Debian GNU/Linux, for the Right Reasons

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■ The Debian project was founded in 1993 and
■ its Linux distribution is known for reliability.
■ It is the basis for derivatives such as Ubuntu.

■ This talk will cover the goals and priorities that distinguish Debian from other operating system distributors, offering simplicity to administrators and flexibility to system designers.

■ The distribution supports smooth upgrades between releases,
■ virtually eliminating the need for reinstalls.
■ The talk will conclude with some techniques for minimizing the
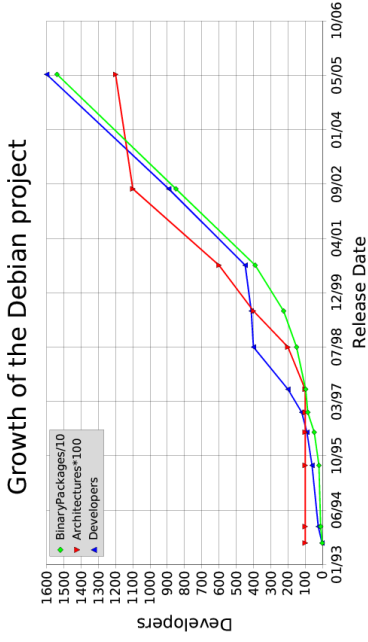■ inconvenience caused by differences in package versions across upgrades.

Software in the Public Interest (SPI)

■ Incorporated, 1997 in New York
  ● Section 501(c)(3) Not-For-Profit
  ● http://www.spi-inc.org/

■ Umbrella for several technologies
  ● Debian, PostgreSQL, GNUstep,
  ● Fresco, OFTC, GNU TeXmacs, wxWidgets

■ This talk will only discuss Debian …
  ● Founded in 1993 by Ian Murdock (went on to Progeny, LSB, Sun)
  ● Has more code than Windows XP (~$2 billion value)
  ● Reliability and stability achieved by over 1000 maintainers

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Sustained growth in many areas

■ Growth in software and types of hardware supported
  ● Over 26000 packages run on 11 computer architectures (Arches)
  ● Partial support for 5 more, as well as 3 non-Linux kernels

Growth of the Debian project

Legend:
- BinaryPackages/10
- Architectures*100
- Developers

Y-axis (Developers): 0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600

X-axis (Release Date): 01/93, 06/94, 10/95, 03/97, 07/98, 12/99, 04/01, 09/02, 01/04, 05/05, 10/06

The Debian GNU/Linux distribution

■ Equivalent content to competing distributions
  ● The Linux kernel and associated administrative programs
  ● Various GNU tools, utilities and applications
  ● Thousands of other applications and alternatives
  ● Apache, MySQL, Perl, OpenOffice, KDE, Mozilla, LTSP, …

■ An automatic tool "lintian" validates packages
  ● Nonconformant submissions are automatically rejected

■ Searchable public bug tracking, http://bugs.debian.org/
  ● Program "reportbug" helps all users submit useful reports

■ Validated dependency data between packages
  ● Security and version upgrades are reliable and fast
  ● Upgrades rarely need a reboot and can occur incrementally
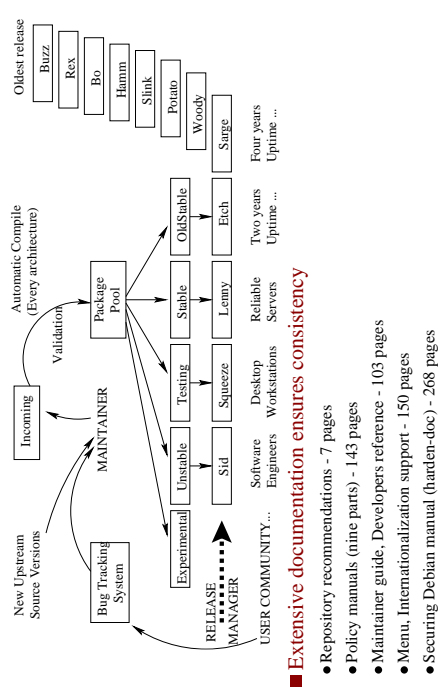 ● Active users are not disturbed

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Differentiator: Administration Effort

■ If the system is only needed for a few hours
  ● Probably best to use a no-install CD/DVD image
  ● I personally still like the derivative "Knoppix"

■ If the system is only needed for a few months
  ● Ubuntu has a stronger focus on initial ease of use
  ● Deprioritizes upgrades and platform flexibility

