

# Week2 Report

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实验课时段: 周五5-6节

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## Q1

命令行命令:

```
vim Q1.c  
gcc Q1.c  
./a.out
```

Q1.c 中的代码:

```
#include <math.h>  
#include <stdio.h>  
int main(){  
    printf("%lf\n",sqrt(2.0));  
    return 0;  
}
```

命令行运行截图:

```
wyt11910104@wyt11910104-virtual-machine: ~/Desktop/OSl...
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ ./main
Hello, world!
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ vim Q1.c
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ gcc Q1.c
Q1.c: In function 'main':
Q1.c:4:2: warning: implicit declaration of function 'printf' [-Wimplicit-function-declaration]
    4 |     printf("%lf",sqrt(2.0));
      |     ^~~~~~
Q1.c:4:2: warning: incompatible implicit declaration of built-in function 'printf'
Q1.c:2:1: note: include '<stdio.h>' or provide a declaration of 'printf'
    1 | #include <math.h>
    +++ |+#include <stdio.h>
    2 |
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ vim Q1.c
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ gcc Q1.c
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ ./a.out
1.414214wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ ./
vim Q1.c
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ gcc Q1.c
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ ./a.out
1.414214
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$
```

## Q2

命令行命令：

```
vim Q2.c
gcc -o Q2.o Q2.c
./Q2.o
file Q2.o
```

Q2.c 中的代码：

```
#include <stdio.h>

int main(){
    printf("%s %d\n","Yitong WANG", 11910104);
    return 0;
}
```

命令行运行截图：

```
wyt11910104@wyt11910104-virtual-machine: ~/Desktop/OSl...
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ vim Q2.c
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ gcc -o Q2.o Q2.c
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ ./Q2.o
Yitong WANG 11910104
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ file Q2.o
Q2.o: ELF 64-bit LSB shared object, x86-64, version 1 (SYSV), dynamically linked
, interpreter /lib64/ld-linux-x86-64.so.2, BuildID[sha1]=2b2479927053b1a2c516fc5
4bdbbc23097b377ddc, for GNU/Linux 3.2.0, not stripped
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ a
```

