

Ada in Debian GNU/Linux - slides suitable for a 50-minute presentation
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I originally wrote these slides for a 30-minute presentation that I gave at the Libre Software Meeting in Bordeaux in 2004, and modified them for a 50-minute presentation at FOSDEM 2006 in Brussels. I made sure these slides were reusable in the future.

Ada in Debian GNU/Linux

★ Why ?

- Contribute to free software
- Promote Ada to the Debian community
- Promote Debian to the Ada community
- Provide a development platform that is complete, integrated and consistent
- To have fun!

★ <http://www.debian.org>



debian

The Debian community

★ Debian is not a product, it is a community (1200 developers)

- ➔ Vendor independent
- ➔ The Debian Constitution brings developers together
- ➔ The distribution is 100% free and standards-compliant
- ➔ Anyone can contribute
- ➔ Stable releases are made “when they're ready”
- ➔ Emphasis on quality

★ 21% of GNU/Linux users (<http://counter.li.org>)

- ➔ surpasses Red Hat and Fedora Core combined (19%)
- ➔ market share is increasing
- ➔ not even counting Ubuntu

★ Mailing lists (<http://lists.debian.org>)

The Debian distribution

★ The largest GNU/Linux distribution

- ➔ 9400 source packages, 16400 binary packages, 14 CD-ROMs
- ➔ 12 architectures supported: alpha, amd64, arm, hppa, i386, ia64, m68k, mips, mipsel, powerpc, s390, sparc

★ All packages obey the same Debian Policy

★ Several specialised distributions are based on Debian

- ➔ Debian-Med, Debian-Edu, Debian-Junior, etc.
- ➔ Live CD: Knoppix (with KDE), Morphix (with GNOME)
- ➔ Commercial : Xandros, Lycoris
- ➔ Skolelinux (server and thin clients)
- ➔ LinEx, Linux de Extremadura (<http://www.linex.org>)
- ➔ Ubuntu (<http://www.ubuntu.com>)

How does Debian work?

- ★ The *unstable* distribution receives all new packages
 - ➔ Only Debian Developers may upload packages
- ★ The *testing* distribution receives packages that:
 - ➔ stayed at least 10 days in *unstable* (5 or 2 days for important packages)
 - ➔ have no release-critical bugs
 - ➔ depend on other packages that are already in *testing*
 - ➔ Scripts build *testing* on a daily basis
- ★ The *stable* distribution only receives critical fixes
 - ➔ Latest stable is Debian 3.1 “Sarge” (June 2005)
 - ➔ Next stable is “Etch”, scheduled for December 2006

Available Ada packages (1)

★ Development platform:

- **gnat** compiler (with ASIS), **gnat-gdb** debugger
- **gnat-gps** integrated development environment
- **adabrowse** documentation system
- **gnat-glade** for distributed applications
- ASIS-based style checker, **gch**

★ Documentation : Ada Reference Manual

Available Ada packages (2)

★ Libraries

- ➔ Networking : **adacgi**, **libadasockets**, **libaws** (Ada Web Server)
- ➔ Graphical interfaces : **libadabindx** (Lesstif), **libgtkada2** (GTK+)
- ➔ Text-mode interfaces : **libtexttools**
- ➔ Data structures and algorithms : **libcharles**, **libxmlada**
- ➔ Relational databases : **gnade** (GNU Ada Database Environment)
- ➔ Other : **libaunit** (unit testing), **libflorist** (POSIX interface), **libopentoken** (lexical analysis)

★ 1 million lines of code, 160 MB installed

Versions of GNAT

Version	Date	ASIS, Glade, Florist	Tasking on powerpc	libgnat.so
GNAT 3.14p (GCC 2.8.1)	Oct 2001	Yes	Yes	Yes
GNAT 3.15p (GCC 2.8.1)	Oct 2002	Yes	Yes	Yes
GCC 3.3	May 2003	No	No	No
GCC 3.4	Apr 2004	No	No	Yes
GCC 4.0	Apr 2005	No	Yes	Yes
GNAT GPL 2005 (GCC 3.4.4)	Nov 2005	Yes	Yes	Yes
GCC 4.1	Feb 2006?	No	Yes	Yes

