

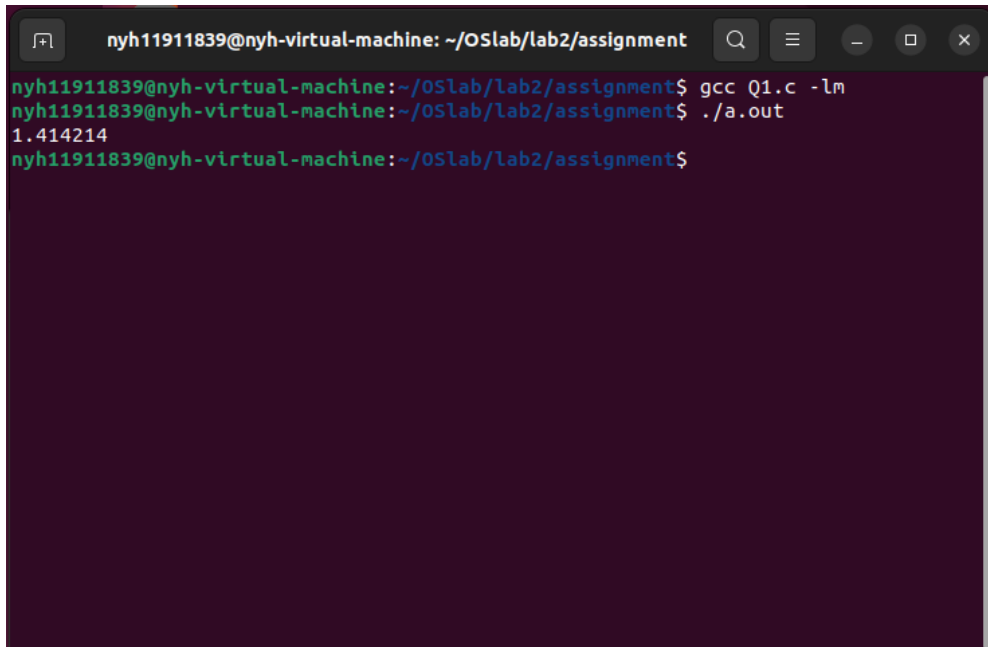
Week2 Report in Class (Fri56)

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Q1

编写c代码存在Q1.c中(截图), 代码中使用math库中的sqrt函数, 对2进行开方, 并打印结果。用gcc命令生成可执行文件Q1并执行(截图)。

```
1  #include <math.h>
2  #include <stdio.h>
3
4
5  int main(){
6      float num = 2;
7      float num_sqrt = sqrt(num);
8      printf("%f\n", num_sqrt);
9      return 0;
10 }
```



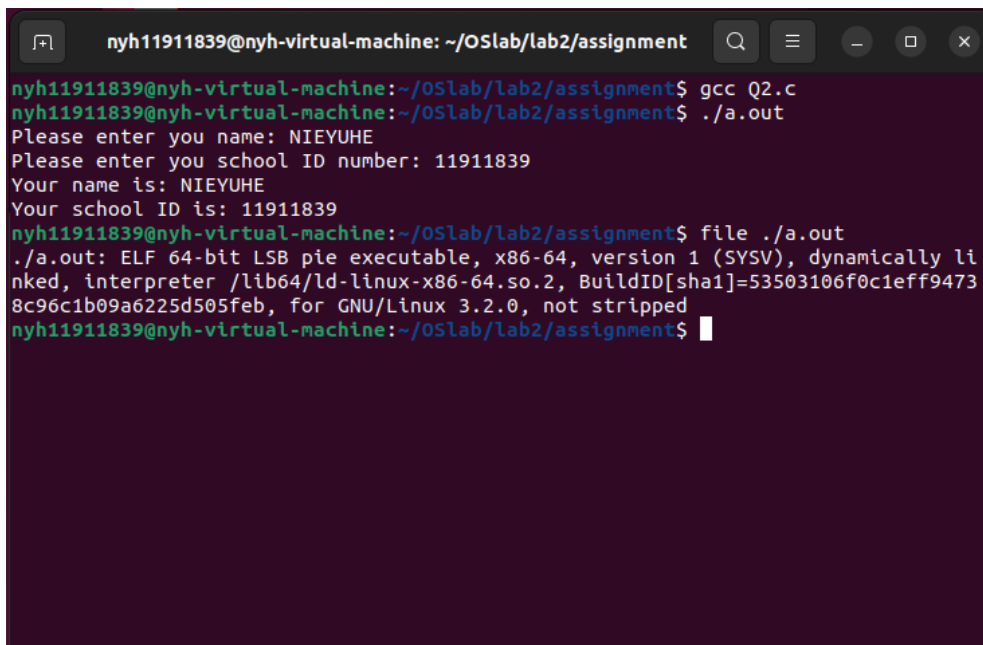
A terminal window titled 'nyh11911839@nyh-virtual-machine: ~/OSlab/lab2/assignment'. The terminal shows the following commands and output:

```
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$ gcc Q1.c -lm
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$ ./a.out
1.414214
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$
```

