

# Where is the header file?

先用 `gcc -v` 打開一個 `.c` 檔案

```
beck@beck-VirtualBox:~$ gcc -v hw0101.c
Using built-in specs.
COLLECT_GCC=gcc
COLLECT_LTO_WRAPPER=/usr/lib/gcc/x86_64-linux-gnu/9/lto-wrapper
OFFLOAD_TARGET_NAMES=nvptx-none:hsa
OFFLOAD_TARGET_DEFAULT=1
Target: x86_64-linux-gnu
Configured with: ../src/configure -v --with-pkgversion='Ubuntu 9.3.0-17ubuntu1-20.04' --with-bugurl=file:///usr/share/doc/gcc-9/README.Bugs --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --prefix=/usr --with-gcc-major-ve
r
sion-only --program-suffix=-9 --program-prefix=x86_64-linux-gnu- --enable-shar
e
d --enable-linker-build-id --libexecdir=/usr/lib --without-included-gettext --
enable-threads=posix --libdir=/usr/lib --enable-nls --enable-clocale=gnu --enab
le-libstdc++-debug --enable-libstdc++-time=yes --with-default-libstdc++-abi=new
--enable-gnu-unique-object --disable-vtable-verify --enable-plugin --enable-de
fault-pie --with-system-zlib --with-target-system-zlib=auto --enable-objc-gc=au
to --enable-multiarch --disable-werror --with-arch=32=i686 --with-abi=m64 --wit
h-multilib-list=m32,m64,mx32 --enable-multilib --with-tune=generic --enable-off
load-targets=nvptx-none=/build/gcc-9-HskZEa/gcc-9-9.3.0/debian/tmp-nvptx/usr,hs
a --without-cuda-driver --enable-checking=release --build=x86_64-linux-gnu --ho
st=x86_64-linux-gnu --target=x86_64-linux-gnu
Thread model: posix
gcc version 9.3.0 (Ubuntu 9.3.0-17ubuntu1-20.04)
COLLECT_GCC_OPTIONS='-v' '-mtune=generic' '-march=x86-64'
/usr/lib/gcc/x86_64-linux-gnu/9/cc1 -quiet -v -imultiarch x86_64-linux-gnu hw0
101.c -quiet -dumpbase hw0101.c -mtune=generic -march=x86-64 -auxbase hw0101 -v
ersion -fasynchronous-unwind-tables -fstack-protector-strong -Wformat -Wformat-
security -fstack-clash-protection -fcf-protection -o /tmp/ccb6H68.s
GNU C17 (Ubuntu 9.3.0-17ubuntu1-20.04) version 9.3.0 (x86_64-linux-gnu)
```

往下滑直到看到 `" #include <...> search starts here: "`

```
ignoring nonexistent directory "/usr/local/include/x86_64-linux-gnu"
ignoring nonexistent directory "/usr/lib/gcc/x86_64-linux-gnu/9/include-fixed"
ignoring nonexistent directory "/usr/lib/gcc/x86_64-linux-gnu/9/../../../../../x86_64-linux-gnu/include"
#include "... search starts here:
#include <...> search starts here:
/usr/lib/gcc/x86_64-linux-gnu/9/include
/usr/local/include
/usr/include/x86_64-linux-gnu
/usr/include
End of search list.
GNU C17 (Ubuntu 9.3.0-17ubuntu1~20.04) version 9.3.0 (x86_64-linux-gnu)
    compiled by GNU C version 9.3.0, GMP version 6.2.0, MPFR version 4.0.2,
    MPC version 1.1.0, isl version isl-0.22.1-GMP

GGC heuristics: --param ggc-min-expand=96 --param ggc-min-heapsize=125286
Compiler executable checksum: bbf13931d8de1abe14040c9909cb6969
COLLECT_GCC_OPTIONS='-v' '-mtune=generic' '-march=x86-64'
 as -v --64 -o /tmp/ccRv8Im9.o /tmp/ccbB6H68.s
GNU assembler version 2.34 (x86_64-linux-gnu) using BFD version (GNU Binutils for Ubuntu) 2.34
COMPILER_PATH=/usr/lib/gcc/x86_64-linux-gnu/9:/usr/lib/gcc/x86_64-linux-gnu/9:/usr/lib/gcc/x86_64-linux-gnu/9:/usr/lib/gcc/x86_64-linux-gnu/9:/usr/lib/gcc/x86_64-linux-gnu/9
LIBRARY_PATH=/usr/lib/gcc/x86_64-linux-gnu/9:/usr/lib/gcc/x86_64-linux-gnu/9/../../x86_64-linux-gnu:/usr/lib/gcc/x86_64-linux-gnu/9/../../../../../lib:/lib/x86_64-linux-gnu:/lib/../../lib:/usr/lib/x86_64-linux-gnu:/usr/lib/../../lib:/usr/lib/gcc/x86_64-linux-gnu/9/../../../../../lib:/usr/lib/
COLLECT_GCC_OPTIONS='-v' '-mtune=generic' '-march=x86-64'
```

