The Debian Kernel and its Team

http//www.vergenet.net/linux/debian_kernel/

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What is the Debian Kernel Team?

Loose collection of Debian Developers and non-Debian Developers

Maintain many of the kernel source packages.

And many of the non-Debian-Installer kernel image packages.

Mail: debian-kernel@lists.debian.org

IRC: irc.debian.org, #debian-kernel

Source: svn.debian.org

Aims

Provide stable, secure, DFSG-free kernel images for Debian users

Provide source packages for users to make custom kernels

Answer bug reports in a timely fashion

DFSG-free

As the kernel is a core part of the Operating System it is in main

And thus must comply with the DFSG

Because of this, some source files are removed or modified

This generally means the removal of drivers that include binary firmware blobs

There has been some support for this from upstream, but work needs to be done

- Such code cannot be maintained other than by the original author
- Such code takes from Linux, it does not give

- ... and its not in keeping with the licencing of other code in the kernel tree.

DFSG-free (continued)

This means that some drivers are missing,
or do not support some hardware

The removal is done to the orig.tar.gz, so the non-DFSG code does not appear in the diff and taint the Debian Archive

Thus, the orig.tar.gz is *not* the same as the tarball on kernel.org

Non-free but distributable drivers are in the process of being made available in non-free

Patches the kernel team like

Security Fixes

Driver Fixes

Stability Fixes

... actually, more or less any type of fix

Patches the kernel team generally reject

Due to limited resources the Debian Kernel is not a playground for:

- New features
- Out-of Tree Drivers
- My favourite patch-set

In general, if it isn't likely to be included upstream, it isn't likely to be added to the Debian Kernel...

... but this feature is really cool, you should put it in anyway

The best way to get a feature into the Debian Kernel
is to get it included upstream

If you are not sure how to do this, ask the kernel team,
generally we are more than happy to help you to help us.

If you can't get it included upstream, consider a patch-package

...or building a custom kernel

... but I want you to put it into the Debian kernel anyway

Unfortunately the kernel team only has a limited amount of time

If you are a developer and are trying to get a patch adopted, then sorry, we don't do that

If you are just being lazy, go and be lazy somewhere else

What package does what?

In general there are seven types of packages that relate to the kernel:

- Image: Binary images for a particular architecture
  e.g: kernel-image-2.4.27-2-686
- Latest: Packages that depend on the latest recommended versions
  e.g: kernel-image-2.4, kernel-headers-2.4,
- Utilities: Tools used to build or install the kernel
  e.g.: initrd-tools, kernel-package*

*not maintained by the Kernel Team

What package does what? (continued)

- Source: Kernel source with Debian Patches
  e.g.: kernel-source-2.4.27
- Headers: Headers for building out of tree modules
  e.g: kernel-headers-2.4.27-2-686
- Build-Helper: Packages that depend on a group of other packages that are used to build kernel images or modules
  e.g: kernel-tree-2.4.27, kernel-build-2.4.27-2
- Patch: Various patches provided by Debian
  e.g: kernel-patch-debian-2.4.27, kernel-patch-powerpc-2.4.27, kernel-patch-2.4-kgdb

Show me the code

If you install kernel-source-VERSION, then it will install the *patched* kernel source tree.

```
sudo apt-get install kernel-source-2.4.27
...
tar jxf /usr/src/kernel-source-2.4.27.tar.bz2
cd kernel-source-2.4.27
```

Debian Patches

Despite attempting to stay close to upstream, Debian applies a number of patches to the tree for one reason or another.

These patches are contained in kernel-patches-debian-VERSION

```
# In the kernel-source-2.4.27 directory unpacked previously
# Patch back to pristine source
/usr/src/kernel-patches/all/2.4.27/unpatch/debian
# Patch the tree back up to the latest debian version
/usr/src/kernel-patches/all/2.4.27/apply/debian
# Patch to an arbitrary release
/usr/src/kernel-patches/all/2.4.27/apply/debian 2.4.27-7
```

Where are you hiding these patches?

These patches are in `/usr/src/kernel-patches/all/2.4.27/debian/`

Most patches include a comment at the top, describing briefly where they are from and what they do.

And the meta-files in the `series//` subdirectory indicate which patch went into which version.

- A line beginning with a `+` denotes an added patch
- A line beginning with a `-` denotes an removed patch
- A line beginning with a `X` denotes removed file,
  usually to make the tree DSFG free.

Where are the headers for building modules?

The headers for debian kernel images are included
in the kerne-headers-VERSION-ABI-FLAVOUR package.
e.g. kernel-headers-2.4.27-2-686

And the headers are installed into
/usr/src/kernel-VERSION-ABI-FLAVOUR/
e.g. /usr/src/kernel-headers-2.4.27-2-686/

This directory also includes the .config that was used to build the kernel image

What is the ABI number?

Image and header package include an ABI number

This is the number the version

e.g. kernel-headers-2.4.27-**2**-686

Denotes different versions of the kernel ABI
for the same kernel version

Incremented when binary incompatibilities are introduced.

This usually occurs because of a security fix.

And means that out-of tree modules need to be rebuilt.