■ If your system is likely to be used for several years
  ● All Linux distributions will have at least one release
  ● Debian assumes more upgrades than installs on average

Differentiator: Integration Quality

Diagram labels:
New Upstream Source Versions; Incoming; Automatic Compile (Every architecture); Validation; Package Pool; Oldest release; Buzz; Rex; Bo; Hamm; Slink; Potato; Woody; Sarge; OldStable; Etch; Stable; Lenny; Reliable Servers — Two years Uptime …; Four years Uptime …; MAINTAINER; Testing; Squeeze; Desktop Workstations; Unstable; Sid; Software Engineers; Experimental; RELEASE MANAGER; USER COMMUNITY…; Bug Tracking System
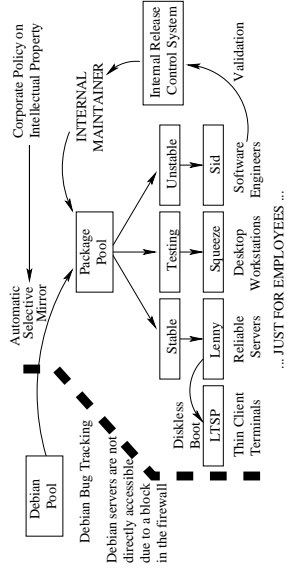
■ Extensive documentation ensures consistency
  ● Repository recommendations - 7 pages
  ● Policy manuals (nine parts) - 143 pages
  ● Maintainer guide, Developers reference - 103 pages
  ● Menu, Internationalization support - 150 pages
  ● Securing Debian manual (harden-doc) - 268 pages
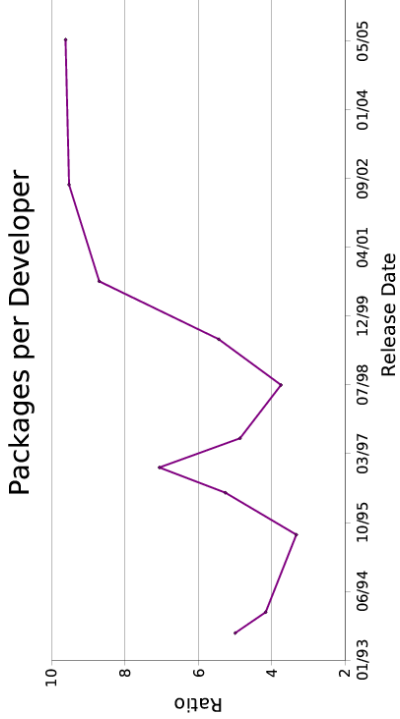
Which version of Debian to use ?

There are always three versions
- Unstable - The latest and greatest of everything
- Testing - Packages which still look good after a week
- Stable - Months of testing by thousands of people

A server, for files or web or similar
- You don't want it to ever crash or lose stuff
- Active security maintenance and patch backports
- This is the intended audience for "stable"
- http://www.debian.org/security/dsa.en.rdf

A desktop machine, where you want all the features
- All your important files are backed up regularly
- Critical stuff lives on a different server computer
- If a crash every few months is ok, use "unstable"
- If you don't mind waiting for features, try "testing"

Differentiator: Debian offers Alternatives

There is more than one way to present ...
OpenOffice includes Presenter
- Very similar to, compatible with, MS PowerPoint

GhostView has a slideshow mode
- Works well if you have a print file of slides

Install Wine and run PowerPoint
- Don't expect it to be faster than under Windows

This talk is done using "mgp"
- This is MagicPoint, a simple text-based method
- Works well with Version Control systems

So many choices ... it can be confusing for people

Selective mirror - customizes Debian

Corporate Policy on Intellectual Property

INTERNAL MAINTAINER

Internal Release Control System

Validation

Automatic Selective Mirror

Package Pool

Unstable — Sid — Software Engineers

Testing — Squeeze — Desktop Workstations

Stable — Lenny — Reliable Servers

LTSP — Thin Client Terminals

Diskless Boot

Debian Pool

Debian Bug Tracking

Debian servers are not directly accessible due to a block in the firewall

... JUST FOR EMPLOYEES ...

