The Future of The GNU C Library

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What is this presentation about?

- **Welcome**
- My background
- Recent changes in the community
- Why standards matter
- Beer soluble (Short term)
- Statistically significant (Medium term)
- Mad Science (Long term)
- Volunteers
- Questions

Some background…

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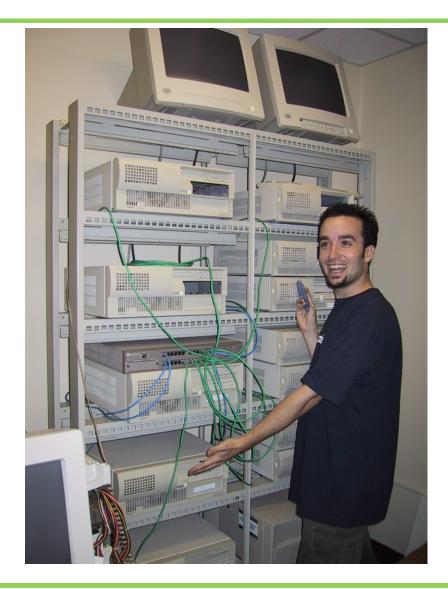- Mad Science (Long term)
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Mentor Graphics…

Baldric 1, and Baldric 2…

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Some background…

1997 – Tinkering with Linux 2.0.x for NATing internal network out via multiple ISP interfaces (RH 5.x era)

2002 – "Good afternoon, my name is Carlos O'Donell and I'm going to be actively supporting glibc on hppa."

2005 – CodeSourcery (CS)

2010 – Mentor Graphics (acquired CS)

2012 – Sourcery CodeBench (work), The GNU C Library (volunteer/work).

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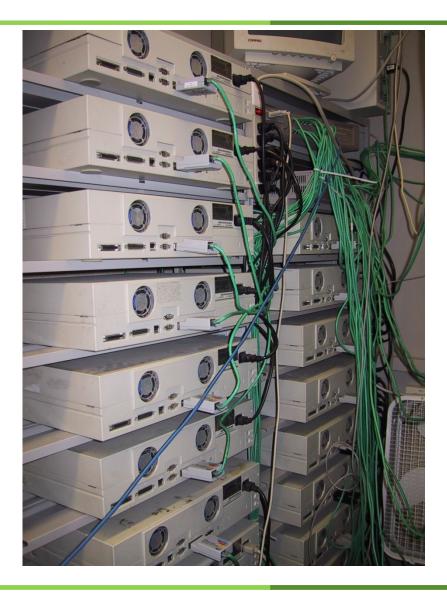- Mad Science (Long term)
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Recent changes (and not so recent)…

- Focus on user community…

- Removed moderation from the lìbc-alpha mailing list
  - Almost 4 years of moderation!

- Continued mentoring on lìbc-help mailing list

- Wiki gardening

- Dissolution of the steering committee (last month)
  - Self governed community of developers
  - Community-based concensus-driven development
  - GNU Project maintainership passed to specific developers

- Not an overnight change…

Standards?!

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Why standards matter?

- Standards matter because they reduce cost…
  - Cost to port people…
  - Cost to port software…
  - Cost to maintain software…

- New-ish standard support work
  - C11 or *ISO/IEC 9899:2011*
    - *Should be all available in 2.16 or 2.17*
  - *POSIX.1-2008* or IEEE Std 1003.1-2008
    - Updating conformance testing.
    - Fixes for detected conformance issues in progress.

C11 Status…

- In progress

- libc

  - No plans to add C11 bounds checking interfaces.

    - Doesn't mean it can't show up in ports.

  - Should be all by 2.16 (June 2012) or 2.17 (Dec 2012)

- libm

  - Considered almost complete.

  - No support yet for imaginary and _Imaginary_I macros.

State of libm.

- All glibc libm bugzilla bugs reviewed (Joseph Myers).

- Most functions not correctly rounding.

- Correctly rounding functions are too slow.

- Failure to set errno correctly.

- Setting rounding modes has precise behaviour in ISO C for some function.

- Various functions in IBM Acc. Math. Library produce wildly wrong results, crash, in non default rounding modes.

- Inaccurate functions on x86 and x86_64.

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Short Term Challenges

- Community
  - More developers, reviewers and testers
  - More distro involvement
  - Getting the word out.
- Process
  - Making releases…
    - When to branch 2.16?
  - Bug triage
- Cooperation with other projects
  - TIRPC transition.

Community

- No write after approval.

- Entirely consensus based.

- Consensus documented on the wiki.
  - Define what's a trivial change.
  - Trivial changes are allowed by everyone.
  - Machine changes need review by machine maintainers
  - Best practice for large changes
  - Bad Changes

Releases?

Glibc 2.15

- Released on March 21st 2012.

Glibc 2.15.1

- Planned release for the end of April
- See all bugs in bugzilla with glibc_2.15 keyword.

Glibc 2.16

- Rolling up all of the issues with milestone 2.16
- Planned to roll into Fedora relases (Approximately June)
- Branch in May.
- Date based releases.

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TIRPC transition…

- Some teething problems with the transition.

- Need to coordinate more closely with TIRPC.

- It's just "work" and we'll be looking to the distributions for help.

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Medium Term Challenges

- EGLIBC/GLIBC merging

- Testing methodology

  · Criteria for performance related patches

- Documentation

  · Creating internals documentation

  · User manual updates

- Upgraded testing framework

  · Cross-build/Cross-test

  · Unit/Functional tests

  · Network testing, LTP, OpenPOSIX (dead)

EGLIBC/GLIBC merging.

- EGLIBC followed all of the FSF/copyright procedures required to successfully merge back all patches.

- Start with independent small patches.

- Split larger features up and start discussing the inclusion of cross-build and cross-test support.

- Discuss with community the support for enabling and disabling POSIX profiles e.g. Message Queues, Tracing, Simple Filesystem etc.

Testing Methodology

Problem:

- Difficult to compare performance over long periods of time.

- No documentation of the use cases and inputs to the testing done to validate the patch for the use case.

Proposal:

- Document the use case, API changes, environment and testing.

- Use this as a documented baseline for reviewing future patches.

Upgraded testing framework.

- Open problem.

- Suggestions made for DegaGNU and QMTest.

- Should support cross-testing

- Should support remote-host testing.

- No requirement to need the entire build tree installed.

More independent testing…

- Current testsuite is very minimal.

- LTP?

- OpenPOSIX?

  · Resurrect these are additional runtime tests.

- Userspace rebuild?

  · Turn the crank on a full userspace recompilation to look for build issues.

  · Runtime issues are much harder.

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Long Term Challenges

- ## Trace
  - Exposing internal state of the library
    - Bull NPTL Trace (2002?), SystemTap, LTTng-UST

- ## Power awareness
  - Instrumentation and behaviour

- ## Autogenerated libm
  - Functional description

- ## Exceptionless syscalls
  - Asynchronous kernel interfaces

http://www.eecg.toronto.edu/~livio/papers/flexsc-osdi10.pdf

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Volunteers?

- Had your glibc bug closed?
- Submitted a patch and never heard back?
- Have a glibc wishlist?
- Read a piece of code and know what it does?

If you answered yes to one or more of the above then you should be involved!

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Thank you for attending this talk!

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