

OST LAB

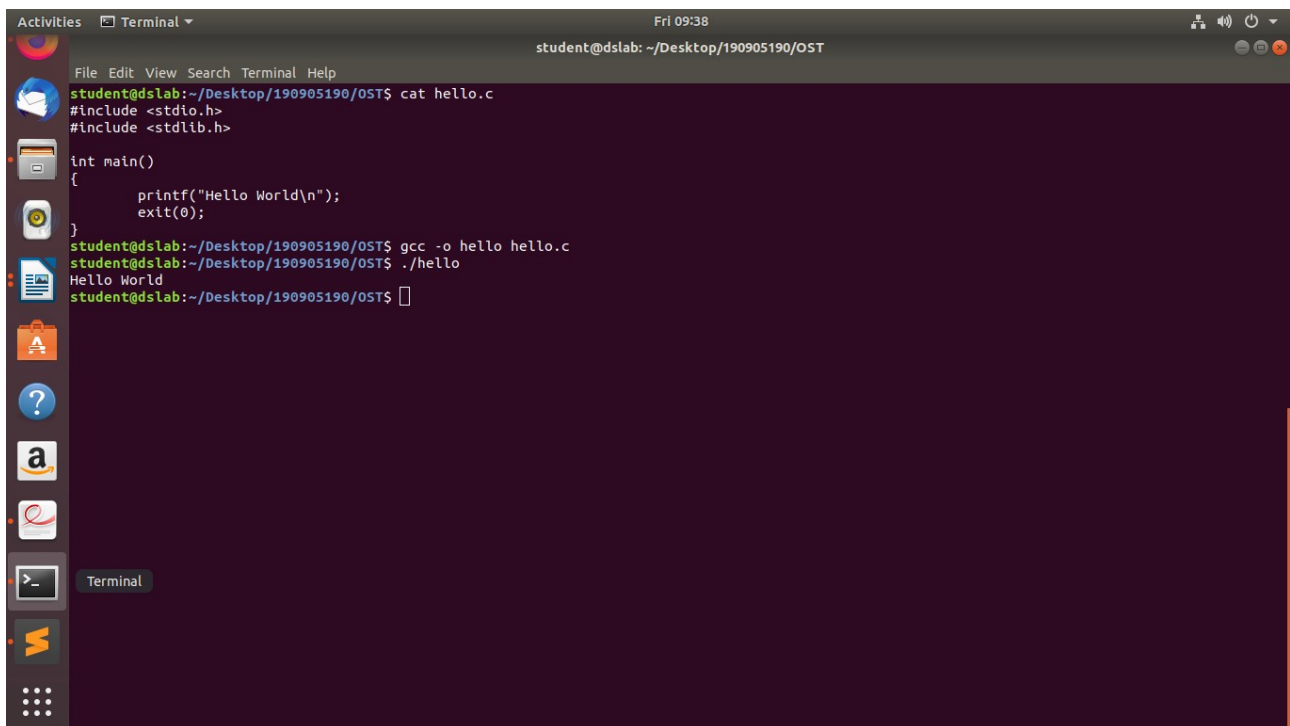
Lab 4

Q1)

Code:

```
#include <stdio.h>
#include <stdlib.h>
```

```
int main()
{
    printf("Hello World\n");
    exit(0);
}
```



The screenshot shows a terminal window titled "Terminal" with the following content:

```
student@dslab: ~/Desktop/190905190/OST$ cat hello.c
#include <stdio.h>
#include <stdlib.h>

int main()
{
    printf("Hello World\n");
    exit(0);
}

student@dslab:~/Desktop/190905190/OST$ gcc -o hello hello.c
student@dslab:~/Desktop/190905190/OST$ ./hello
Hello World
student@dslab:~/Desktop/190905190/OST$
```

The terminal window has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The status bar at the top shows "Fri 09:38" and "student@dslab: ~/Desktop/190905190/OST". The left sidebar contains various application icons, including a file manager, a terminal, and a web browser.

