illumos
State of the Community
POSIX Update

Garrett D’Amore
Advanced Micro Devices, Inc.
illumos is:

- Open Source System V (Solaris) Derived
- Development home for DTrace and ZFS
- Kernel + core for OmniOS, SmartOS, NexentaStor
- Four years on its own, but really ~25 years old
Recent Developments

- Network Virtualization
- Virtualization (LX brand, Bhyve, etc.)
- Persistent L2ARC
- SMB2 / SMB3
- Hardware drivers
- POSIX & Compatibility
Pace

- Good stuff happening
- But,
  - without the frenetic churn
  - this is a good thing
  - but,
  - its also a concern
State of POSIX in Tree

- Mostly complete support for POSIX.1-2001, SUSv3
- Failings are in user land mostly (e.g. more, pax, etc.)
- Minimal support for POSIX 2008 updates. Largest of which is locale_t (newlocale(3c)& friends)
- Some 2008 interfaces present, but not exposed, and many removed interfaces exposed
Driving Real $$

- Standbys: Nexenta, Joyent, Delphix, OmniTI
- New comers: RackTop, Pluribus Networks
- “Stealthy” players: e.g. Tegile
- Total “market” value: > $100M (perhaps >>)
CHALLENGES & Opportunities
No “Formal” Organization
things we lack

- Bounties
- Governance (?!?)
- Ownership
- Marketing
- Legal presence
Opportunities for non-Gurus

- Write & improve documentation
- Localization
- Test development
- Marketing
~150 Contributors
~0 ♀ Contributors
Where are the women?
Hire a Female Kernel Engineer. Today.
Groupthink.

— people are sheeple
Linux
—“easy” choice
FUD.

(Not Elmer.)
Drift & Divergence
Lots of private forks
less is more
less(1) is more(1)
less **BLOAT** is more *(better)*
less (compatible) is more (compatible)
less talking is more coding
illumos-core vision

- focus on code
- standards compliant - *by default*
- less is more
- self-hosting
- self-testing
- cross-platform
- illumos coding standards (RTI ready by default)
Standards

- SunOS 4.x (and 3.x) is truly ancient (32-bit SPARC only!)
- XPG3 - this is really, really old
- POSIX is really, really old (1988)
- XPG4 - is also really old
- SUS - aka XPG4v2 - also old
- SUSv2 - UNIX98
- SUSv3 - POSIX.1 2001
- SUSv4 - POSIX.1 2008 - work in progress
Ancient & Useless Stuff

- htable, gettable - last possible use was in 1990 (DNS anyone?!)  
- Wireless USB. DOA.  
- 16-bit PCMCIA. Seriously?!?  
- SunOS 4.x a.out support  
- kssl - no TLS support  
- NCA/NL7C - Global Zone only, actually slows all other traffic down  
- LMS (AMT/HECI) - Can you say security risk/pointless?
readdir_r(3c) case study

- Standardized by POSIX in 1995 (IEEE Std. 1003.1c-1995)
- Earlier Draft version (Draft 6) supported in Solaris 2.6 - 11
- By default
- Solaris is the only common operating system to still do this
readdir_r(3c) case study

- struct dirent *readdir_r(DIR *, struct dirent **);

- unless...

  - _POSIX_C_SOURCE - 0 >= 199506L or...
  
  - _POSIX_PTHREAD_SEMANTICS or...

  - _LP64 or...

  - _FILE_OFFSET_BITS != 32

- in which case...

  - int readdir_r(DIR *, struct dirent *, struct dirent **);

- note that return value semantics are different!
readdir_r(3c) resolution

• struct dirent *readdir_r(DIR *, struct dirent **);

• unless...
  • _POSIX_C_SOURCE - 0 >= 199506L or...
  • _POSIX_PTHREAD_SEMANTICS or...
  • _LP64 or...
  • _FILE_OFFSET_BITS == 32 or...
  • !_SUNOS_SOURCE

• in which case...
  • int readdir_r(DIR *, struct dirent *, struct dirent **);
  • (note that you now get POSIX compliant by DEFAULT!)
accomplishments so far

• less(1) is more(1)

• uname & puname

• fexecve(2), O_TTY_INIT, O_DIRECTORY

• removed a lot of bloat (~200KLOC)

• suppression and updates for POSIX 2008 symbols we already had (-D_XOPEN_SOURCE=700)

• s/awk/nawk/

• no more dbus or hal dependencies

• rich self tests for POSIX (and non-POSIX) interfaces (>3000 tests)

• 85 separate bugs/features integrated (started Aug 14, approx 2 per day)

• vi(1) is real vi, not vim(1)
uname(2)

- `uname -s == “illumos”`
- `uname -r == 0.9.x (x == months since Aug 2010)`
- `puname(1) utility`
  - `puname -S uname -s -r == “SunOS 5.11”`
  - `puname -S uname -v == “alternate-uname”`
- `puname -U to restore`
- `implemented as new flag in process uarea`
uname breakage

- 64-bit Studio (checks for SunOS > 5.7)
- hald - fixed (in separate git repo), breaks X
- config.guess (auto*) - can override in configure command line
- pkgdepend - (fixed?) via terminatorlib/cwd.py
- DTrace printf test (test checks uname == SunOS)
Remaining Compliance Work for C APIs

- System Interfaces (POSIX.1-2008)
  - memory streams
  - dprintf (universe explodes…)
  - pthreads changes
- C11 support
  - interfaces to improve security
Shell & Utilities Work

- pax (not star, thank you very much)
- modernize (slightly) awk
- lots of minor updates (mv, cp, ls, etc.)
- replace ksh93 with dash + libedit
- Test suite development, Standard(s) trolling
Can I Help?

YES! YOU CAN!
• Code & Documentation reviews

• Testing

• Help upstreaming

• Code contributions (pull requests!)

• http://bitbucket.org/gdamore/illumos-gate
  • “core” branch
Thank you!!