★ All versions have different ABIs, so are incompatible

★ Policy: use one version for all packages in Debian

➔ 3.0 “Woody”: GNAT 3.14p

➔ 3.1 “Sarge”: GNAT 3.15p

➔ i386, powerpc, sparc

★ Policy: backport fixes and maintain the chosen GNAT well

Maintenance of GNAT

★ Since July 2003

★ Bugs

- ➔ Use the Debian BTS as a public bug database on GNAT 3.15p
- ➔ Write test cases (~120 tests)
- ➔ Forward bug reports to GCC's bugzilla
- ➔ Backport fixes to GNAT 3.15p

★ libgnatvsn (GNAT Version and other internals)

- ➔ Build from the GNAT sources, share with ASIS, GLADE and others
- ➔ License: GNAT-Modified GPL

★ libgnatprj (GNAT Project Manager)

- ➔ Build from GNAT sources, share with ASIS, GLADE and others
- ➔ Link gnatmake et al dynamically instead of statically
- ➔ License: pure GPL (part of the compiler)

★ Support for GNU/kFreeBSD (January 2006, Aurélien Jarno)

GCC vs. GNAT GPL (1)

★ GNAT GPL 2005 Edition released November 2005

- Excellent technical quality
- Supports several features of Ada 2005
- ASIS, GLADE and all libraries synchronised
- Available on i386-*-linux-gnu, powerpc-*-darwin and i386-*-win32
- Based on GCC 3.4.4 + 700 kb worth of patches
- Ada sources not entirely merged in GCC's repository
 - diff from 3.4.4 to GNAT GPL: 16 megabytes (counting Ada only!)
 - diff from 4.0.1 to GNAT GPL: 11 megabytes (counting Ada only!)
 - diff from 4.1 branchpoint to GNAT GPL: 11 megabytes (counting Ada only!)
- Not available for other platforms, e.g. amd64, sparc

GCC vs. GNAT GPL (2)

★ What is the GNAT-Modified GPL?

- Only affects the run-time library; the compiler has always been pure GPL.
- “Special exception” clause allows using the library in proprietary software
- Present in all public versions of GNAT until 3.15p
- Present in all versions of GNAT Pro
- Present in all versions of GCC
- Removed from GNAT GPL 2005 Edition

```
-- GNAT is free software; you can redistribute it and/or modify it under --  
-- terms of the GNU General Public License as published by the Free Soft- --  
-- ware Foundation; either version 2, or (at your option) any later ver- --
```

```
[...]
```

```
-- As a special exception, if other files instantiate generics from this --  
-- unit, or you link this unit with other files to produce an executable, --  
-- this unit does not by itself cause the resulting executable to be --  
-- covered by the GNU General Public License. This exception does not --  
-- however invalidate any other reasons why the executable file might be --  
-- covered by the GNU Public License. --
```

GCC vs. GNAT GPL (3)

★ Long debate on comp.lang.ada in November 2005

★ Pro GPL:

- ➔ Technical quality
- ➔ Combat proprietary software, which is immoral

★ Pro GNAT-Modified GPL:

- ➔ Selfish: Want to sell proprietary software, but cannot afford GNAT Pro
- ➔ Interoperability: link with programs under other free licenses (e.g. BSD)
- ➔ The GPL's virality is immoral
- ➔ Betrayed contributor: “I contributed work under GMGPL, I don't like that the exception was removed”
- ➔ Marketing: the GPL would slow adoption of Ada in SMEs
- ➔ Competition: libstdc++ also uses a license with special permission

GCC vs. GNAT GPL (4)

★ Call for vote on comp.lang.ada

- ➔ Which compiler for Etch?
- ➔ Choose between GNAT GPL, GCC 3.4 and GCC 4.0
- ➔ +2 points for a strong preference
- ➔ +1 point for “default choice”
- ➔ -1 point for strong opposition against one choice

★ Results:

GNAT GPL 2005	GCC 3.4	GCC 4.0
-11	7	16

★ And the winner is...