Q2)

Code:

“fred.c”

```
#include <stdio.h>
void fred(int arg)
{
    printf("fred: we passed %d\n", arg);
}
```

“bill.c”

```
#include <stdio.h>

void bill(char *arg)
{
    printf("bill: we passed %s\n", arg);
}
```

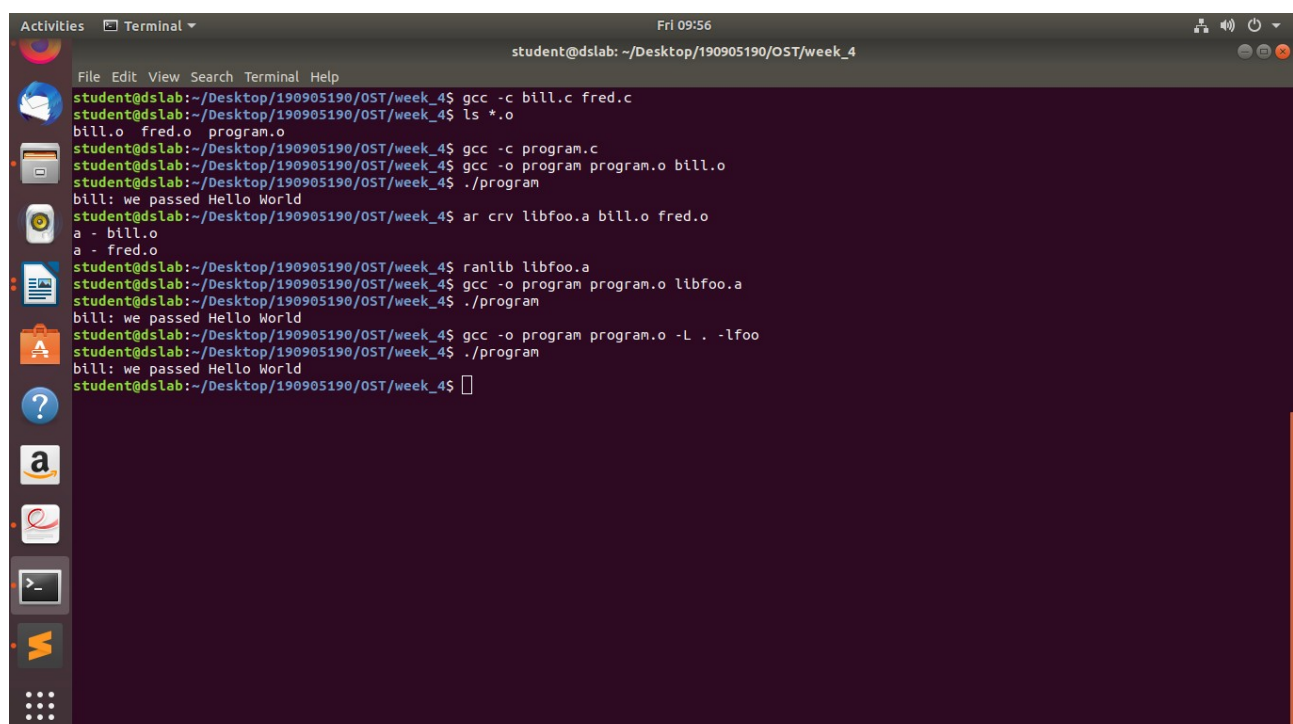
“program.c”

```
#include <stdlib.h>
#include "lib.h"

int main()
{
    bill("Hello World");
    return 0;
}
```

“lib.h”

```
void bill(char *);
void fred(int);
```



The screenshot shows a terminal window with the following commands and output:

```
student@dslab: ~/Desktop/190905190/OST/week_4
student@dslab:~/Desktop/190905190/OST/week_4$ gcc -c bill.c fred.c
student@dslab:~/Desktop/190905190/OST/week_4$ ls *.o
bill.o  fred.o  program.o
student@dslab:~/Desktop/190905190/OST/week_4$ gcc -c program.c
student@dslab:~/Desktop/190905190/OST/week_4$ gcc -o program program.o bill.o
student@dslab:~/Desktop/190905190/OST/week_4$ ./program
bill: we passed Hello World
student@dslab:~/Desktop/190905190/OST/week_4$ ar crv libfoo.a bill.o fred.o
a - bill.o
a - fred.o
student@dslab:~/Desktop/190905190/OST/week_4$ ranlib libfoo.a
student@dslab:~/Desktop/190905190/OST/week_4$ gcc -o program program.o libfoo.a
student@dslab:~/Desktop/190905190/OST/week_4$ ./program
bill: we passed Hello World
student@dslab:~/Desktop/190905190/OST/week_4$ gcc -o program program.o -L . -lfoo
student@dslab:~/Desktop/190905190/OST/week_4$ ./program
bill: we passed Hello World
student@dslab:~/Desktop/190905190/OST/week_4$
```

