

ClangBSD

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What is this all about?

What is this all about?

- ▶ GCC 4.2.1/Binutils 2.15 and no updates allowed
- ▶ Old, buggy, unmaintainable
- ▶ Missing features - C++0x, newer CPUs support
- ▶ solution?

What is Clang/LLVM?

What is Clang/LLVM?

C/C++/ObjC compiler

Mature

Developer friendly

BSD-like licensed

What is Clang/LLVM?

- ▶ Supports - X86, ARM, PowerPC, Mips, Sparc etc.
- ▶ Advanced optimizations (LTO, JIT etc.)
- ▶ Drop-in replacement for GCC
- ▶ Fast, understandable warnings, easy to contribute
- ▶ Used everywhere (ruby, php, python, MacOSX ...)
- ▶ Actively developed (Apple, Google, Cray, OSS ...)

What is Clang/LLVM?

- ▶ compiler-rt
- ▶ llvm-mc
- ▶ static analysis
- ▶ libc++

What is Clang/LLVM?

- ▶ <http://clang.llvm.org>
- ▶ <http://llvm.org>
- ▶ <http://llvm.org/devmtg/2009-10/StateOfClang.pdf>
- ▶ <http://clang.llvm.org/performance.html>
- ▶ <http://llvm.org/Users.html>

DEMO

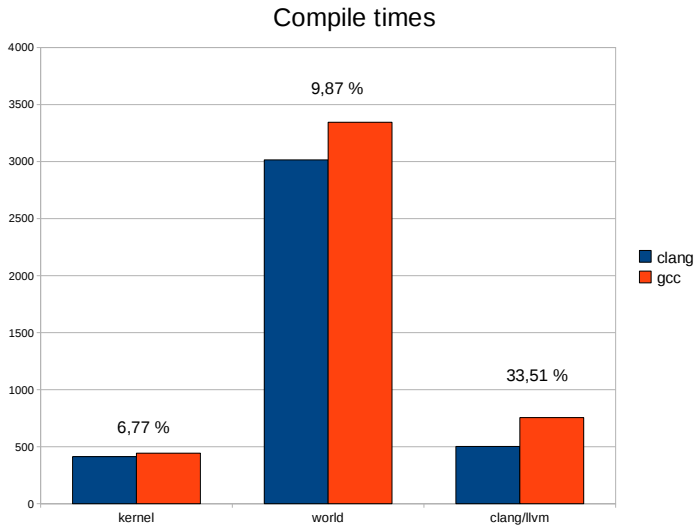
What is Clang/LLVM?

```
pes ~$ g++ /tmp/CodeGenFunction.cpp | & head -n20
In file included from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/include/llvm/BasicBlock.h:19,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/include/llvm/Function.h:24,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/include/llvm/Module.h:19,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenTypes.h:18,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CGBlocks.h:18,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenModule.h:22
:
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenFunction.h:
27,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenFunction.cp
p:15,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenFunction.cp
p:2:
/data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/include/llvm/SymbolTableListTraits.h:78: error: expected unquali
fied-id before '}' token
In file included from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/include/llvm/BasicBlock.h:21,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/include/llvm/Function.h:24,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/include/llvm/Module.h:19,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenTypes.h:18,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CGBlocks.h:18,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenModule.h:22
:
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenFunction.h:
27,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenFunction.cp
p:15,
                 from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenFunction.cp
p:2:
/data/home/rdivacky/clangbsd/usr.bin/clang/lib/libclangcodegen/../../../../contrib/llvm/include/llvm/ADT/Twine.h: In member function 'llvm::Twine::String
Ref llvm::Twine::Twine::getSingleStringRef() const':
pes ~$ g++ /tmp/CodeGenFunction.cpp | & wc -l
   3932
pes ~$
```

What is Clang/LLVM?

```
pes ~$ clang++ /tmp/CodeGenFunction.cpp
In file included from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/Libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenFunction.cp
p:1:
In file included from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/Libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenFunction.cp
p:14:
In file included from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/Libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenFunction.h:
26:
In file included from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/Libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenModule.h:21
:
In file included from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/Libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CGBlocks.h:17:
In file included from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/Libclangcodegen/../../../../contrib/llvm/tools/clang/lib/CodeGen/CodeGenTypes.h:17:
In file included from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/Libclangcodegen/../../../../contrib/llvm/include/llvm/Module.h:18:
In file included from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/Libclangcodegen/../../../../contrib/llvm/include/llvm/Function.h:23:
In file included from /data/home/rdivacky/clangbsd/usr.bin/clang/lib/Libclangcodegen/../../../../contrib/llvm/include/llvm/BasicBlock.h:18:
/data/home/rdivacky/clangbsd/usr.bin/clang/lib/Libclangcodegen/../../../../contrib/llvm/include/llvm/SymbolTableListTraits.h:75:69: error: expected ';'
    after class
    static ValueSymbolTable *toPtr(ValueSymbolTable &R) { return &R; }
    ^
1 error generated.
pes ~$
```

What is Clang/LLVM?



What is ClangBSD?

A lot of testing....

...and analyzing/bug
submitting

What is ClangBSD?

- ▶ Clang/LLVM build system integrated into FreeBSD
- ▶ Small modifications to the buildsystem
- ▶ Aim at supporting all GCC-driver-compatible compilers
- ▶ Bug fixes and workarounds in the FreeBSD sources

Status of ClangBSD

Compiles everything...

...on amd64 and i386

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¹We even have FreeBSD printf extensions :)

Status of ClangBSD?

- ▶ AMD64 compiles and works just fine
- ▶ i386 miscompiles some pieces but fine otherwise
- ▶ ARM - good support but no FreeBSD interest
- ▶ Mips - Oleksander Tymoshenko, missing -mno-abicalls
- ▶ PowerPC - Nathan Whitehorn, missing va args handling
- ▶ Sparc64 - missing 64bit ABI support, work-in-progress
- ▶ IA64 - removed in the past, no effort here

Status of ClangBSD?

- ▶ Code size problems (i386/boot2)
- ▶ Inline asm not 100% on X86 (libc, mplayer)
- ▶ Warnings all over the place
- ▶ Miscompilations
- ▶ Profiling missing

Difference to what will be integrated

- ▶ Clang as the default compiler
- ▶ contrib/llvm contains unnecessary stuff
- ▶ Unfinished integration upstream (driver changes etc.)
- ▶ Makefile.inc1 needs to be polished
- ▶ Changes to src

Ports

- ▶ Ongoing effort (kwm, rene, andrius)
- ▶ Lots of hardcoded gcc stuff
- ▶ C99 vs C89
- ▶ Clang is more strict than GCC 4.2

Future of ClangBSD

Integration!

Future of ClangBSD?

- ▶ Runtime testing calls
- ▶ Internal discussion
- ▶ Import!

Questions?