

LLVM in OpenMandriva

An update from the first Linux distribution to use clang as its main compiler

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What is OpenMandriva?

- Linux distribution focused on the desktop, more recently also targeting ARM and RISC-V devices (e.g. PinePhone) and devboards (e.g. Beagle V, Rock Pi, Raspberry Pi) and servers/VMs
- Independently developed distribution, not based on anything else (but borrowing some stuff from everywhere;))
- Purely community driven Open Source project, descendant of Mandrake/Mandriva
- Switched to clang as main compiler as early as 2015
- For more details, check our website or communications channels mentioned at the end

Why did we switch to clang?

- We like readable, maintainable code. gcc is great for users, but not so good for working with its code
- We expect targets like amdgpu to become increasingly important
- Less duplication we need LLVM anyway (Mesa)
- Useful tools (sanitizers, creduce)
- Usually not a lot of trouble with prerelease versions (we've been using 13.0 since -rc1)

- LLVM libraries, clang, lld, openmp, polly, libunwind: used as default tools
- LLVM binutils:

used a lot, but through wrapper scripts. We want clang and gcc to coexist — nm, ar and friends from LLVM binutils fail on gcc LTO files, GNU nm, ar and friends fail on LLVM LTO files (bitcode). So we use a wrapper script that checks for either compiler's LTO output and picks the tool version that will work

PGO:

Used for some key libraries (where generating useful profile data is possible/easy). Temporarily mostly disabled because of <u>bug 51624</u>. We expect to extend the use of PGO to additional packages.

- IIdb:
 - Included, but most people use gdb because it's what they're familiar with
- compiler-rt:

Used to be enabled by default, but we had to switch back to libgcc because of corner cases (library X built with gcc [therefore linking to libgcc] and library Y built with clang [including compiler-rt] being used in the same application can cause clashes), plan is to switch back to compiler-rt after sorting out problems

libc++:

available, but not used by default: binary compatibility concerns with other distributions. If our system libraries (e.g. Qt) use libc++ and a user installs a non-free application/game built on another distribution built against Qt using libstdc++, that will cause problems. And we don't want to ship multiple copies of system libraries...

libc:

We're watching, but it's not really usable yet. Also, same binary compatibility issues as with libc++. At some point, if libc turns out well, we might do a libc/libc++ build to see if it's worth doing from a performance perspective...

Modifications

- Minor tweaks like adding target triplets, default settings
- Backports of some patches from master and phabricator (RISC-V linker relaxation for IId)
- Probably most controversial: We change the default of -fgnuc-version to 11.2

Why -fgnuc-version=11.2?

 Yes, this shouldn't be done — but it's everywhere, and distributions by definition deal with 3rd party code. We're not in a position to fix this.

-fgnuc-version=11.2 problems

We get this instead of the slow versions mentioned before
— but this is better: It results in a compile failure so it
doesn't go unnoticed (unlike the optimizations we miss
out on by pretending we're gcc 4.2.1). And of course
CFLAGS="\$CFLAGS -fgnuc-version=4.2.1" is
always a "quick fix"

export CC="gcc"; export CXX="g++"

- Not considered a taboo still used in a few packages (we'd like to fix this, but it's not a high priority — help welcome!):
 - glibc big pain, lots of gcc specific code
 - grub2 theme engine broken when built with clang
 - ppl compile time error
 - wine (x86_64 only) 64-bit winecfg crashes on startup when built with clang
 - mesa (x86_64 only) reports of crashes on old hardware that are fixed by CC=gcc, no details provided - possible use of SSE3 or higher despite no -march= allowing it?
 - systemd (x86_64 only) hang on upgrades when built with clang on x86_64 but not znver1

Thanks for your attention

We can't take questions because of the lightning talks format — but feel free to ask on the CFP, or find the OpenMandriva team on



Matrix: https://matrix.to/#/%23openmandriva:matrix.org

IRC: <u>libera.chat #openmandriva</u>

Forum: https://forum.openmandriva.org/

or email bero@lindev.ch

