

Hw0104 Where is the header file?

在終端機打gcc -v hw0103.c可以看出gcc在下列這些地方尋找標頭檔

```
siang@zhangxianglingdeMacBook-Pro school % gcc -v hw0103.c
Apple clang version 12.0.0 (clang-1200.0.32.2)
Target: x86_64-apple-darwin19.6.0
Thread model: posix
InstalledDir: /Library/Developer/CommandLineTools/usr/bin
"/Library/Developer/CommandLineTools/usr/bin/clang" -cc1 -triple x86_64-apple-macosx10.15.0 -Wdeprecated-objc-isa-usage -Werror=deprecated-objc-isa-usage -Werror=implicit-function-declaration -emit-obj -mrelax-all -disable-free -disable-llvm-verifier -discard-value-names -main-file-name hw0103.c -mrelocation-model pic -pic-level 2 -mthread-model posix -mframe-pointer=all -fno-strict-return -masm-verbose -munwind-tables -target-sdk-version=10.15.6 -fcompatibility-qualified-id-block-type-checking -target-cpu penryn -dwarf-column-info -debugger-tuning=lldb -target-linker-version 609 -v -resource-dir /Library/Developer/CommandLineTools/usr/lib/clang/12.0.0 -isysroot /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk -I/usr/local/include -internal-isystem /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/local/include -internal-isystem /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include -internal-externc-isystem /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include -internal-externc-isystem /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/System/Library/Frameworks (framework directory) -Wno-implicit-int-float-conversion -Wno-c99-designator -Wno-final-dtor-non-final-class -Wno-extra-semi-stmt -Wno-misleading-indentation -Wno-quoted-includet-in-framework-header -Wno-implicit-fallthrough -Wno-enum-enum-conversion -Wno-enum-float-conversion -fdebug-compilation-dir /Users/siang/school -ferror-limit 19 -fmessage-length 157 -stack-protector 1 -fstack-check -mdarwin-stkchk-strong-link -fblocks -fencode-extended-block-signature -fregister-global-dtors-with-atexit -fgnu-version=4.2.1 -fobjc-runtime=macosx-10.15.0 -fmax-type-align=16 -fdiagnostics-show-option -fcolor-diagnostics -o /var/folders/dj/l5y3ybv57z/f78l_0nzc4gcr0000gn/T/hw0103-b5176e.o -x c hw0103.c
clang -cc1 version 12.0.0 (clang-1200.0.32.2) default target x86_64-apple-darwin19.6.0
ignoring nonexistent directory "/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/local/include"
ignoring nonexistent directory "/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/Library/Frameworks"
#include "...": search starts here:
#include <...> search starts here:
  /usr/local/include
  /Library/Developer/CommandLineTools/usr/lib/clang/12.0.0/include
  /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include
  /Library/Developer/CommandLineTools/usr/include
  /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/System/Library/Frameworks (framework directory)
End of search list.
"/Library/Developer/CommandLineTools/usr/bin/ld" -demangle -lto_library /Library/Developer/CommandLineTools/usr/lib/libLTO.dylib -no_deduplicate -dynamic -arch x86_64 -platform_version macos 10.15.0 10.15.6 -syslibroot /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk -o a.out -L/usr/local/lib /var/folders/dj/l5y3ybv57z/f78l_0nzc4gcr0000gn/T/hw0103-b5176e.o -lSystem /Library/Developer/CommandLineTools/usr/lib/clang/12.0.0/lib/darwin/libclang_rt.osx.a
```

在find找出 stdio.h 所在位置為 /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include

```
siang@zhangxianglingdeMacBook-Pro school % find /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include -name stdio.h
/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include/sys/stdio.h
/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include/stdio.h
siang@zhangxianglingdeMacBook-Pro school %
```

之後嘗試把stdio.h 的檔名改為 stdio.h.1006

```
siang@zhangxianglingdeMacBook-Pro school % mv /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include/stdio.h /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include/stdio.h.1006
mv: rename /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include/stdio.h to /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include/stdio.h.1006: Permission denied
siang@zhangxianglingdeMacBook-Pro school % sudo !!
sudo mv /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include/stdio.h /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include/stdio.h.1006
Password:
siang@zhangxianglingdeMacBook-Pro school %
```

再回到gcc編譯，發現無法編譯，找不到 stdio.h

```
f78l_0nzc4gcr0000gn/T/hw0103-123490.o -x c hw0103.c
clang -cc1 version 12.0.0 (clang-1200.0.32.2) default target x86_64-apple-darwin19.6.0
ignoring nonexistent directory "/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/local/include"
ignoring nonexistent directory "/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/Library/Frameworks"
#include "...": search starts here:
#include <...> search starts here:
  /usr/local/include
  /Library/Developer/CommandLineTools/usr/lib/clang/12.0.0/include
  /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include
  /Library/Developer/CommandLineTools/usr/include
  /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/System/Library/Frameworks (framework directory)
End of search list.
hw0103.c:1:10: fatal error: 'stdio.h' file not found
#include <stdio.h>
         ~~~~~~
1 error generated.
```

