social-Sciences  62  55  70.5  15.5

See Section 5.2 [Header Lines and Column Names], page 9, for examples of dealing with header lines.

5.2 Header Lines and Column Names

Output Header Lines
If the input does not have a header line, use --header-out to add a header in the first line of the output, indicating which operation was performed:

```bash
$ datamash --sort --header-out groupby 2 min 3 max 3 < scores.txt
GroupBy(field-2)  min(field-3)  max(field-3)
Arts  46  88
Business  79  94
Engineering  39  99
Health-Medicine  72  100
Life-Sciences  14  91
Social-Sciences  27  90
```

Skipping Input Header Lines
If the input has a header line (first line containing column names), use --header-in to skip the line:

```bash
$ cat scores_h.txt
Name  Major  Score
Shawn  Arts  65
Marques  Arts  58
Fernando  Arts  78
Paul  Arts  63
...

$ datamash --sort --header-in groupby 2 mean 3 < scores_h.txt
Arts  68.947
Business  87.363
Engineering  66.538
Health-Medicine  90.615
Life-Sciences  55.333
Social-Sciences  60.266
```

If the header line is not skipped, `datamash` will show an error (due to strict input validation):

```bash
$ datamash groupby 2 mean 3 < scores_h.txt
datamash: invalid numeric value in line 1 field 3: 'Score'
```
Using Header Lines

Column names in the input header lines can be printed in the output header lines by using
```
--headers
```
(or `-H`, both are equivalent to `--header-in --header-out`):

```
$ datamash --sort --headers groupby 2 mean 3 < scores_h.txt
GroupBy(Major)  mean(Score)
Arts            68.947
Business        87.363
Engineering     66.538
Health-Medicine 90.615
Life-Sciences   55.333
Social-Sciences 60.266
```

Or in short form (`-sH` instead of `--sort --headers`), equivalent to the above command:

```
$ datamash -sH groupby 2 mean 3
```

Column Names

When the input file has a header line, column names can be used instead of column numbers.
In the example below, `Major` is used instead of the value 2, and `Score` is used instead of
the value 3:

```
$ datamash --sort --headers groupby Major mean Score < scores_h.txt
GroupBy(Major)  mean(Score)
Arts            68.947
Business        87.363
Engineering     66.538
Health-Medicine 90.615
Life-Sciences   55.333
Social-Sciences 60.266
```

`datamash` will read the first line of the input, and deduce the correct column number
based on the given name. If the column name is not found, an error will be printed:

```
$ datamash --sort --headers groupby 2 mean Foo < scores_h.txt
datamash: column name 'Foo' not found in input file
```

5.3 Field Delimiters

`datamash` uses tabs (ascii character 0x09) as default field delimiters. Use `-W` to treat one or
more consecutive whitespace characters as field delimiters. Use `-t`, `--field-separator` to
set a custom field delimiter.

The following examples illustrate the various options.

By default, fields are separated by a single tab tab. Multiple tabs denotes multiple fields
(this is consistent with GNU coreutil's `cut`):

```
$ printf '1\t\t2\n' | datamash sum 3
2
$ printf '1\t\t2\n' | cut -f3
2
```

Using `-W`, one or more consecutive whitespace characters are treated as a single field
delimiter:
$ printf '1 \t 2\n' | datamash -W sum 2
2
$ printf '1 \t 2\n' | datamash -W sum 3
datamash: invalid input: field 3 requested, line 1 has only 2 fields

Using -t, a custom field delimiter character can be specified. Multiple consecutive delimiters are treated as multiple fields:

$ printf '1,10,,100\n' | datamash -t, sum 4
100

5.4 Column Ranges

datamash accepts column ranges such as 1,2,3 and 1-3.

Simulating input with multiple columns:

$ seq 100 | paste -- -- --
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
...

The following are equivalent:

$ seq 100 | paste -- -- -- | datamash sum 1 sum 2 sum 3 sum 4
1225 1250 1275 1300

$ seq 100 | paste -- -- -- | datamash sum 1,2,3,4
1225 1250 1275 1300

$ seq 100 | paste -- -- -- | datamash sum 1-4
1225 1250 1275 1300

$ seq 100 | paste -- -- -- | datamash sum 1-3,4
1225 1250 1275 1300

Ranges can be used with multiple operations:

$ seq 100 | paste -- -- -- | datamash sum 1-4 mean 1-4
1225 1250 1275 1300 49 50 51 52

5.5 Reverse and Transpose

Transpose

Use transpose to swap rows and columns in a file:

$ cat input.txt
Sample Year Count
A 2014 1002
B 2013 990
C 2014 2030
D 2014 599

$ datamash transpose < input.txt
Sample A B C D
Year 2014 2013 2014 2014
Count 1002 990 2030 599

By default, transpose verifies the input has the same number of fields in each line, and fails with an error otherwise:

$ cat input.txt
Sample Year Count
A 2014 1002
B 2013
C 2014 2030
D 2014 599

$ datamash transpose < input1.txt
datamash: transpose input error: line 3 has 2 fields (previous lines had 3); see --help to disable strict mode

Use --no-strict to allow missing values:

$ datamash --no-strict transpose < input1.txt
Sample A B C D
Year 2014 2013 2014 2014
Count 1002 N/A 2030 599

Use --filler to set the missing-field filler value:

$ datamash --no-strict --filler XYZ transpose < input1.txt
Sample A B C D
Year 2014 2013 2014 2014
Count 1002 XYZ 2030 599

Reverse

Use reverse to reverse the fields order in a file:

$ cat input.txt
Sample Year Count
A 2014 1002
B 2013 990
C 2014 2030
D 2014 599

$ datamash reverse < input.txt
Count Year Sample
1002 2014 A
990 2013 B
2030 2014 C
599 2014 D
By default, reverse verifies the input has the same number of fields in each line, and fails with an error otherwise. Use \texttt{--no-strict} to disable this behaviour (see section above for an example).

## Combining Reverse and Transpose

Reverse and Transpose can be combined to achieve various manipulations. (reminder: \texttt{tac} (https://www.gnu.org/software/coreutils/tac) can be used to reverse lines in a file):

\begin{verbatim}
$ cat input.txt
A   1   xx
B   2   yy
C   3   zz

$ tac input.txt
C   3   zz
B   2   yy
A   1   xx

$ tac input.txt | datamash reverse
zz  3   C
yy  2   B
xx  1   A

$ cat input.txt | datamash reverse | datamash transpose
xx  yy  zz
1    2    3
A    B    C

$ tac input.txt | datamash reverse | datamash transpose
zz  yy  xx
3    2    1
C    B    A
\end{verbatim}

### 5.6 Groupby on /etc/passwd

datamash with the groupby operation mode can be used to aggregate information.

Using this simulated /etc/passwd file as input:

\begin{verbatim}
$ cat passwd
root:x:0:0:root:/root:/bin/bash
daqm:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
\end{verbatim}
Parameter `-t` is used to indicate the field separator `:` (instead of the default `tab`).

Aggregate (`groupby`) login shells (column 7) and count how many users use each:

```
$ datamash -t: --sort groupby 7 count 7 < passwd
/bin/bash:7
/bin/false:4
/bin/sync:1
/usr/sbin/nologin:14
```

Aggregate (`groupby`) login shells (column 7) and print comma-separated list of users (column 1) for each shell (`collapse`):

```
$ cat passwd | datamash -t: --sort groupby 7 collapse 1
/bin/bash:root,guest,gordon,charles,alice,bob,postgres
/bin/false:mysql,rabbitmq,redis,postfix
/bin/sync:sync
/usr/sbin/nologin:daemon,bin,sys,games,man,lp,mail,news,uucp,proxy,www-data,backup,list
```

Aggregate unix-groups (column 4) and print comma-separated list of users (column 1) for each group:

```
$ datamash -t: --sort groupby 4 collapse 1 < /etc/passwd
0:root
1:daemon
10:uucp
1000:gordon,charles,alice,bob
12:man
124:mysql
125:guest
126:postgres
```
5.7 Check - checking tabular structure

datamash check validates the tabular structure of a file, ensuring all lines have the same number of fields. check is meant to be used in scripting and automation pipelines, as it will terminate with non-zero exit code if the file is not well structured, while also printing detailed context information about the offending lines:

```
$ cat good.txt
A 1 ww
B 2 xx
C 3 yy
D 4 zz

$ cat bad.txt
A 1 ww
B 2 xx
C 3
D 4 zz

$ datamash check < good.txt && echo ok || echo fail
4 lines, 3 fields
ok

$ datamash check < bad.txt && echo ok || echo fail
line 2 (3 fields):
  B 2 xx
line 3 (2 fields):
  C 3
datamash: check failed: line 3 has 2 fields (previous line had 3)
fail
```
5.7.1 Expected number of lines/fields

`check` accepts optional `lines` and `fields` and will return failure if the input does not have the requested number of lines/fields.

The syntax is:

```
datamash check [N lines] [N fields]
```

Usage examples:

```
$ cat file.txt
A  1  ww
B  2  xx
C  3  yy
D  4  zz

$ datamash check 4 lines < file.txt && echo ok
4 lines, 3 fields
ok

$ datamash check 3 fields < file.txt && echo ok
4 lines, 3 fields
ok

$ datamash check 4 lines 3 fields < file.txt && echo ok
4 lines, 3 fields
ok

$ datamash check 7 fields < file.txt && echo ok
line 1 (3 fields):
  A  1  ww
datamash: check failed: line 1 has 3 fields (expecting 22)

$ datamash check 10 lines < file.txt && echo ok
datamash: check failed: input had 4 lines (expecting 10)
```