## Q3

C语言的编译过程主要有以下几个步骤：

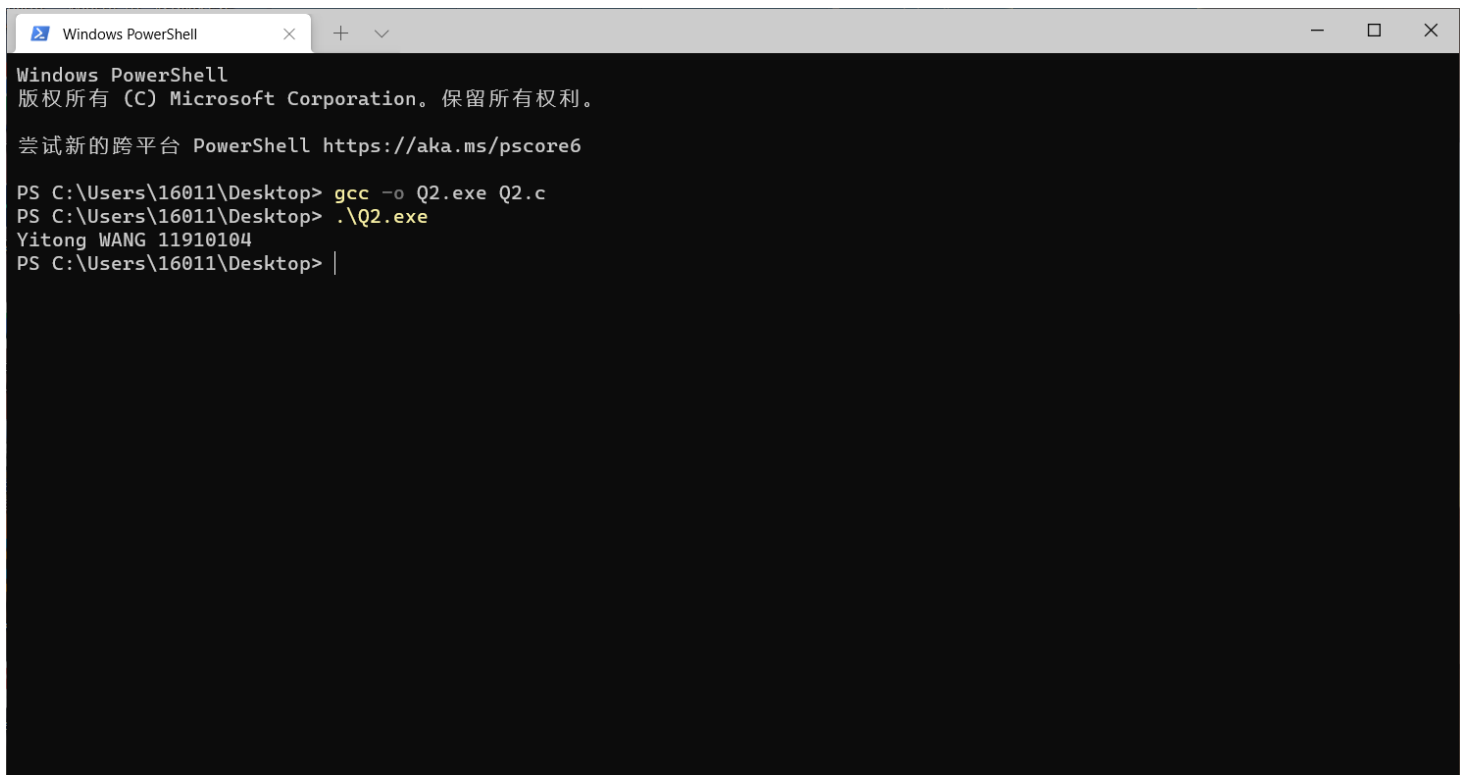
- 预处理：主要是
  - 处理一些其中的伪指令，如#define等等
  - 处理头文件包含指令，如#include等等
  - 处理条件编译指令，如#ifdef等等
- 编译优化
  - 编译会通过词法分析和语法分析，进行语法检查，并翻译成中间代码和汇编代码
  - 优化过程是对中间代码的优化，也有对目标代码生成的优化
- 汇编和链接
  - 汇编会将汇编语言代码翻译成目标机器指令，得到相应的目标文件
  - 链接主要会将有关的目标文件相连接，确保不同文件之间的定义可以连接起来

(参考：[https://blog.csdn.net/weixin\\_40756041/article/details/88052207](https://blog.csdn.net/weixin_40756041/article/details/88052207) )