Q2

编写c代码存在Q2.c中,请实现一个可以打印自己姓名和学号的C语言程序(截图)。用gcc生成目标文件Q2.o, 然后生成可执行文件Q2并执行。用file命令查看文件类型(截图)。

```
1  #include <stdio.h>
2
3  int main(){
4      char name_str[20];
5      char id_str[20];
6
7      printf("Please enter you name: ");
8      scanf("%s", name_str);
9      printf("Please enter you school ID number: ");
10     scanf("%s", id_str);
11
12     printf("Your name is: %s\n", name_str);
13     printf("Your school ID is: %s\n", id_str);
14     return 0;
15 }
```



```
nyh11911839@nyh-virtual-machine: ~/OSlab/lab2/assignment
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$ gcc Q2.c
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$ ./a.out
Please enter you name: NIEYUHE
Please enter you school ID number: 11911839
Your name is: NIEYUHE
Your school ID is: 11911839
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$ file ./a.out
./a.out: ELF 64-bit LSB pie executable, x86-64, version 1 (SYSV), dynamically li
nked, interpreter /lib64/ld-linux-x86-64.so.2, BuildID[sha1]=53503106f0c1eff9473
8c96c1b09a6225d505feb, for GNU/Linux 3.2.0, not stripped
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$
```

Q3

请总结C语言的编译过程。

1. Pre-process

- extend `#define` `#include` into C code

2. Compile & Optimize

- Check the grammar of the code, if there is no mistake, compile it and transform it into intermediate code (assembly language)
- Optimize the code
- Output `.s` files

3. Assemble

- Transform the intermediate code into the target code (machine language)
- Output `.o` files

4. Link

- Link all the target code and the static/dynamic library
- Produce executable file

Q4

windows和ubuntu下的可执行文件的格式分别是什么？

- Windows: `.exe`
- Ubuntu: There is not suffix of the executable file in Ubuntu, while the The standard Linux executable format is named **Executable and Linking Format (ELF)**

Q5

请编写makefile文件(截图)，执行make命令或者执行make file1时通过Q1打印2的开方结果(截图)，执行make file2时通过Q2打印自己的姓名学号(截图)。

```

1  main1: Q1.o
2      gcc -o main1 Q1.o -lm
3  Q1.o: Q1.c
4  file1:
5      make main1
6      ./main1
7
8  main2: Q2.o
9      gcc -o main2 Q2.o
10 Q2.o: Q2.c
11 file2:
12     make main2
13     ./main2
14
15 clean:
16     rm Q1.o Q2.o