The Debian Project is extensible
- The entire engineering flow is exposed and accessible
- Corporations can inherit it selectively and brand it
- There is no need to expose internal software activities

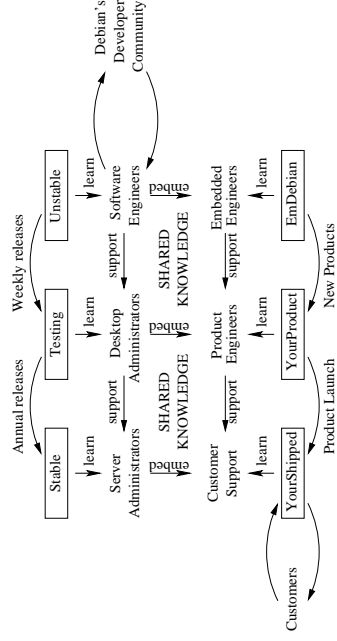# Local enhancements are encouraged

An enhancement could be simple
- Changing a default to make a package easier to install
Could also be an in-house application
- Allowing controlled rollout of versions and upgrades

Maintainers convert source into releases
- Accept source from "upstream" authors (could be in-house)
- Write control and dependency data needed by the installer
- Determine which versions should be released to users
- Monitor bug databases and raise issues with authors

Accelerates the usual release-related work
- It has to be done, irrespective of the target system
- Debian integrates all the tools and heavily tests them
- Eliminates issues of third party tool compatibility

Project wide average of maintainers

Packages per Developer

Ratio — Release Date
01/93 06/94 10/95 03/97 07/98 12/99 04/01 09/02 01/04 05/05

Debian is more efficient at software integration
- Package maintenance is usually a part time activity

Negligible need for Support

Only small deployments use external consultants
- Several companies offer per-call support services
- But large installations tend to train in-house staff

Unplanned onsite support is almost eliminated
- Graphical tools are optional; administering over WAN is fine
- Install defaults have full security and basic services ready
- Accelerates initial system configuration, reduces workload

There are under 120 listed consultants for the US
- Over 800 in the worldwide listing, in 64 countries
- Could be more, but there's not much demand for them

Managing Training as a Resource

- **No recurring required license costs**
  - You control all expenditure, vendors compete for your business
  - You have an incentive to determine whether a need is recurring
- **Never need to depend on a non-responsive vendor**
  - Your organization has access to the project data and archives
  - Consultants aim to accelerate work and reduce short term effort
- **Build expertise only for strategic areas**
  - For non-proprietary packages, recoup costs by offering support
  - Packages are not controlled by the distribution vendor
- **The project's work is openly shared out**
  - But the work is varied and the benefits are very different

Synergy reduces training needs

- **The entire corporation only has one learning curve**
  - Distinct functional groups, same technology, learn once, reuse
  - More commonality, maximises effectiveness of Support teams

Diagram labels: Stable — Testing — Unstable; Server Administrators, Desktop Administrators, Software Engineers; Debian's Developer Community; Embedded Support Engineers — EmDebian; Product Engineers — YourProduct — New Products; Customer Support — YourShipped; Customers; SHARED KNOWLEDGE; learn, support, embed; Annual releases, Weekly releases; Product Launch.

- **Can restrict Points of Contact to Debian**

Derivative Distributions

- **Debian has some specialist sub-projects**
  - For children, medicine, education, desktop, legal
- **In-house derivatives are unannounced**
  - Their efficiency contributes to a business edge, so don't tell
- **Public derivatives need not announce**
  - There is no requirement to notify Debian, but some do ...
  - Innominate mGuard security appliance
  - PePLink debian, firewall/gateway server
- **Some public projects do announce**
  - Knoppix, Gnoppix, Progeny, Libranet, LindowsOS, Xandros,
  - Intimate, OpenZaurus, Mephis, Morphix, BRLSPEAK,
  - Bonzai, Freeduc, BSLinux, Netserva Dlite, Linux/MNIS,
  - Good-Day, Omoikane, LinEx, Linuxin, PingOO, Timo's,
  - Adamantix. BlackRhino. Flonix. Gibraltar. TrX. ...

Contributing back to the Project

- **Binary only software can be contributed**
  - Does user benefit outweigh inconvenience of closed source?
  - Closed source packages have higher maintenance workload
  - Your organization is likely to remain responsible for it
- **There is no obligation to contribute to Debian**
  - However, SPI gratefully accepts your charitable contributions
  - Follow corporate self interest to maximize the value received
- **Self interest drives most labor contributions**
  - Don't need to go looking for opportunities to help out
  - Corporate goals will identify future needs with high ROI
  - Assign resources to address those selfish needs and goals

