HW 1 (2021-27764 안지수)

Complie Process

1.1 Preprocessing

(a)

stdio.h : /usr/include/stdio.h (875 lines)

math.h : /usr/include/math.h (1341 lines)

```
$ cpp -v /dev/null

Using built-in specs.
COLLECT_GCC=cpp
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
Thread model: posix
gcc version 9.3.0 (Ubuntu 9.3.0-17ubuntu1~20.04)
COLLECT_GCC_OPTIONS='-E' '-v' '-mtune=generic' '-march=x86-64'
 /usr/lib/gcc/x86_64-linux-gnu/9/cc1 -E -quiet -v -imultiarch x86_64-linux-gnu /dev/null -mtune=generic -march=x86-64 -fasynchronous-u
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.
# 1 "/dev/null"
# 1 "<built-in>"
# 1 "<command-line>"
# 31 "<command-line>"
# 1 "/usr/include/stdc-predef.h" 1 3 4
# 32 "<command-line>" 2
# 1 "/dev/null"
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/:/usr/lib/gcc/x86_64-lin
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
COLLECT_GCC_OPTIONS='-E' '-v' '-mtune=generic' '-march=x86-64'
```

(b)

```
extern int printf (const char *__restrict __format, ...);
```

```
extern int scanf (const char *__restrict __format, ...);
```

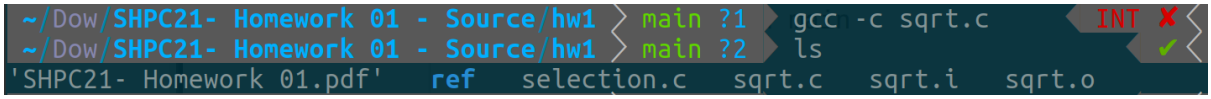
```
extern double sqrt (double __x) __attribute__ ((__nothrow__ , __leaf__)); extern double __sqrt (double __
x) __attribute__ ((__nothrow__ , __leaf__));
```

```
$ gcc -E sqrt.c -o sqrt.i
```

(c) 헤더파일에 실제 구현이 들어있지는 않다. 헤더파일에는 함수의 인터페이스만 서술되어 있다. 실제구현은 object file 또는 shared object파일로 저장되어 있으며 컴파일 과정중 linking단계에서 linker를 통해 linking된다.

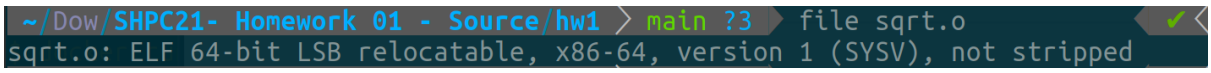
1.2 Compilation

(a) gcc -c sqrt.c




```
gcc -c sqrt.c
```

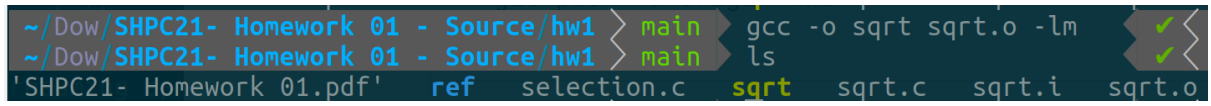
(b) ELF 64-bit LSB relocatable file



file 명령어를 사용하여 파일의 포멧을 알아낸다.

1.3 Linking

(a) stdio.h는 libc.so나 lib.a에 구현이 들어있고, linker가 해당 object파일을 자동으로 링킹해주기 때문에 문제가 없지만 math.h의 경우 구현이 libm.so또는 ilb.a에 구현이 들어있고 이를 링킹해 주는것이 default옵션이 아니기 때문에 아래와 같이 이것의 링킹을 명시해야한다.




```
gcc -o sqrt sqrt.o -lm
```

(b)