在那裡可以看到一串位址還有 End of search list

接下來試著 cd 去最後一個看看 (ls)

```
beck@beck-VirtualBox:~$ cd /usr/include
beck@beck-VirtualBox:/usr/include$ ls
aio.h          fnmatch.h      mlocate         pwd.h           syscall.h
aliases.h      fstab.h         mntent.h        python3.8       sysexits.h
alloca.h       fts.h           monetary.h      rdma            syslog.h
argp.h         ftw.h           mqueue.h        re_comp.h       tar.h
argz.h         gcalc-2         mtd             regex.h         termio.h
ar.h           gci-2           net             regexp.h         termios.h
arpa           gconv.h         netash          reglib          tgmath.h
asm-generic    getopt.h        netatalk        resolv.h        thread_db.h
assert.h       glob.h          netax25         rpc             threads.h
byteswap.h     gnu-versions.h netdb.h          rpcsvc          time.h
complex.h      grp.h           neteconet       sched.h         ttyent.h
cpio.h         gshadow.h       netinet         scsi            uchar.h
crypt.h        iconv.h         netipx          search.h        ucontext.h
ctype.h        ifaddrs.h       netiucv         semaphore.h     ulimit.h
dirent.h       inttypes.h      netpacket       setjmp.h        unistd.h
dlfcn.h        iproute2        netrom          sgTTY.h         utime.h
drm            langinfo.h      netrose         shadow.h        utmp.h
elf.h          lastlog.h       nfs             signal.h        utmpx.h
endian.h       libgen.h        nl_types.h     sound           values.h
envz.h         libintl.h       nss.h          spawn.h         video
err.h          limits.h        obstack.h      stab.h          wait.h
errno.h        link.h          openvpn        stdc-predef.h  wchar.h
error.h        linux           paths.h        stdint.h        wctype.h
execinfo.h     locale.h        poll.h         stdio_ext.h     wordexp.h
fcntl.h        malloc.h        printf.h       stdio.h         X11
features.h     math.h          proc_service.h stdlib.h         x86_64-linux-gnu
fenv.h         mcheck.h        protocols      string.h        xen
                             pthread.h     strings.h
                             pty.h        sudo_plugin.h
```

看起來似乎對了，但太多了不想看

```
argz.h          gcalc-2         mtd             regex.h         termio.h
ar.h            gci-2           net             regexp.h         termios.h
arpa           gconv.h         netash          reglib          tgmath.h
asm-generic    getopt.h        netatalk        resolv.h        thread_db.h
assert.h       glob.h          netax25         rpc             threads.h
byteswap.h     gnu-versions.h netdb.h          rpcsvc          time.h
complex.h      grp.h           neteconet       sched.h         ttyent.h
cpio.h         gshadow.h       netinet         scsi            uchar.h
crypt.h        iconv.h         netipx          search.h        ucontext.h
ctype.h        ifaddrs.h       netiucv         semaphore.h     ulimit.h
dirent.h       inttypes.h      netpacket       setjmp.h        unistd.h
dlfcn.h        iproute2        netrom          sgTTY.h         utime.h
drm            langinfo.h      netrose         shadow.h        utmp.h
elf.h          lastlog.h       nfs             signal.h        utmpx.h
endian.h       libgen.h        nl_types.h     sound           values.h
envz.h         libintl.h       nss.h          spawn.h         video
err.h          limits.h        obstack.h      stab.h          wait.h
errno.h        link.h          openvpn        stdc-predef.h  wchar.h
error.h        linux           paths.h        stdint.h        wctype.h
execinfo.h     locale.h        poll.h         stdio_ext.h     wordexp.h
fcntl.h        malloc.h        printf.h       stdio.h         X11
features.h     math.h          proc_service.h stdlib.h         x86_64-linux-gnu
fenv.h         mcheck.h        protocols      string.h        xen
                             pthread.h     strings.h        xorg
                             pty.h        sudo_plugin.h
beck@beck-VirtualBox:/usr/include$ ls | grep stdio
stdio_ext.h
stdio.h
beck@beck-VirtualBox:/usr/include$
```

用 grep 就直接找到 stdio.h 了