Q3)

Code:

“program2.c”

```
#include <stdio.h>
#include <stdlib.h>
#include "stack.h"
#define MAX_STACK_SIZE 10
```

```
int main()
{
    push(2);
    push(3);
    push(4);

    int it = pop();
    display();
    it = pop();
    display();
    // printf("\n");
    return 0;
}
```

“stack.c”

```
#include <stdio.h>
#include <stdlib.h>
#include "stack.h"
#define MAX_STACK_SIZE 10
int top = -1;
int stack[MAX_STACK_SIZE];
void push(int item)
{
    if (top >= MAX_STACK_SIZE - 1)
    {
        stackFull();
    }
    stack[++top] = item;
    display();
}
```

```
int pop()
{
    if(top == -1){
        stackEmpty();
        exit(0);
    }
    return stack[top--];
}
```

```
void stackFull()
{
    printf("Stack Full\n");
}
```

```

}

void stackEmpty()
{
    printf("Stack Empty\n");
}

void display()
{
    for(int i =0; i<=top; i++)
    {
        printf("%d\t", stack[i]);
    }
    printf("\n");
}

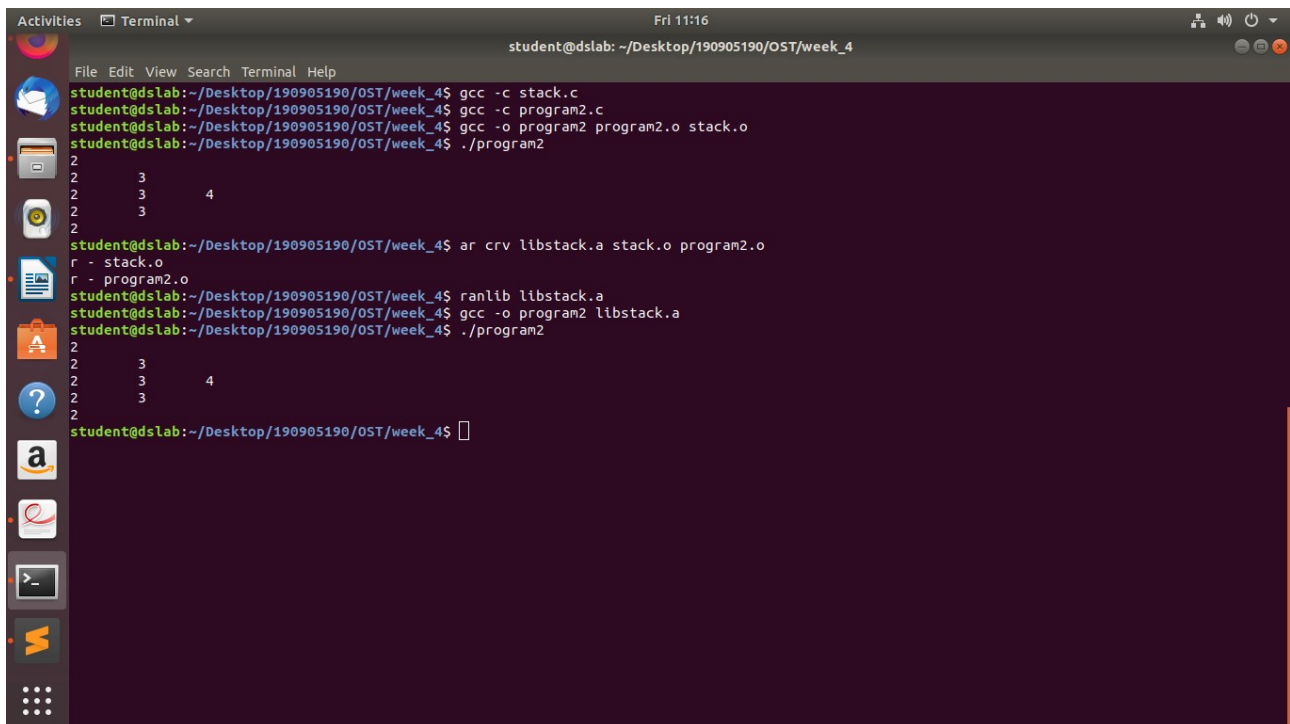
```

