Zig Compiler and build system

CONCEPTS

zig is one binary: compiler, build system, formatter, test runner and a drop-in C/C++ cross compiler.

build.zig build script
↓ declares
Steps install, run, test
↓ build
Artifacts exe, lib, tests
↓ installs to
zig-out/ bin, lib

Build output goes to zig-out/ and the cache to .zig-cache/; both are safe to delete and belong in .gitignore.

Zig is pre-1.0: build.zig APIs and some flags change between releases, so check zig version first.

PROJECT

`zig init`
Scaffold build.zig, build.zig.zon and src/

`zig init --minimal`
Only write a stub build.zig and .zon

`zig version`
Print the compiler version

`zig env`
Show lib, std and cache directories

`zig fetch --save <url>`
Add a dependency to build.zig.zon

`zig fetch --save=<name> <url>`
Add it under a chosen name

BUILD SYSTEM

`zig build`
Run the default install step

`zig build run`
Build and run the executable

`zig build run -- <args>`
Pass arguments to the program

`zig build test`
Run the project's test step

BUILD SYSTEM (cont.)

`zig build -l`
List the available steps

`zig build --help`
Show all options, including project -D ones

`zig build <step>`
Run a custom step from build.zig

`zig build --summary all`
Show every step, not just failures

`zig build --watch`
Rebuild when sources change

`zig build -D<name>=<value>`
Set a project option

OPTIMIZE AND TARGET

`zig build -Doptimize=Debug`
Default: safety checks on, no optimization

`zig build -Doptimize=ReleaseSafe`
Optimized, keeps safety checks

`zig build -Doptimize=ReleaseFast`
Fastest code, safety checks off

`zig build -Doptimize=ReleaseSmall`
Smallest binary

`zig build -Dtarget=<triple>`
Cross compile the whole project

`zig build -Dtarget=x86_64-windows`
Example: Windows 64-bit

`zig targets`
List supported targets and CPUs

SINGLE FILES

`zig run <file.zig>`
Compile and run a file

`zig run <file.zig> -- <args>`
Run with program arguments

`zig build-exe <file.zig>`
Compile an executable

`zig build-lib <file.zig>`
Compile a static library

`zig build-exe <file.zig> -O ReleaseFast`
Set the optimization mode

SINGLE FILES (cont.)

`zig build-exe <file.zig> -target <triple>`
Cross compile one file

`zig build-exe <file.zig> -lc`
Link libc

`zig build-exe <file.zig> -l<lib>`
Link a system library

TEST AND FORMAT

`zig test <file.zig>`
Run the tests in a file

`zig test <file.zig> --test-filter <text>`
Run only matching tests

`zig fmt <path>`
Format files or directories in place

`zig fmt --check <path>`
List unformatted files, change nothing

C AND C++ TOOLCHAIN

`zig cc <file.c> -o <out>`
Compile C with the bundled clang

`zig c++ <file.cpp> -o <out>`
Compile C++

`zig cc -target <triple> <file.c>`
Cross compile C

`zig cc -target x86_64-linux-musl <file.c>`
Example: static Linux binary

`zig translate-c <file.h>`
Convert C to Zig on stdout

`CC="zig cc" make`
Use zig as the C compiler in a make build

RECIPES

Static Linux binary from any host

```
zig build -Dtarget=x86_64-linux-musl -Doptimize=ReleaseSafe
file zig-out/bin/<name>
```

Add a dependency

```
zig fetch --save <url>
# then in build.zig:
b.dependency("<name>", .{})
```