GDL – GNU Data Language

presented by Alain Coulais & Sylwester Arabas
alain.coulais@obspm.fr / sarabas@igf.fuw.edu.pl

The GDL team:
Marc Schellens, Alain Coulais, Joel Gales, Sylwester Arabas, and many, many more volunteers around the world!

(Marc is the primary author and the maintainer of GDL)
Plan of the talk

- What’s GDL? (Sylwester)
- Who uses it and why? (Alain)
- Why/how/when could GDL become a GNU package? (You)
What’s GDL (and IDL/PV-WAVE)

http://www.ittvis.com/

- GDL\(^a\) is developed with the aim of providing a free/libre/open-source drop-in replacement for IDL®
- IDL (ITT VIS Interactive Data Language):
  - is a tool for data analysis and visualisation
  - is a programming language (’77)
  - is a popular software package in astrophysics, atmospheric physics, hyperspectral and medical imaging (in some cases a de facto standard)
  - is proprietary and expensive
  - is related with GDL as Matlab with Octave/Scilab, etc.

\(^a\) despite its name, GDL is not an official GNU package yet
What’s GDL (and IDL/PV-WAVE)

http://www.ittvis.com/

- **GDL** is developed with the aim of providing a free/libre/open-source drop-in replacement for **IDL**
- **IDL** (ITT VIS Interactive Data Language):
  - is a tool for data analysis and visualisation
  - is a programming language ('77) (cf. archives of comp.lang.idl-pvwave)
  - is a popular software package in astrophysics, atmospheric physics, hyperspectral and medical imaging (in some cases a de facto standard)
  - is proprietary and expensive
  - is related with GDL as Matlab with Octave/Scilab, etc.

- Despite its name, GDL is not an official GNU package yet
What’s GDL (and IDL/PV-WAVE)

http://www.ittvis.com/

- **GDL** is developed with the aim of providing a free/libre/open-source drop-in replacement for IDL®
- **IDL (ITT VIS Interactive Data Language):**
  - is a tool for data analysis and visualisation
  - is a programming language (’77) (cf. archives of comp.lang.idl-pvwave)
  - is a popular software package in astrophysics, atmospheric physics, hyperspectral and medical imaging (in some cases a de facto standard)
  - is proprietary and expensive
  - is related with GDL as Matlab with Octave/Scilab, etc.

\[a\] despite its name, GDL is not an official GNU package yet
What’s GDL (and IDL/PV-WAVE)

http://www.ittvis.com/

- **GDL** is developed with the aim of providing a free/libre/open-source drop-in replacement for IDL®.
- **IDL (ITT VIS Interactive Data Language):**
  - is a tool for data analysis and visualisation
  - is a programming language (’77) (cf. archives of comp.lang.idl-pvwave)
  - is a popular software package in astrophysics, atmospheric physics, hyperspectral and medical imaging (in some cases a de facto standard)
  - is proprietary and expensive
  - is related with GDL as Matlab with Octave/Scilab, etc.

\(^a\) despite its name, GDL is not an official GNU package yet
What’s GDL (and IDL/PV-WAVE)

http://www.ittvis.com/

• GDL\(^a\) is developed with the aim of providing a free/libre/open-source drop-in replacement for IDL\(^\text{\textcopyright}\)

• IDL (ITT VIS Interactive Data Language):
  - is a tool for data analysis and visualisation
  - is a programming language ('77) (cf. archives of comp.lang.idl-pvwave)
  - is a popular software package in astrophysics, atmospheric physics, hyperspectral and medical imaging (in some cases a de facto standard)
  - is proprietary and expensive
  - is related with GDL as Matlab with Octave/Scilab, etc.

\(^a\) despite its name, GDL is not an official GNU package yet
What's GDL (and IDL/PV-WAVE)

GDL\textsuperscript{a} is developed with the aim of providing a free/libre/open-source drop-in replacement for IDL\textsuperscript{®}

IDL (ITT VIS Interactive Data Language):

- is a tool for data analysis and visualisation
- is a programming language (’77)
- is a popular software package in astrophysics, atmospheric physics, hyperspectral and medical imaging (in some cases a de facto standard)
- is proprietary and expensive
- is related with GDL as Matlab with Octave/Scilab, etc.

\textsuperscript{a} despite its name, GDL is not an official GNU package yet
...one may say that the idea behind GDL is to make this simpler for a scientist.
...one may say that the idea behind GDL is to make this simpler for a scientists.
Demo (typical usage: load, analyse and plot data)

```idl
a = make_array(1024, /float)
a[9] = 1
save, a, file='demo.sav'

restore, 'demo.sav'
help
print, min(a)
print, max(a)
print, sqrt(mean(a^2) - mean(a)^2)
f = fft(a)
help, f
p = abs(f)^2
print, sqrt(total(p[1:-1]))
print, python('numpy', 'std', a)
plot, wtn(a, 4, /inverse)
```