★ **GCC 4.1** :)

Planned transition to GCC 4.1 (1)

★ Goals and benefits of the transition:

- ➔ More hardware platforms supported: amd64, ppc64, hppa.
- ➔ Ada 2005 features
- ➔ Provide all libraries with the GNAT-Modified GPL

★ Activities planned

- ➔ Port patches from GNAT 3.15p to GCC 4.1
 - especially symbolic tracebacks, libgnatvsn and libgnatprj
- ➔ Backport fixes from GCC's trunk as necessary for stability
- ➔ Port ASIS and GLADE to GCC 4.1
 - Work has started on SourceForge, thanks to Martin Krischik
 - Requires knowledge of GNAT internals
- ➔ Take other libraries and GPS from CVS, allows use of the GNAT-Modified GPL

Planned transition to GCC 4.1 (2)

★ Timeline of the transition:

- ➔ Decision: November 2005
- ➔ GCC 4.1 in Debian experimental: December 2005
- ➔ Work starts: March 2006
- ➔ GCC 4.1 release: February or March 2006
- ➔ GCC 4.1 eventually becomes the new default in Debian, 4.0 removed
 - GCC 3.4 remains in Debian for Fortran 77 and Pascal
- ➔ Planned toolchain freeze: June 2006
- ➔ Planned general freeze: November 2006
- ➔ Planned release of Etch: December 2006

★ But...

I'm being sort of side-tracked...

So I don't know if I can deliver
on all these promises.



Libraries (1)

★ Goal : offer a consistent and integrated development platform

★ Consistent:

→ All libraries are packaged according to the same principles

→ 1 source package yields 2 or 3 binary packages:

→ libLIBRARY1 (/usr/lib/libLIBRARY.so.1.2.3)

→ libLIBRARY-dev

→ libLIBRARY-doc

★ Integrated:

→ Three dependency kinds between packages

→ *depends*, *recommends*, *suggests*

Libraries (2)

★ GNU Ada Environment Specification for file system hierarchy

- ➔ Sources : `/usr/share/ada/adainclude/LIBRARY/*.ad[bs]`
- ➔ ALI : `/usr/lib/ada/adalib/LIBRARY/*.ali`
- ➔ Project file : `/usr/share/ada/adalib/LIBRARY.gpr`
- ➔ Symlink to the shared library : `/usr/lib/libLIBRARY.so`
- ➔ Static library : `/usr/lib/libLIBRARY.a`
- ➔ All these files are in the `-dev` package

★ Documentation is in `-dev` or `-doc`

- ➔ `/usr/share/doc/libLIBRARY-doc/*`

★ Actual shared library is in the library package

- ➔ `/usr/lib/libLIBRARY.so.1.2.3`
- ➔ `/usr/lib/libLIBRARY.so.1 -> libLIBRARY.so.1.2.3`

Libraries (3)

```
with "/usr/share/ada/adainclude/gtkada2.gpr";
project Testgtk is
  for Source_Dirs use (".", "opengl");
  for Object_Dir use "obj";
  for Exec_Dir use ".";
  for Main use ("testgtk");
  package Compiler is
    for Default_Switches ("Ada") use ("-g", "-O1", "-gnatafo");
  end Compiler;
  package Binder is
    for Default_Switches ("Ada") use ("-E");
  end Binder;
  package Linker is
    for Default_Switches ("Ada") use
      (GtkAda2.Ada_Switches, "-lgtkada2_gl", "lw.o");
  end Linker;
end Testgtk;
```

Call for contributions

★ You can help!

★ Report bugs, provide patches

➔ GCC 4.1 on new architectures: amd64, powerpc64, kfreebsd-i386

★ Co-maintain packages

★ Adopt packages

➔ PolyORB, BUSH (BUbusiness SHell), Booch Components, Ada Image Server, Adagio, Grace, AdaCL, Adasubst/Adadep/AdaControl, etc. etc.

➔ probably another million lines of code waiting to be packaged

How to become a Debian Developer

★ Identify yourself

- ➔ Generate a GPG key
- ➔ Have your key signed by a Debian Developer

★ Adopt one or more packages

★ Announce them on debian-mentors@lists.debian.org

★ Find a sponsor

- ➔ He will check your packages
- ➔ He will upload them to Debian

★ Apply and find an advocate

- ➔ The advocate recommends the applicant
- ➔ The applicant is accepted as a Debian Developer

Conclusions

- ★ Debian today offers the most complete Ada development environment
- ★ Promotion of Debian to the Ada community works
- ★ Promotion of Ada to the Debian community is in progress
- ★ References

- ➔ Debian Policy for Ada :

- <http://www.ada-france.org/debian/debian-ada-policy.html>

- ➔ Debian : <http://www.debian.org>

- ➔ Newsgroups comp.lang.ada and fr.comp.lang.ada