## Q4

考虑将Q2.c通过gcc编译，在Windows 10和Ubuntu 20.04下生成可执行文件：

- Windows系统：

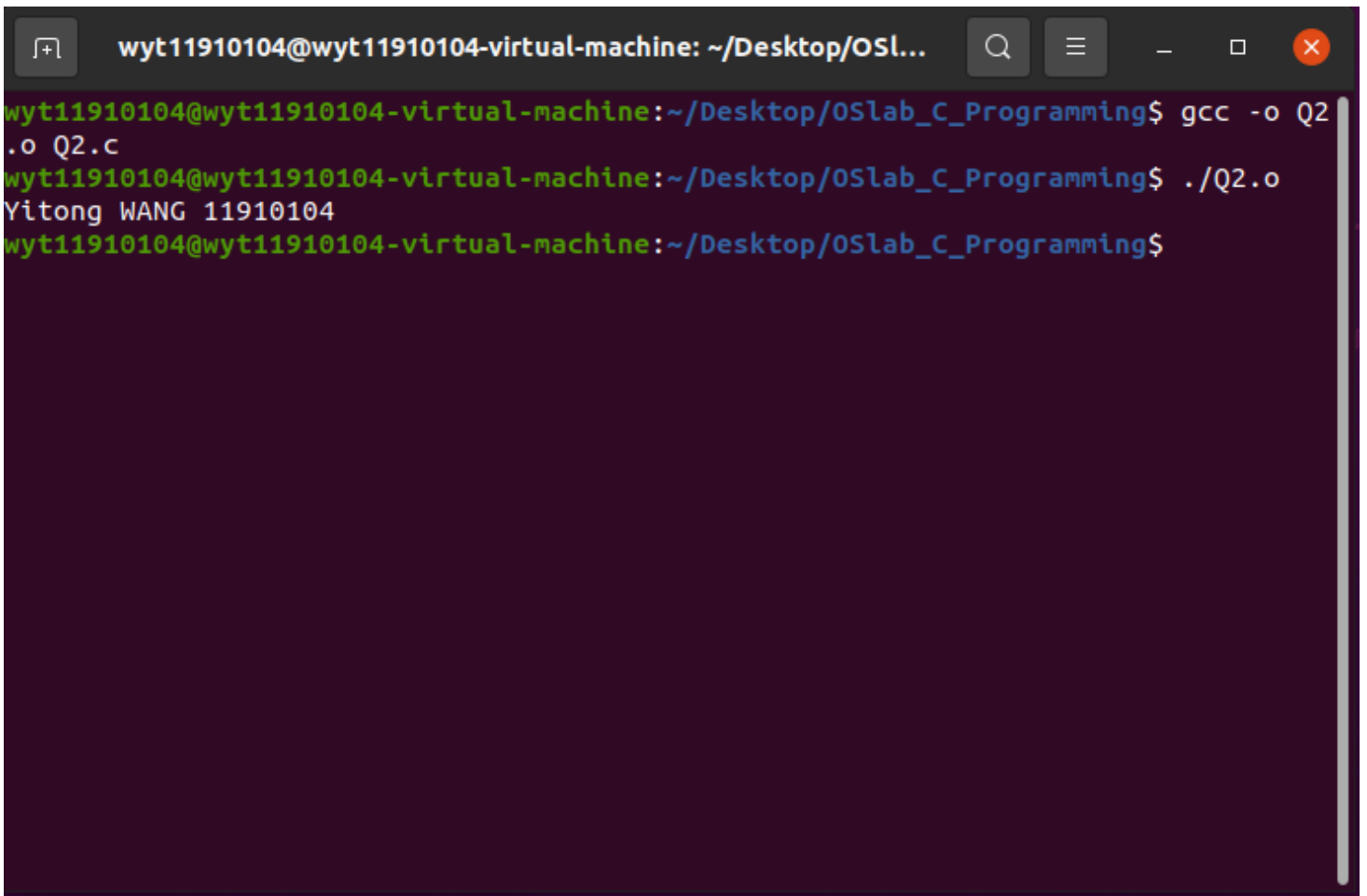


```
Windows PowerShell
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尝试新的跨平台 PowerShell https://aka.ms/pscore6

PS C:\Users\16011\Desktop> gcc -o Q2.exe Q2.c
PS C:\Users\16011\Desktop> .\Q2.exe
Yitong WANG 11910104
PS C:\Users\16011\Desktop> |
```

- Ubuntu系统：



A terminal window with a dark background and light green text. The window title is "wyt11910104@wyt11910104-virtual-machine: ~/Desktop/OSl...". The terminal shows the following commands and output:

```
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ gcc -o Q2.o Q2.c
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ ./Q2.o
Yitong WANG 11910104
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$
```

然后使用file命令，在Ubuntu系统下查看对应文件格式：

```
wyt11910104@wyt11910104-virtual-machine: ~/Desktop/OSl...
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ gcc -o Q2.o Q2.c
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ ./Q2.o
Yitong WANG 11910104
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ file Q2.o
Q2.o: ELF 64-bit LSB shared object, x86-64, version 1 (SYSV), dynamically linked
, interpreter /lib64/ld-linux-x86-64.so.2, BuildID[sha1]=2b2479927053b1a2c516fc5
4bdbbc23097b377ddc, for GNU/Linux 3.2.0, not stripped
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ file Q2.exe
Q2.exe: PE32+ executable (console) x86-64, for MS Windows
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$
```

