Integrating LLVM into FreeBSD

2011 LLVM Developers Meeting

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Monday, November 28, 2011
GNU Toolchain

- GCC
- Binutils
- ElfTools
- GDB

2006
Toolchain Freeze

2007

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2008 & 2009
Cupertino -- Today, Clang completed its first complete self-host! We built all of LLVM and Clang with Clang (over 550k lines of C++ code). The resulting binaries passed all of Clang and LLVM's regression test suites, and the Clang-built Clang could then build all of LLVM and Clang again. The third-stage Clang was also fully-functional, completing the bootstrap.

Congratulations to all of the Clang developers on this amazing achievement!
FOSDEM BSD Licensed Toolchain Summit

libc++ ported

LLDB port in started

2011
FreeBSD 9.0 Coming Soon

- GCC remains default
- Clang ~3.0 in base
- Much of libgcc replaced
- Some BSD ELF Tools
WIPs

• libc++ import
• LLDB port
• switchable ports compiler
TODO

• Finish libgcc replacement
• External toolchain support
• Switch for base compiler
• Clean cross build support
Gaps

Linker

MIPS

ARM

gcov

Sparc64
Acceptance

Issues

If it ain't broke, don't fix it.

Weak or missing architectures

Questions of benefits

GCC investment concerns

Quality concerns

Community concerns

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Clang/LLVM specific features?

When?  What kind?
Temporally Enhanced Security Logic Assertions (TESLA)

- Represent assertions as temporal logic or automata
- Assertions are tested on experienced paths at run-time
- On failure: panic(), stack trace, DTrace events
Berkeley Packet Filter JIT

• Existing i386 and amd64 JIT from WinPcap
  • Pros: Lightweight, simple
  • Cons: Hardcoded, unoptimized
  • LLVM would fix those issues
Firewalls

• Rulesets are DSLs
• Often use bytecode
• Too many
FreeBSD and LLVM a powerful combination!