; <- here we use CMSVLIB
;    for reading IDL's obscure file format
; \ 
; | ------ with a bigger array, OpenMP
; / 
; would be used for parallelisation
; <- FFTW 
; \
; \ __ __ / 
; / 
; <- here Python/numpy is called
; <- here we use Plplot for plotting
; and GSL for wavelet transform
; Przygotowanie danych
; łacz dane z dwóch sąsiednich
; plików, zadając warunek, żeby
; pierwszy bin był 6 godzin 60 UTC a
; ostatni 60 UTC 24 godziny później

t_0 = day1994(mm, dd, yyyy, 0, 6, 0) ; godzina zapisana w formacie sekund
l_1 = day1994(mm, dd, yyyy, 0, 0, 0)
index_t_0 = where(t gt t_0 and t lt t_0+420)
index_l_1 = where(t_2 lt l_1 and t_2 gt l_1-20)
print(index_t_0, index_l_1)
snl = [snl[*], index_t_0(0):n_elements(t)-1], [snl[*], index_l_1(0):n_elements(t)-1]

; Tworzę tablice odpowiadające regionowi powyżej wyznaczonej granicy
r_brdr = 5000
snl_up = snl[r_brdr/15:n_elements(r)-1, *]
r_up = r[r_brdr/15:n_elements(r)-1]

snl[*] = 5000
for i=8,n_elements(r_up)-1 do begin
  snl[*] = (15*i) * snl[*]
end

-------

% READFITS: Now reading 1024 by 1024 array
% READFITS: Now reading FITS extension of type IMAGE
% Stop encountered: DEMOHST
24 demoHST.pro

readfits.pro

AG, May 2005
reading FITS files and displaying pretty images
pro demoHST, test=test
LOADCT, 3D

msg =
while (1) window (0) do WHILE
image=READFITS( "data3D_Fits.fits", h, ext=1)
WINDOW, 0
TPFCL, REDIM(image, 512, 512)
image=READFITS( "data3D_Fits.fits", h, ext=1)
WINDOW, 1, minx=1000, prsys=1000
TPFCL, image
image=REDIM(image, 512, 512)
WINDOW, 2
TPFCL, image
msg =
read, press enter to continue: . msg
histo, msg
read, press enter to continue: . msg
tool, msg > 10
read, press enter to continue: . msg
if KEYWORD_EGJ(test) then stop

msg =
write, msg =
Wrote /obs/cornell/brook/AvroHST.pro

CCL CLC
People do acknowledge the use of GDL in referred papers:

  „Calculations on 4-core, 2.4 GHz, 64-bit processors with 4 Gib RAM, using GDL-0.9rc4 running under GNU/Linux, took about 3 hours per map.‟

  „Using one single IDL session, we would need 47 days … installing an IDL licence on each cluster node was not an option, we used the open source clone of IDL, GNU Data Language”

  „The open source GDL (Gnu Data Language) interpreter can also be used to run ULySS”

  „The deconvolution of the count maps was done numerically with GDL, the GNU Data Language”
Packages

- Thanks to all packagers:
  (incl. Juan A. Añel, Markus Dittrich, Takeshi Enomoto, Sébastien Fabbro,
  Orlando Garcia Feal, Gaurav Khanna, Justin Lecher, Sebastien Maret,
  Lea Noreskal, Orion Poplawski, Marius Schamschula, Gürkan Sengün,
  Thierry Thomas, . . .)

- GDL (the current version!) is available as a package for:
  - ArchLinux
  - Debian
  - Fedora
  - Gentoo
  - Ubuntu
  - FreeBSD
  - Fink
  - MacPorts
  - Hmug
  - ...

- More help and feedback needed:
  - upgrades/enhancements to existing packages
  - new packages (OpenSUSE, Homebrew, Cygwin, Solaris,
    CentOS, Slackware . . .)
Packages

• Thanks to all packagers:
  (incl. Juan A. Añel, Markus Dittrich, Takeshi Enomoto, Sébastien Fabbro, Orlando Garcia Feal, Gaurav Khanna, Justin Lecher, Sebastien Maret, Lea Noreskal, Orion Poplawski, Marius Schamschula, Gürkan Sengün, Thierry Thomas, . . .)

• GDL (the current version!) is available as a package for:
  - ArchLinux
  - Debian
  - Fedora
  - Gentoo
  - Ubuntu
  - FreeBSD
  - Fink
  - MacPorts
  - Hmug
  - ...

• More help and feedback needed:
  - upgrades/enhancements to existing packages
  - new packages (OpenSUSE, Homebrew, Cygwin, Solaris, CentOS, Slackware . . .)
• Thanks to all packagers:
  (incl. Juan A. Añel, Markus Dittrich, Takeshi Enomoto, Sébastien Fabbro, Orlando Garcia Feal, Gaurav Khanna, Justin Lecher, Sebastien Maret, Lea Noreskal, Orion Poplawski, Marius Schamschula, Gürkan Sengün, Thierry Thomas, . . . )

• GDL (the current version!) is available as a package for:
  • ArchLinux
  • Debian
  • Fedora
  • Gentoo
  • Ubuntu
  • FreeBSD
  • Fink
  • MacPorts
  • Hmug
  • ...

• More help and feedback needed...
  • upgrades/enhancements to existing packages
  • new packages (OpenSUSE, Homebrew, Cygwin, Solaris, CentOS, Slackware . . . )
Thanks for your attention!

http://gnudatalanguage.sf.net/ (new website!)

Topics for discussion:

• becoming a GNU package:
  • why?
  • how? (progress on GDL documentation)
  • who can help? whom to contact?

• Google SoC? (Juan’s suggestion)

• Packaging issues:
  • ...