

Your Build in a Datacenter

Remote Caching and Execution in Bazel

<https://bazel.build>

Bazel in a Nutshell ...think CMake not Jenkins

- Multi Language → Java, C/C++, Python, Go, Android, iOS, Docker, etc.
- Multi Platform → Windows, macOS, Linux, FreeBSD
- Extension Language → Add build rules for any language
- Tracks all dependencies → Correctness → Performance
 - Bazel only rebuilds what is necessary
 - **Perfect incrementality** → no more clean builds
 - **Dependency graph** → **extreme parallelism** (*and remote execution*)

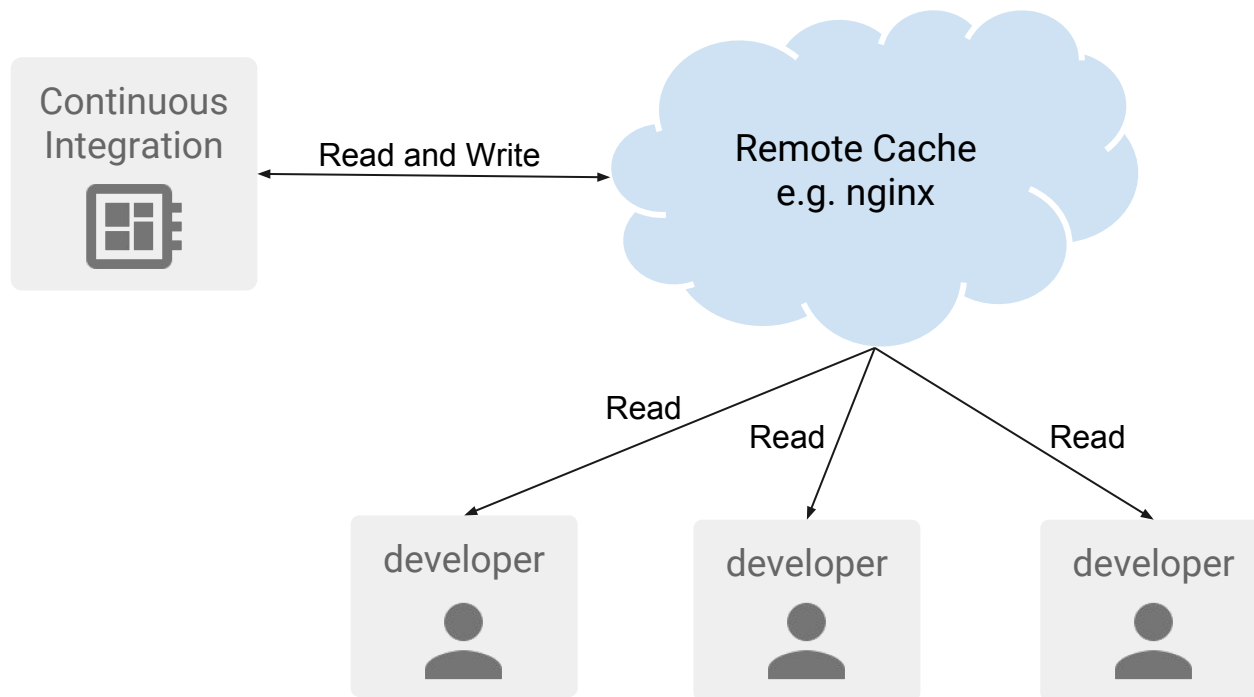
Remote Caching ...what is it?

- Any HTTP/1.1 server with support for PUT and GET is a remote cache
 - nginx, Apache httpd, etc.
- Bazel can store and retrieve build outputs to/from a remote cache
- Allows build outputs to be shared by developers and continuous integration (CI)
- **50 - 90% build time reduction is the common case**

Remote Caching ...how does it work?

- Dependency Graph → Action Graph
- What's an action?
 - Command e.g. `/usr/bin/g++ hello_world.cc -o hello_world`
 - Input Files e.g. `hello_world.cc`
 - Output Filenames e.g. `hello_world`
 - Platform e.g. `debian 9.3.0, x86_64, g++ 8.0, etc.`
 - ...
- SHA256(action) → Action Key
- Bazel can store and retrieve build outputs via their action key

Remote Caching ...how to use it?



Remote Execution *...because fast*

- Remember actions?
- Bazel can send an action for execution to a remote machine i.e. a datacenter
 - Shared cache of build/test outputs → no work is the fastest work
 - Lots of beefy machines → run hundreds of compiler invocations in parallel
 - True cross-compilation → run a test on Windows from your Linux desktop

Remote Execution *...because fast*

- gRPC-based API
- **Bazel Buildfarm**
 - OSS project: github.com/bazelbuild/bazel-buildfarm
 - Work in Progress
 - Contributors include Uber, Twitter, TwoSigma, with support from Google

What we are working on

- Stabilize the remote execution API
- Cross Compilation Support in Bazel and Buildfarm
- Local Execution inside a Docker container (Docker Sandbox)
- Minimize network usage (rsync) → up to 90% reduction in download sizes

Thanks!

<https://docs.bazel.build/versions/master/remote-caching.html>