Kernel et distributions
Le cas de Debian

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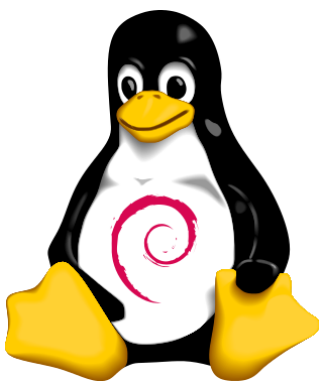

HELMHOLTZ
ASSOCIATION

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Maximilian Attems

Theoretical Physicist

- Postdoc of Frankfurt Institute of Advanced Studies
- Numerical simulations of Yang-Mills theory on TOP 500 clusters for ultra-relativistic heavy ion collisions

Linux Contributor since 2004

- Linux janitor Maintainer late 2.5 early 2.6
- 2.6.32.X stable series contributor
- klibc Co-Maintainer
- make deb-pkg

Debian Linux Contributor since 2005

- Early userspace
- x86

Who are we?

Currently 5 general maintainers: Maximilian Attems, Bastian Blank, Dann Frazier, Ben Hutchings, Moritz Muehlenhoff

Many more specialised contributors:

- Specific architectures
- Specific features (e.g. Xen)
- Bug triage

Would appreciate more help, particularly with bug triage, ports PowerPC and Sparc.

Linux releases early and often

Linux is released about 5 times a year (plus stable updates every week or two) ...though some features aren't ready to use when they first appear in a release

For Debian 7.0 'wheezy' we chose to freeze with Linux 3.2, which was getting pretty old by the time of release

Good news:
we have lots of new kernel features in testing/unstable

Bad news:
some of them won't really work without new userland

What do we do?

Bug triage - takes a huge amount of time

Backport bug fixes and features - particularly new hardware support for stable
...while trying not to change kernel ABI in stable

Update build configurations for each new upstream release - e.g. to enable new drivers

Try to ensure smooth upgrades when there are major implementation changes - e.g. KMS, switch to libata drivers

Integrate some features not accepted upstream

Debian Linux stable releases

We integrate all stable releases as each patch from it fixes a bug. Ben Hutchings is currently directly maintaining the stable release of Linux 3.2.

We backport fixes that are too intrusive for the stable upstream.

We backport newer drivers version on demand and on popular requests.

We test in the possible limit of our hardware to catch eventual regressions early. Very often our users to test out our newer Linux.

Extra features

Always aim to get patches merged upstream. But many big features that users want added are not merged upstream for a long time. Kernel team expects features to be upstream first, then backported.

But there have been exceptions:

- OpenVZ and VServer - being reimplemented upstream with cgroups and namespaces
- Xen - now upstream
- aufs - needed for Debian Live
- PREEMPT_RT - gradually being merged upstream; new option in amd64 and i386 packages

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Official Linux kernel packages (1)

Main source package is Linux. Most binary package names change regularly.

- linux-image-version-abi-flavour - compiled kernel and modules
- linux-headers-version-abi-flavour (and others) - development package for OOT modules
- linux-libc-dev - headers for userland
- linux-source-version - for custom kernels
- linux-doc-version, linux-manual-version, etc.
- linux-support-version-abi - scripts and metadata to support linux-latest

Official Linux kernel packages (2)

The linux-latest source package builds meta-packages to support automatic upgrades between binaries built from Linux.

- linux-image-flavour
- linux-headers-flavour
- linux-source, linux-doc, linux-tools, etc.

The installer will normally install linux-image-flavour (for some appropriate flavour).