之後把檔案放回去，stdio.h 回到原本的位置，就可以編譯了

```
siang@zhangxianglingdeMacBook-Pro school % sudo mv /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include/stdio.h.1006 /Library/Developer/CommandLin
eTools/SDKs/MacOSX.sdk/usr/include/stdio.h
siang@zhangxianglingdeMacBook-Pro school % gcc -v hw0103.c
Apple clang version 12.0.0 (clang-1200.0.32.2)
Target: x86_64-apple-darwin19.6.0
Thread model: posix
InstalledDir: /Library/Developer/CommandLineTools/usr/bin
"/Library/Developer/CommandLineTools/usr/bin/clang" -cc1 -triple x86_64-apple-macosx10.15.0 -Wdeprecated-objc-isa-usage -Werror=deprecated-objc-isa-usage -W
error=implicit-function-declaration -emit-obj -mrelax-all -disable-free -disable-llvm-verifier -discard-value-names -main-file-name hw0103.c -mrelocation-mod
el pic -pic-level 2 -mthread-model posix -mframe-pointer=all -fno-strict-return -masm-verbose -munwind-tables -target-sdk-version=10.15.6 -fcompatibility-qua
lified-id-block-type-checking -target-cpu penryn -dwarf-column-info -debugger-tuning=lldb -target-linker-version 609 -v -resource-dir /Library/Developer/Comm
andLineTools/usr/lib/clang/12.0.0 -isysroot /Library/Developer/CommandLineTools/SDKs/MacOSX.sdk -I/usr/local/include -internal-isystem /Library/Developer/Comm
andLineTools/SDKs/MacOSX.sdk/usr/local/include -internal-isystem /Library/Developer/CommandLineTools/usr/lib/clang/12.0.0/include -internal-externc-isystem
/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include -internal-externc-isystem /Library/Developer/CommandLineTools/usr/include -Wno-reorder-init-l
ist -Wno-implicit-int-float-conversion -Wno-c99-designator -Wno-final-dtor-non-final-class -Wno-extra-semi-stmt -Wno-misleading-indentation -Wno-quoted-inclu
de-in-framework-header -Wno-implicit-fallthrough -Wno-enum-enum-conversion -Wno-enum-float-conversion -fdebug-compilation-dir /Users/siang/school -ferror-lim
it 19 -fmessage-length 157 -stack-protector 1 -fstack-check -mdarwin-stkchk-strong-link -fblocks -fencode-extended-block-signature -fregister-global-dtors-with
-atexit -fgnuc-version=4.2.1 -fobjc-runtime=macosx-10.15.0 -fmax-type-align=16 -fdiagnostics-show-option -fcolor-diagnostics -o /var/folders/dj/l5y3ybv57z
f78l_0nzc4gcr000gn/T/hw0103-0fe7d6.o -x c hw0103.c
clang -cc1 version 12.0.0 (clang-1200.0.32.2) default target x86_64-apple-darwin19.6.0
ignoring nonexistent directory "/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/local/include"
ignoring nonexistent directory "/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/Library/Frameworks"
#include "... search starts here:
#include <...> search starts here:
/usr/local/include
/Library/Developer/CommandLineTools/usr/lib/clang/12.0.0/include
/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include
/Library/Developer/CommandLineTools/usr/include
/Library/Developer/CommandLineTools/SDKs/System/Library/Frameworks (framework directory)
End of search list.
```

Hw0105-how to convert a negative integer from decimal to hex.

電腦要儲存十進位的負數時，會用32bits的記憶體，以二補數的方式儲存數值。利用二補數的概念能將負數轉為無符號的二進位制正數，例如：

將11010010的最高位1不變，其餘位數的1變0，0 變1

10101101再加一

10101110

再將四個位元為一組，得到ae（十六進制）

Hw0106 Bonus: Where is my cd ?

```
siang@zhangxianglingdeMacBook-Pro school % uname -a
Darwin zhangxianglingdeMacBook-Pro.local 19.6.0 Darwin Kernel Version 19.6.0: Thu Jun 18 20:49:00 PDT 2020; root:xnu-6153.141.1~1/RELEASE_ARM_T8020_T8040 arm64
siang@zhangxianglingdeMacBook-Pro school % which cd
cd: shell built-in command
siang@zhangxianglingdeMacBook-Pro school %
```

由which cd得到cd是shell的內建項目，
及並非外部程式，所以找不到cd的位
置。