“stack.h” :

```

void push(int);
int pop();
void stackFull();
void stackEmpty();
void display();

```



```

student@dslab: ~/Desktop/190905190/OST/week_4
File Edit View Search Terminal Help
student@dslab:~/Desktop/190905190/OST/week_4$ gcc -c stack.c
student@dslab:~/Desktop/190905190/OST/week_4$ gcc -c program2.c
student@dslab:~/Desktop/190905190/OST/week_4$ gcc -o program2 program2.o stack.o
student@dslab:~/Desktop/190905190/OST/week_4$ ./program2
2
2      3
2      3      4
2      3
2
student@dslab:~/Desktop/190905190/OST/week_4$ ar crv libstack.a stack.o program2.o
r - stack.o
r - program2.o
student@dslab:~/Desktop/190905190/OST/week_4$ ranlib libstack.a
student@dslab:~/Desktop/190905190/OST/week_4$ gcc -o program2 libstack.a
student@dslab:~/Desktop/190905190/OST/week_4$ ./program2
2
2      3
2      3      4
2      3
2
student@dslab:~/Desktop/190905190/OST/week_4$

```

Q4)

Code:

“main.c”

```
#include <stdlib.h>
#include "a.h"

extern void function_two();
extern void function_three();

int main()
{
    function_two();
    function_three();
    exit(EXIT_SUCCESS);
}
```

“2.c”

```
#include "a.h"
#include "b.h"
```

```
void function_two()
{

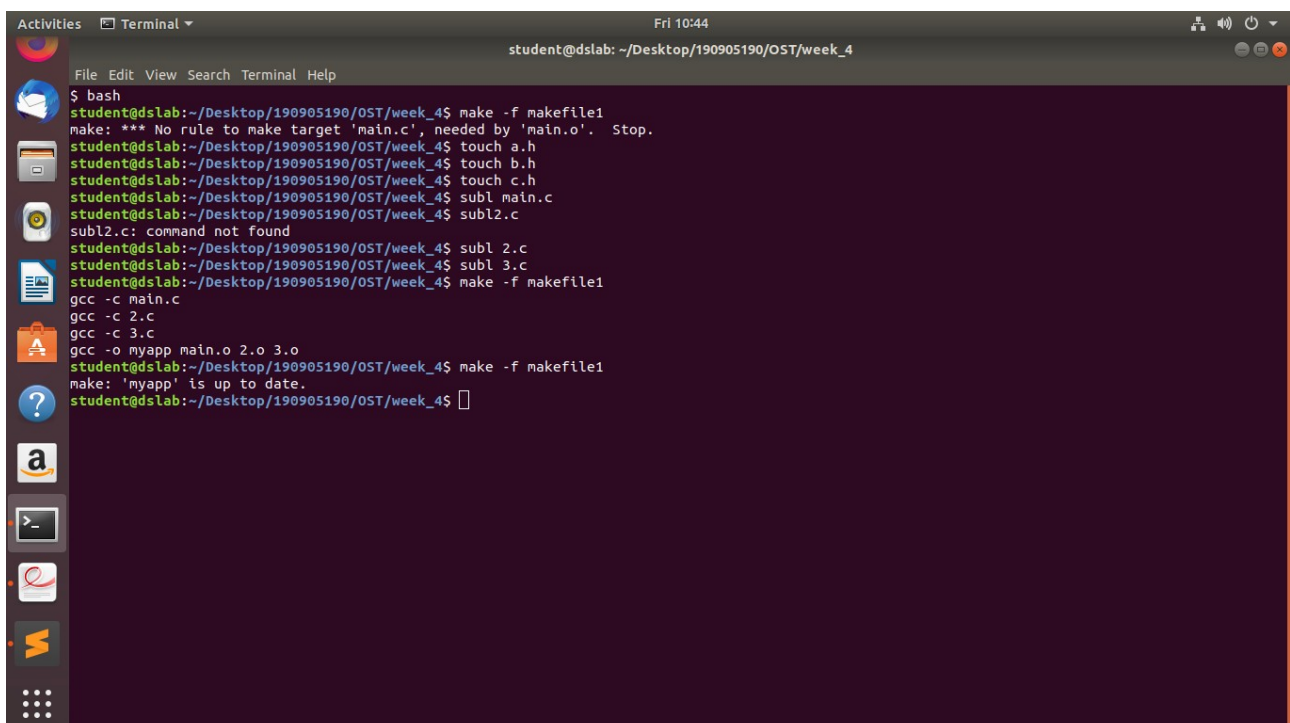
}
```