可见对应可执行文件的格式：

- Windows: PE32+ executable
- Ubuntu: ELF 64-bit LSB shared object

## Q5

### Q1.c

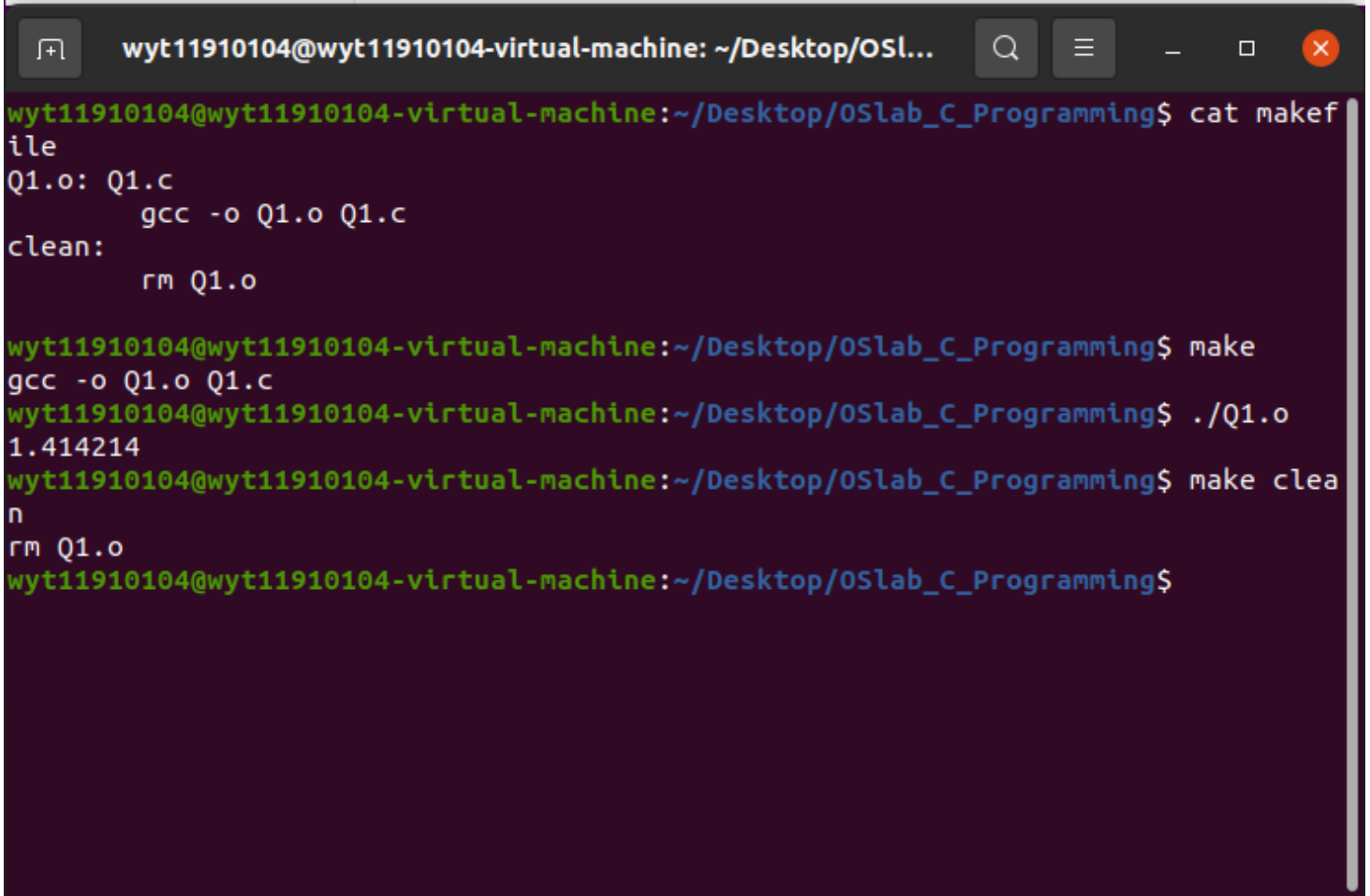
- 命令行命令：

```
vim makefile
make
./Q1.o
```

- makefile内容：

```
Q1.o: Q1.c
        gcc -o Q1.o Q1.c
clean:
        rm Q1.o
```

- 运行截图:

A terminal window with a dark background and light green text. The window title is 'wyt11910104@wyt11910104-virtual-machine: ~/Desktop/OSl...'. The terminal shows the following commands and output:

```
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ cat makefile
Q1.o: Q1.c
        gcc -o Q1.o Q1.c
clean:
        rm Q1.o

wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ make
gcc -o Q1.o Q1.c
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ ./Q1.o
1.414214
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ make clean
rm Q1.o
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$
```