How can I build my own kernel *The Debian Way*?

```
sudo apt-get install kernel-source-2.4.27 kernel-headers-2.4.27-2-686
...
tar jxf /usr/src/kernel-source-2.4.27.tar.bz2
cd kernel-source-2.4.27
# Add patches to your hearts content
cp /usr/src/kernel-headers-2.4.27-2-686/.config .
make menuconfig # or make xconfig or make oldconfig or...
make-kpkg clean
fakeroot make-kpkg --initrd --revision=mykernel.1.0 kernel_image
```

Kernel Versions –
There are so many, how can I make sense of it?

Sarge

- The target for most architectures for Sarge is 2.4.27 and 2.6.8.
- apus and various m68k sub-architectures do not have a working 2.4 or 2.6 upstream, their target is 2.2.25
- mips only has a 2.6.8 image due to 2.4 support problems
- hppa will only have 2.6.8 for the same reason

Available Kernels Revisions in Sarge

	2.2.25	2.4.27	2.6.8
alpha		2.4.27-9	2.6.8-13
amiga (m68k)	*		
apus (powerpc)		2.4.27-5	
arm		*	
atari (m68k)	*		
bvme6000 (m68k)	*		
hppa		2.4.27-8	2.6.8-13
i386		2.4.27-8	2.6.8-13
ia64		2.4.27-8	2.6.8-13
m68k		*	*
mac (m68k)	*		
mips			*
mvme147 (m68k)	*		
mvme16x (m68k)	*		
powerpc		2.4.27	2.6.8-13
q40 (m68k)			
s390		2.4.27-8	2.6.8-13
sparc	*	2.4.27-8	2.6.8-11

Source: http://people.debian.org/~dannf/kernel-stats/kernel-avail.html, 14th April 2005

Kernel Versions – Sid

- As well as acting as staging area for updates to sarge,
- Sid also generally has the latext 2.6 kernel for testing
- ... and a bunch of older stuff that should probably be removed.

Available Kernels Revisions in Sid

	2.2.25	2.4.25	2.4.26	2.4.27	2.6.8	2.6.10	2.6.11
alpha				2.4.27-9	2.6.8-15		
amiga (m68k)	*	*	*				
apus (powerpc)				2.4.27-5			
arm				*			
atari (m68k)	*	*	*				
bvme6000 (m68k)	*	*	*				
hppa				2.4.27-8	2.6.8-13	2.6.10-4	
i386				2.4.27-9	2.6.8-15	2.6.10-6	2.6.11-2
ia64				2.4.27-8	2.6.8-14	2.6.10-6	
m68k				*	2.6.8-13		
mac	*						
mips				*			
mvme147 (m68k)	*	*	*				
mvme16x (m68k)	*	*	*				
powerpc				2.4.27	2.6.8-13	2.6.10-1	2.6.11
q40 (m68k)			*				
s390				2.4.27-8	2.6.8-13	2.6.10-4	2.6.11-2
sparc	*		*	2.4.27-9	2.6.8-15	2.6.10-6	

Source: http://people.debian.org/~dannf/kernel-stats/kernel-avail.html, 14th April 2005

2.6 Development

The 2.6 development model puts the onus of stabilising the kernel on the distribution

This means that Debian has to stabilise the 2.6 kernel it ships

Examining the BTS one can observe that this is not an easy task

Its a moving target

With a rapidly evolving code-base

And runs on a lot of hardware that the kernel team
does not have access to

And the kernel team only has limited resources

2.6 Development and Debian

The approach of the Kernel Team to stabilising 2.6
can be summarised as follows.

- Provide a stabilised release for Sarge
- Provide a more recent release in unstable for people to test
- When users report bugs for Sarge, try to get them to test the newer kernel, to see if has been fixed
- Where possible pull patches from upstream
- Rely on users to report bugs with various pieces of hardware that we don't have

2.6 Development and Debian: Details

Sarge

Kernel for rc0 is based on kernel-source-2.6.8-15

This is also the version in unstable

A new version is pending in SVN and should be uploaded shortly, mostly security fixes

unstable is going to act as a staging area for rc1

2.6 Development and Debian: Details

Beyond Sarge

Track upstream.

Currently 2.6.11,

when 2.6.12 is released get it into unstable ASAP, etc...

until we go into a stabalisation pahse for Etch

2.6 Development and Debian: Status

2.6 for Debian mostly works...

except for ACPI...

which is to blame for all problems

Improving The Kernel Team's Processes

Nightly builds from SVN

Tools to isolate packaging problems:
missing symbols, ABI changes, stray files

More timely response to bug reports

Single source kernel

How to help

Bug reports are always welcome, but we already have lots of these

If you report a bug, please consider taking the time to look on the net and in upstream (bitkeeper, LKML, etc...) and see if there is a fix available. If there is, add it to the bug report.

The kernel-team manages many packages, If you want to report a bug, please take some time to look through all bugs logged against kernel-team@lists.debian.org, to see of the problem has already been logged. I would estimate that about 50% of bugs are duplicates.

How to help (continued)

If you want to report a bug, please also help in debugging the problem by testing out patches, different kernel versions. Its very difficult for the kernel-team to test a fix if they don't own a specific piece of hardware.

If you don't have a bug to report, but would like to fix some of the open bugs in the BTS, please, please, please do!

Questions?