Official Linux kernel packages (3)

- firmware-free - separate 'firmware' compliant with DFSG
- linux-base - base package for images and tools
- linux-tools builds
  - linux-kbuild-upstream - kernel build system and tools for building OOT modules
  - linux-tools-upstream - perf tool
  - usbip - usbip configuration tools

Firmware files

- Most peripherals have microcontroller running non-free firmware; some require host to load it
- Several drivers used to include firmware, making kernel non-free. Fudged with GRs for a while; finally fixed in squeeze
- Users with these devices - almost any wifi card, some network controllers and Radeon GPUs - will still need the firmware files installed
- Kernel team maintains firmware-nonfree source package covering most firmware files that are clearly redistributable
- Also collected in linux-firmware.git repository maintained by David Woodhouse and Ben Hutchings

Custom Linux builds

The official packages work for most users, but not all:

- Different ARM platforms need incompatible configurations, and we cannot build them all
- New features are not enabled immediately if we are worried about potential regressions

Using either upstream source or Debian linux-source package:

- make && make install
- make deb-pkg - build packages

make deb-pkg features

Directly in linux tree without external helpers allows to build

- linux-image-version - usual Linux images
- linux-image-version-dbg if CONFIG_DEBUG_INFO - stripped debug symbols
- linux-libc-dev - userland headers
- linux-headers-version - Linux headers
- linux-firmware-version - Linux firmware files

TODO: linux-source-version, linux-tools-version, ..

Out-of-tree modules

The kernel team does not encourage the use of out-of-tree modules. However, we support them by providing development packages and by avoiding ABI changes during a stable release.

Debian has two packages to aid in building out-of-tree modules:

- dkms - builds and installs modules automatically. Can build packages for installation on other systems. Also supported by Ubuntu and SUSE.

- module-assistant - builds packages as directed. Uses a separate package name for each kernel ABI.

Initramfs

Main source package is initramfs-tools.

Co-developed with Ubuntu and hence sharing all the pain and fun of the software and that special relation. In any case a huge step forward after the very special initrd-tools.

initramfs-tools paved the way for pluggable initramfs generators. But, early userspace shouldn't be visible to users. Other distributions later switched to new dracut. We are releasing initramfs-tools and developing it.

It is also possible to boot only using klibc, as Google does.

klibc

small libc for initramfs

portable to various architectures (alpha, arm, cris, hppa, mips, powerpc, s390, x86, ..)

stable over the years

version >= 2.0 with buffered stdio

kinit (md, nfsmount, BOOTP/DHCP, ..)

utils (cat, cpio, dmesg, mount, ps, umount, ..)

Possible TODO's

- Team device driver [3.3]: Alternative to the bonding driver - simpler, modular, high-level control deferred to userland Basic configuration can be done with ip, but it really needs new tools - teamd, teamnl, etc.
- Transcendent memory [3.0-3.5]: Abstract storage for memory pages, expected to be slower than regular memory but faster than disk, Pages stored by hypervisor (Xen)
- New KMS drivers [3.3-3.10]: DRM/KMS drivers added for old, new and virtual hardware. Make it work: join the X Strike Force and package the new X drivers.
- Module signing [3.7]: Kernel modules can be signed at build time, and the kernel configured to refuse loading unsigned modules. Necessary step to implement Secure Boot.

Documentation

manpages-dev - the system call API

linux-doc-upstream - miscellaneous upstream documentation

linux-manual-upstream - the internal API, based on structured comments

debian-kernel-handbook - Debian-specific information; currently also Linux-specific but could cover other kernels

http://wiki.debian.org/DebianKernel - wiki index page

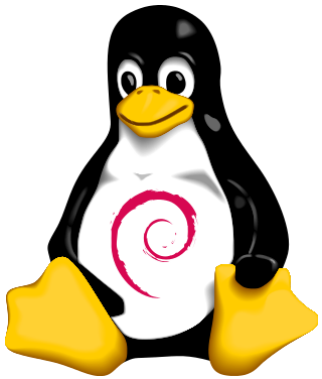
Conclusions

Debian Linux team has plenty of fun and work with Linux.

Our work gets deployed to the International Space Station.

We will freeze for Debian 8.0 on Linux >= 3.11.

We welcome new external contributors.



Credits

Linux 'Tux' logo Larry Ewing, Simon Budig.
Modified by Ben Hutchings to add Debian open-ND logo

Debian open-ND logo Software in the Public Interest, Inc. Mini

Debconf 12 Talk (Maximilian Attems + Ben Hutchings) Debconf

13 Talk (Ben Hutchings)