## Q2.c

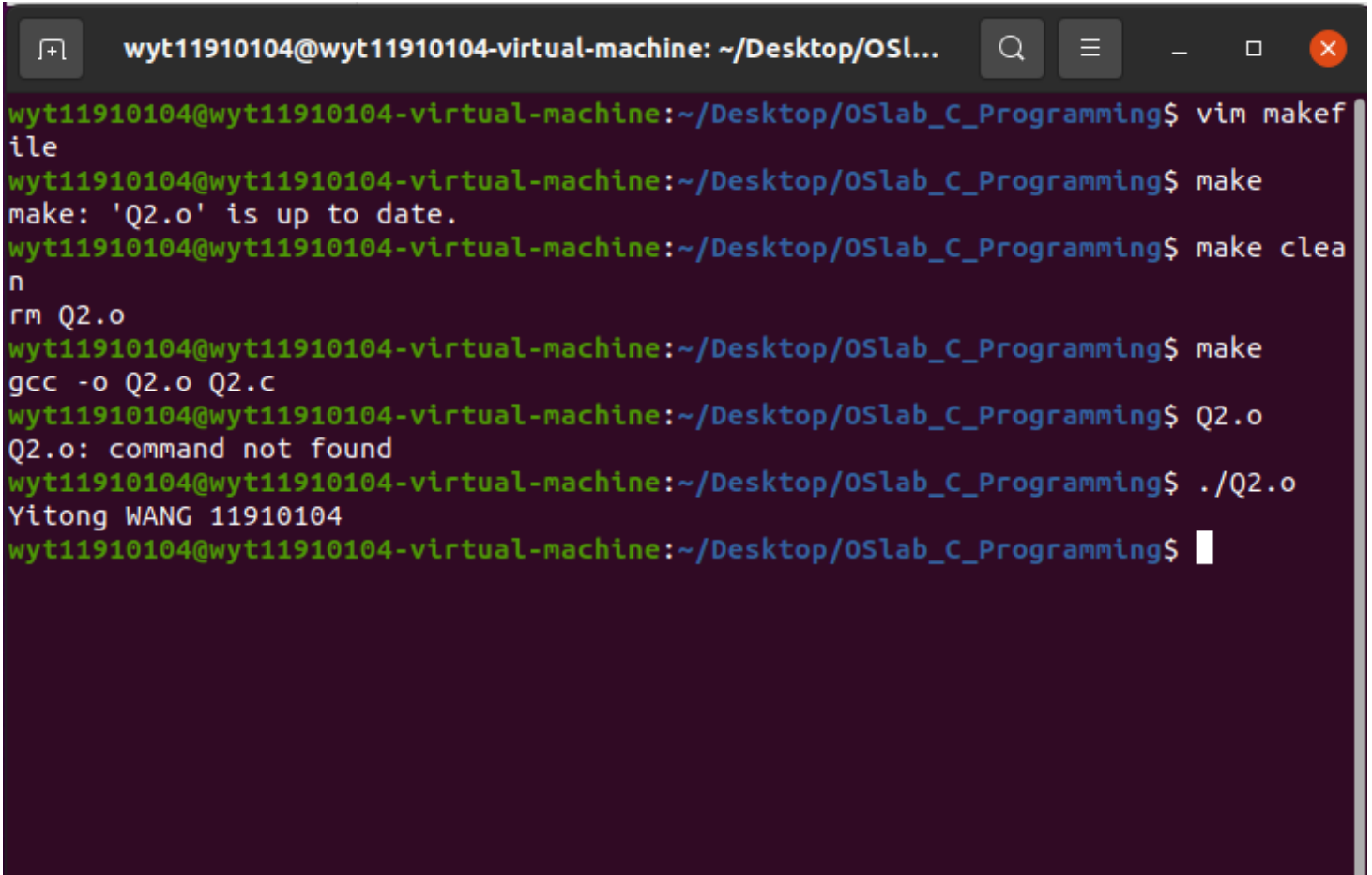
- 命令行命令:

```
vim makefile
make
./Q2.o
make clean
```

- makefile内容:

```
Q2.o: Q2.c
      gcc -o Q2.o Q2.c
clean:
      rm Q2.o
```

- 运行截图:



```
wyt11910104@wyt11910104-virtual-machine: ~/Desktop/OSlab_C_Programming$ vim makefile
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ make
make: 'Q2.o' is up to date.
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ make clean
rm Q2.o
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ make
gcc -o Q2.o Q2.c
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ Q2.o
Q2.o: command not found
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$ ./Q2.o
Yitong WANG 11910104
wyt11910104@wyt11910104-virtual-machine:~/Desktop/OSlab_C_Programming$
```