```

```
nyh11911839@nyh-virtual-machine: ~/OSlab/lab2/assignment
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$ make file1
make main1
make[1]: Entering directory '/home/nyh11911839/OSlab/lab2/assignment'
cc -c -o Q1.o Q1.c
gcc -o main1 Q1.o -lm
make[1]: Leaving directory '/home/nyh11911839/OSlab/lab2/assignment'
./main1
1.414214
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$ make file2
make main2
make[1]: Entering directory '/home/nyh11911839/OSlab/lab2/assignment'
cc -c -o Q2.o Q2.c
gcc -o main2 Q2.o
make[1]: Leaving directory '/home/nyh11911839/OSlab/lab2/assignment'
./main2
Please enter you name: NIEYUHE
Please enter you school ID number: 11911839
Your name is: NIEYUHE
Your school ID is: 11911839
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$
```

Q6

给定宏定义 `#define MUL(x) (x)*(x)`, `MUL(9+3)`的计算结果是什么?

```
1  #define MUL(x) (x)*(x)
2  #include <stdio.h>
3
4  int main(){
5      float result = MUL(9+3);
6      printf("%f\n", result);
7      return 0;
8  }
```

```
nyh11911839@nyh-virtual-machine: ~/OSlab/lab2/assignment
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$ gcc Q6.c
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$ ./a.out
144.000000
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$
```

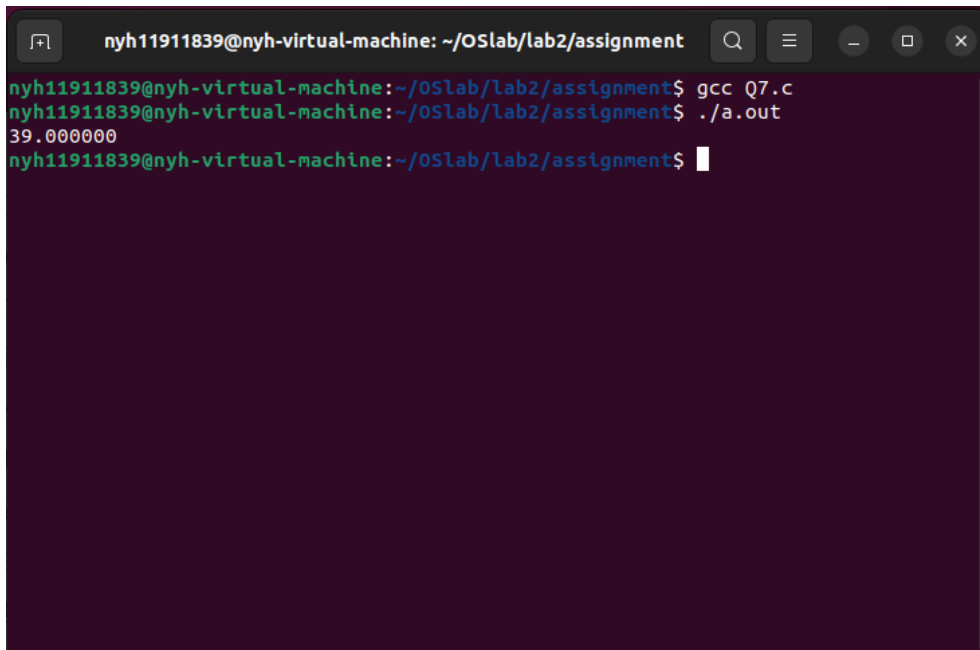
The result is 144.

- $(9+3) * (9+3) = 144$

Q7

给定宏定义 `#define MUL(x) x*x`, `MUL(9+3)` 的计算结果是什么?

```
1  #define MUL(x) x*x
2  #include <stdio.h>
3
4  int main(){
5      float result = MUL(9+3);
6      printf("%f\n", result);
7      return 0;
8  }
```



```
nyh11911839@nyh-virtual-machine: ~/OSlab/lab2/assignment
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$ gcc Q7.c
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$ ./a.out
39.000000
nyh11911839@nyh-virtual-machine:~/OSlab/lab2/assignment$
```

The result is 39.

- $9 + 3*9 + 3 = 9+27+3=39$