Debian Free Software Guidelines

- **http://www.debian.org/social_contract#guidelines**
  - Free Redistribution by recipient
  - Source Code available, distributable
  - Derived Works permitted under same license
  - Integrity of the Author's original source
  - No discrimination against Persons or Groups
  - No discrimination against Fields of Endeavor
  - Distribution of entire License with software
  - License must not be specific to Debian project
  - License must not contaminate in Aggregation
- **Similar to the Open Source Definition (OSD)**
  - Example Licenses: "GPL", "BSD", and "Artistic"
- **Remainder classified as NON-FREE software**
  - Special case of FREE that only works with some NON-FREE
  - It is placed into CONTRIB instead of MAIN, to avoid confusion

Differentiator: Conservative on Copyright

- **Software archives are partitioned**
  - By default, a new package would be placed into "non-free"
  - This name should encourage you to review the license carefully
  - Licensing is always located in /usr/share/doc/package/copyright
  - Reviews may trigger corporate filtering of the distribution
- **Does it meet all nine guidelines, without doubt ?**
  - If so, the package is moved into "main" or "contrib" partitions
  - If doubt later appears, the package is immediately moved back
  - The guidelines need to be studied for corporate relevance
- **Some upstream developers have disagreed**
  - Their new license terms were intended to meet the guidelines
  - But they were rejected by Debian, maybe because of ambiguity
- **You must comply with all the licensing terms ...**

Installing or Bootstrapping Debian

- Debian can be added to an existing Linux system
  - Mount the new partition and run "debootstrap"
  - An ordinary standalone open source program!
- Most people use the Debian Installer in Stable
  - http://www.debian.org/releases/stable/installmanual
- Stable's feature set may be too old for your needs
  - If necessary, upgrade to Testing or Unstable
  - Can do that later on, whenever you notice
- Suppose you know you need Testing before you start?
  - Using the Stable Debian Installer is suggested
  - Just add more APT sources to the default list
  - The "install" and "upgrade" occur in parallel

Debian Upgrades, a few hints

- The package choices rarely go away completely,
  - but may change name, upstream version, default, etc
  - You may need to update automatic-install scripts
- If you have several machines, cache the new stable
  - Squid proxy, apt-cacher, mirror, mount DVDs, ...
- The default kernel version usually changes
  - Even if you don't use it, worth adding for emergencies
  - Keep all kernel packages installed; tiny disk footprint
- If in doubt, mirror the root filesystem

Thank you for your interest

- Any questions ?
  - http://www.debian.org/intro/why_debian
  - http://www.debian.org/
  - http://wiki.debian.org/
  - http://scd.debian.net/
  - /server irc.debian.org /join #debian
- Alexander Perry
  - mailto: alex.perry@ieee.org

Distribution Pricing / Availability

- The distribution is currently five DVDs
  - A while ago, the base install fitted on one floppy disk
- Available for purchase as DVDs
  - Under $3 per DVD online, often available at conferences
  - This is cheaper than salaries for making them in-house
  - Useful for Document Control archives and mobile users
- Computers can install from the internet
  - This is free (plus your own bandwidth charges)
  - Eliminates searching for the stack of five DVDs
  - Avoids having old release versions in circulation
- Corporations generally mirror Debian internally
  - Reduces internet bandwidth for upgrade rollouts
  - Eliminates dependency on accessibility of public servers

Linux Kernel, just another Package

- The default kernel is configured for low risk
  - Has to install on as many platforms as possible
  - Excellent performance after install is ... a bonus
- You can do better, for your actual platform
  - Install Debian's "kernel-package" and dependencies
  - Choose, download, unpack and configure as usual
  - Run "fakeroot make-kpkg --initrd kernel_image"
  - linux-image...deb files made, ready for use
- If you use a custom kernel, watch for security issues!
  - http://www.debian.org/security/2010/dsa-1996
- Treat that deb file like any other package binary
  - Reuse it on all machines with the same hardware
  - Upload it to your local repository for distribution

Differentiator: Flexibility and chroot

- Dual architecture? mips/mipsel arm/armel i386/amd64
  - Simply install both, switch between them as appropriate
    - cdebootstrap --architecture amd64
  - Can share non-object directories using "mount --bind"
  - x86 kernel in 64 bit mode can support 32 bit userspace too
- Need both stability and recent applications in one box?
  - Install both Stable and Unstable, mix and match runtimes
  - Usual to boot Stable, unless your kernel needs Unstable
- This is an easy way to canary a proposed upgrade
  - Clone filesystem (even live), upgrade in chroot, test
  - If everything seems fine, try pivoting into the chroot
  - Assuming nothing blows up, swap which release is a chroot