For convenience, `line,row,rows` can be used instead of `lines`; `field,columns,column,col` can be used instead of `fields`. The following are all equivalent:

```
datamash check 4 lines 10 fields < file.txt
datamash check 4 rows 10 columns < file.txt
datamash check 10 col 4 row < file.txt
```

5.7.2 checks in automation scripts

In pipeline/automation context, it is often beneficial to validate files as early as possible (immediately after file is created, as in fail-fast methodology ([https://en.wikipedia.org/wiki/Fail-fast](https://en.wikipedia.org/wiki/Fail-fast))). A typical usage in a shell script would be:
#!/bin/sh

die()
{
    base=$(basename ""$0"")
    echo "$base: error: $@" >&2
    exit 1
}

custom pipeline-or-program > output.txt \
    || die "program failed"

datamash check < output.txt \
    || die "'output.txt' has invalid structure (missing fields)"

If the generated output.txt file has invalid structure (i.e. missing fields), datamash will print the stderr enough details to help in troubleshooting (line numbers and offending line's content).

5.8 Cross-tab - Cross-Tabulation (pivot-tables)

Cross-tabulation compares the relationship between two fields. Given the following input file:

```
$ cat input.txt
a x 3
a y 7
b x 21
a x 40
```

Show cross-tabulation between the first field (a/b) and the second field (x/y) - counting how many times each pair appears (note: sorting is required):

```
$ datamash -s crosstab 1,2 < input.txt
  x   y
  a  2  1
  b  1  N/A
```

The default operation is count - in the above example, a and x appear twice in the input file, while b and y never appear together.

An optional grouping operation can be used instead of counting.

For each pair, sum the values in the third column:

```
$ datamash -s crosstab 1,2 sum 3 < input.txt
  x   y
  a  43  7
  b  21  N/A
```

For each pair, list all unique values in the third column:

```
$ datamash -s crosstab 1,2 unique 3 < input.txt
  x   y
  a  3,40 7
```
5.9 Rounding numbers

The following demonstrate the different rounding operations:

\[
\text{\$ ( echo }\ X\ ;\ \text{seq }-1.25\ 0.25\ 1.25)\ \text{\}) \\text{\}\n\mid\ \text{datamash --full }\text{--H round 1 ceil 1 floor 1 trunc 1 frac 1}
\]

<table>
<thead>
<tr>
<th>X</th>
<th>round(X)</th>
<th>ceil(X)</th>
<th>floor(X)</th>
<th>trunc(X)</th>
<th>frac(X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.25</td>
<td>-1</td>
<td>-1</td>
<td>-2</td>
<td>-1</td>
<td>-0.25</td>
</tr>
<tr>
<td>-1.00</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>-0.75</td>
<td>-1</td>
<td>0</td>
<td>-1</td>
<td>0</td>
<td>-0.75</td>
</tr>
<tr>
<td>-0.50</td>
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</table>

5.10 Binning numbers

Bin input values into buckets of size 5:

\[
\text{\$ ( echo }\ X\ ;\ \text{seq }-10\ 2.5\ 10)\ \text{\}) \\text{\}\n\mid\ \text{datamash --H --full bin:5 1}
\]

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</tbody>
</table>

5.11 Binning strings

Hash any string input value into a numeric integer. A typical usage would be to split an input file into \(N\) chunks, ensuring that all values of a certain key will be stored in the same chunk:

\[
\text{\$ cat input.txt}
\text{PatientA 10}
\text{PatientB 11}
\text{PatientC 12}
\text{PatientA 14}
\]
PatientC 15

Each patient ID is hashed into a bin between 0 and 9 and printed in the last field:

$ datamash --full strbin 1 < input.txt

PatientA 10 5
PatientB 11 6
PatientC 12 7
PatientA 14 5
PatientC 15 7

Splitting the input into chunks can be done with awk:

$ cat input.txt | datamash --full strbin 1 \
    | awk '{print > $NF ".txt"}'}
6 Reporting bugs

To report bugs, suggest enhancements or otherwise discuss GNU Datamash, please send electronic mail to bug-datamash@gnu.org.

For bug reports, please include enough information for the maintainers to reproduce the problem. Generally speaking, that means:

- The version numbers of Datamash (which you can find by running `datamash --version`) and any other program(s) or manual(s) involved.
- Hardware and operating system names and versions.
- The contents of any input files necessary to reproduce the bug.
- The expected behavior and/or output.
- A description of the problem and samples of any erroneous output.
- Options you gave to configure other than specifying installation directories.
- Anything else that you think would be helpful.

When in doubt whether something is needed or not, include it. It’s better to include too much than to leave out something important.

Patches are welcome; if possible, please make them with `diff -c` (see Section “Overview” in Comparing and Merging Files) and include ChangeLog entries (see Section “Change Log” in The GNU Emacs Manual). Please follow the existing coding style.
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