Debian GNU/Hurd Status update

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It's all about freedom #0

“The freedom to run the program, for any purpose”

I.e.:

• Freedom from sysadmin!
  • WTH is fdisk/mke2fs/... hidden in /sbin?
  • I should be able to just work with my disk/network access

• Freedom to innovate
  • Experimental filesystem, personal work-flow, new kind of process combination,...

• Also provide freedom from misbehaving programs and drivers
Micro-kernel layering

Kernel  Tasks, memory, IPC

ext2fs  auth  pfinet  proc  root  user

sh  cp
Micro-kernel layering

• Server crash? Not a problem
  • “Computer bought the farm” is just an error, not something-of-the-death
• Easier to debug/tune
  • Just run gdb, gprof, …
• Can dare crazy things
  • The Hurd console has dynamic font support
    • See chinese support in pseudo-graphical mode (actually pure VGA textmode!) of Debian installer.
• Kernel only handles Tasks, memory, IPC
Hurd possibilities

Kernel

ext2fs
pfinet
auth
proc
ftpfs
root

user

sh
cp

isofs
Hurd possibilities

```bash
settrans -c ~/ftp: /hurd/hostmux /hurd/ftpfs /
(just once for good)
settrans -a ~/mnt /hurd/iso9660fs
ls ~/mnt
README-or-FAIL
```

... 

- Only downloads what is needed.
- Can be permanently stored in ext2fs

```bash
settrans ~/.signature /hurd/run /usr/games/fortune
```
Example: interpose TCP/IP stack

€ settrans -ca $HOME/servers/socket/2
   /hurd/pfinet -i $HOME/servers/tun0

€ openvpn ... $HOME/servers/tun0 &

€ remap /servers/socket/2
   $HOME/servers/socket/2

€€€ wget www.gnu.org

• My own translator
• Can plug my own VPN software
• Only wget accesses it (well, the shell too :) )
But also

€ remap /bin/sh $HOME/bin/sh
€ remap /bin $HOME/unionbin

... 

• Check out Stow/Nix/Guix!
How does it work?

- ext2fs
- pfinet
- auth
- proc
- ftpfs
- user
- sh
- libc
- isofs
- cp
- libc

Kernel
Rationale

- **Everything** is an (interposable) RPC
- Translators exposed in the FS
  - The user gets to decide what/how to interpose
    - Without need for costly ptrace or fragile libc symbols interposition.
    - **Native** fakeroot/chroot
    - Fully virtualized and fine-grained interface
  - Just need to use what's provided by the admin, e.g.
    - $HOME/
    - TCP/IP stack
  and pile over it
Hurd possibilities (cont'ed)

Kernel

- ext2fs
- pfinet
- root
- auth
- proc
- open vpn
- ftpfs
- pfinet
- part
- sh
- ext2fs
- user
- isofs
- cp
Hurd possibilities (cont'ed)

i.e. ISO image inside a partitioned disk image on ftp over a VPN
Porting packages to hurt-i386

• This is essentially a POSIX system
  • So portable portable programs should just work fine

• Top dumb issues
  • Not linux or BSD? #include <windows.h>
  • Have mach.h? Must be MacOS
  • make -j $(grep … /proc/cpuinfo) → make -j
  • #include <linux/limits.h>
  • hardcoded errno values
  • Missing -lpthread, -ldl, -lX11, ...

• See Hurd porter page's developer corner

• And PATH_MAX not defined, as allowed by POSIX...
PATH_MAX is evil for you

Fragile semantic in POSIX

- Never meant to mean “reasonable size for a buffer containing a file name”
  - Linux' 4096 : a whole page, a whole TLB entry !
- Paths can actually be longer
  - “hidden”, ”protected” files?!?
- Does that include the trailing \0? (not so clear in POSIX...)
  - Does your code actually properly handle that?

- A can of worms that nobody really tests...
Current State

Hardware support

- i686
- start of 64bit support
  - Kernel boots completely, now missing RPC 32/64bit translation
- DDE Linux 2.6.32 drivers layer for network boards
  - In userland netdde translator!
- IDE, Xorg, …
- AHCI driver for SATA
- Xen PV domU
  - Required GNU Mach changes only
- Preliminary sound support through userland Rump
- No USB yet
Current State

Software support

- Quite stable
  - Have not reinstalled boxes for a decade.
  - Debian builddss keep building packages, no hang after weeks!
- ~81% of Debian archive builds out of tree
  - XFCE, almost gnome, almost KDE
  - Firefox (aka iceweasel), gnumeric, …
- Standard *native* Debian Installer
Recent work

Special thanks to Justus Winter!!

- Init system decoupled
  - Allows to use standard Debian sysvinit scripts!
  - Using dmd for Guix & such
- Distributed mtab translator
- Various optimizations
  - Protected payloads
  - Lockless implementations
  - Paging management
  - Message dispatch
- Valgrind start-of-port
Releases

- Nice 0.401 release on April 2011.
- Arch Hurd LiveCD release on August 2011.
- Released Debian-unofficial
  - wheezy/sid snapshot CDs on May 2013 \o/
  - jessie/sid snapshot CDs on May 2015 \o/
Removal from ftp-master

- Due since many years
- Not really useful to mirror all over the world anyway
- But beware of consequences
  - `buildd.debian.org` able to get fed from `debian-ports`?
    - Scheduled binNMUs for transitions
    - Losing this would be very tedious for ports maintainers
    - Exposure in e.g. `http://buildd.debian.org/yourpackage`
  - Toolchain version upgrades (gcc, perl)
    - Give `$WHOEVER_DOES_IT` accounts just to be able to check those?
- In short, managing to get most support without extra load?

Conversely, those would help ports currently on `debian-ports`
- Real status for Second-Class Citizens
- BoF?
Future work

- Xen PVH support, X86_64 support
- Language bindings for translators (ADA?)
- Read-ahead
- \{hdd,sound,usb\}dde?
- Rump drivers?
- GNU system: Guix/Hurd?
- Startup in scheme?
- Your own pet project?
Thanks!

• http://hurd.gnu.org/
• http://www.debian.org/ports/hurd/
• http://people.debian.org/~mbanck/debian-hurd.pdf
• The increasing irrelevance of IPC performance for microkernel-based Operating Systems