ccache Compiler cache

CONCEPTS

ccache hashes the preprocessed source, compiler and flags. On a hit it returns the stored object file instead of compiling. Run a build twice and compare 'ccache -s' to see it working.

ccache gcc ... hash inputs
↓ lookup
Cache hit: copy object
↓ miss
Real compiler store result

Each compile is a lookup keyed by source, flags and compiler

Config precedence (highest first)

Source	Example
Command line	ccache max_size=1G gcc ...
Environment	CCACHE_MAXSIZE=1G
Directory config	ccache.conf up the tree
Cache config	$CCACHE_DIR/ ccache.conf
System config	/etc/ ccache.conf

RUNNING IT

`ccache <compiler> <args>`
Prefix a compiler command

`ln -s $(which ccache) ~/bin/gcc`
Masquerade as the compiler

RUNNING IT (cont.)

`make CC='ccache gcc'`
Pass the prefix to make

`CC="ccache gcc" ./configure`
Use it with autotools

`CMAKE_C_COMPILER_LAUNCHER`
Set to ccache via -D (also CXX)

`ccache -V`
Print the version

`ccache --help`
List all options

`ccache <KEY>=<value> gcc ...`
Set one config option for this call

STATISTICS

`ccache -s`
Show summary of hits and misses

`ccache -s -v`
Show more detailed statistics

`ccache -s -vv`
Show even more detail

`ccache -z`
Zero the statistics counters

`ccache -x`
Show compression statistics

`ccache --print-stats`
Machine-readable counters

CACHE MANAGEMENT

`ccache -M <size>`
Set maximum cache size (default GiB)

`ccache -M 0`
Remove the size limit

`ccache -F <num>`
Set maximum number of files

`ccache -c`
Clean up to the configured limits

`ccache -C`
Clear all cached files, keep config

`ccache --evict-older-than <age>d`
Drop entries unused for N days

`ccache -d <dir> -s`
Operate on another cache directory

CONFIGURATION

`ccache -p`
Show effective config and its origin

`ccache -k <key>`
Print one config value

`ccache -o <key>=<value>`
Write a config option to the file

CONFIGURATION (cont.)

`CCACHE_DIR=<dir>`
Cache location

`CCACHE_MAXSIZE=<size>`
Cache size limit (default 5GiB)

`CCACHE_DISABLE=1`
Bypass ccache entirely

HIT RATE AND CORRECTNESS

`CCACHE_BASEDIR=<dir>`
Rewrite absolute paths under dir

`CCACHE_SLOPPINESS=<list>`
Relax checks to get more hits

`CCACHE_SLOPPINESS=time_macros`
Ignore __DATE__ and __TIME__

`CCACHE_SLOPPINESS=pch_defines`
Allow precompiled headers

`CCACHE_COMPILERCHECK=content`
Hash compiler binary contents

`CCACHE_NODIRECT=1`
Disable direct mode

`CCACHE_RECACHE=1`
Ignore existing results and overwrite

DEBUGGING AND SHARING

`CCACHE_LOGFILE=<file>`
Log every decision to a file

`CCACHE_DEBUG=1`
Write per-object debug files

RECIPES

Trial: measure the speedup

```
ccache -z
make clean && make -j8
make clean && make -j8
ccache -s   # second build
should be mostly hits
```

Transparent via symlinks

```
mkdir -p ~/ccbin
for c in gcc g++ cc c++; do
ln -sf $(which ccache) ~/
ccbin/$c; done
export PATH=$HOME/ccbin:
$PATH
gcc --version   # now routed
through ccache
```

CMake project with ccache

```
L=CMAKE_C_COMPILER_LAUNCHER=
ccache
X=
CMAKE_CXX_COMPILER_LAUNCHER=
ccache
cmake -B build -G Ninja -D$L
-D$X
cmake --build build &&
ccache -s
```

Why is it missing?

```
export CCACHE_LOGFILE=/tmp/
ccache.log
make clean && make
grep -iE 'miss|result' /tmp/
ccache.log | head
ccache -p | grep -E
'sloppiness|base_dir'
```