Google

Building, Testing, and Distributing Chromium's C++ Toolchain

LLVM Distributors Conference
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hans@chromium.org

Background: Chromium and Chrome

Chromium

+ Branding =

Chrome

Background: How we use LLVM

- Chrome is built with LLVM for all platforms
- Clang, lld, libc++, sanitizers, clang-format, clang-tidy, etc.
- Started experimenting with LLVM/Clang in 2009
- Switched Chrome/Mac builds in 2011
- Switched Chrome/Linux & Android builds after that
- Started working on Windows support in 2013
- Switched Chrome/Win builds in 2018

How does this make us a *Distributor*?

- Toolchain downloaded by Chromium "post-checkout git hook[1]"
- Many active Chromium committers
- Many many machines in the build farm
- Also developers outside Google
- We provide Windows, Mac and Linux binaries
- Non-Chromium developers find them useful too

1 https://source.chromium.org/chromium/chromium/src/+/main:tools/clang/scripts/update.py

What makes us special?

- Living at HEAD, frequent releases
- No local patches
- Targeting many architectures and operating systems
- Single-purpose toolchain: Chromium (and V8, WebRTC, …)

How we do it: Building

- Bootstrap build
- PGO + ThinLTO (on non-Mac)
- Windows, Linux, Mac/x86, Mac/arm64
- Cron job for fresh binaries in the morning

How we do it: Testing

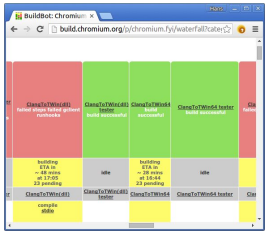
- "Tip-of-tree" continuous integration buildbots
- Build tip-of-tree LLVM
- Then uses that to build tip-of-tree Chromium
- Then runs Chromium's test suite
- Many build configurations, many bots
- + Regular Chrome tests when we commit

https://ci.chromium.org/p/chromium/g/chromium.clang/console

How we do it: Distribution

- Upload tarballs to Google Cloud Storage
- Push binaries to our distributed build system
- Check in update to the "post-update git hook" script

How we do it: A Diagram



Continuous integration

~weekly

1 day

trunk LLVM

clang-123abc-1.tgz

Chrome Canary

Parting Thoughts: There's Room for Improvement

- Staying close to HEAD can be hard
- No local patches + not allowing test failures --- all breakages slow us down
- "Those Chromium folks revert all the patches"
- Better pre- and post-commit testing would be nice
- "Oops, my commit trivially broke the build/tests" should not be a thing
- Moving more LLVM infra to GitHub might help?

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