“3.c”

```
#include "b.h"
#include "c.h"
```

```
void function_three()
{

}
```



```
student@dslab: ~/Desktop/190905190/OST/week_4
$ bash
student@dslab:~/Desktop/190905190/OST/week_4$ make -f makefile1
make: *** No rule to make target 'main.c', needed by 'main.o'. Stop.
student@dslab:~/Desktop/190905190/OST/week_4$ touch a.h
student@dslab:~/Desktop/190905190/OST/week_4$ touch b.h
student@dslab:~/Desktop/190905190/OST/week_4$ touch c.h
student@dslab:~/Desktop/190905190/OST/week_4$ subl main.c
student@dslab:~/Desktop/190905190/OST/week_4$ subl 2.c
subl2.c: command not found
student@dslab:~/Desktop/190905190/OST/week_4$ subl 2.c
student@dslab:~/Desktop/190905190/OST/week_4$ subl 3.c
student@dslab:~/Desktop/190905190/OST/week_4$ make -f makefile1
gcc -c main.c
gcc -c 2.c
gcc -c 3.c
gcc -o myapp main.o 2.o 3.o
student@dslab:~/Desktop/190905190/OST/week_4$ make -f makefile1
make: 'myapp' is up to date.
student@dslab:~/Desktop/190905190/OST/week_4$
```

```
student@dslab: ~/Desktop/190905190/OST/week_4
student@dslab:~/Desktop/190905190/OST/week_4$ touch b.h
student@dslab:~/Desktop/190905190/OST/week_4$ make -f makefile1
gcc -c 2.c
gcc -c 3.c
gcc -o myapp main.o 2.o 3.o
student@dslab:~/Desktop/190905190/OST/week_4$ rm 2.o
student@dslab:~/Desktop/190905190/OST/week_4$ make -f makefile1
gcc -c 2.c
gcc -o myapp main.o 2.o 3.o
student@dslab:~/Desktop/190905190/OST/week_4$
```

Q5)

Code:

“makefile2”

all: myapp

Which compiler

CC = gcc

Where are include files kept

INCLUDE = .

Options for development

CFLAGS = -g -Wall -ansi

myapp: main.o 2.o 3.o

\$(CC) -o myapp main.o 2.o 3.o

main.o: main.c a.h

\$(CC) -I \$(INCLUDE) \$(CFLAGS) -c main.c

2.o: 2.c a.h b.h

\$(CC) -I \$(INCLUDE) \$(CFLAGS) -c 2.c

3.o: 3.c b.h c.h

\$(CC) -I \$(INCLUDE) \$(CFLAGS) -c 3.c

Activities Terminal Fri 10:54 student@dslab: ~/Desktop/190905190/OST/week_4

```
File Edit View Search Terminal Help
student@dslab:~/Desktop/190905190/OST/week_4$ rm *.o myapp
student@dslab:~/Desktop/190905190/OST/week_4$ make -f makefile2
gcc -I . -g -Wall -ansi -c main.c
gcc -I . -g -Wall -ansi -c 2.c
gcc -I . -g -Wall -ansi -c 3.c
gcc -o myapp main.o 2.o 3.o
student@dslab:~/Desktop/190905190/OST/week_4$
```