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?

Continuous Integration

Remote Cache
e.g. nginx

Read and Write

Read

Read

Read

developer

developer

developer
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