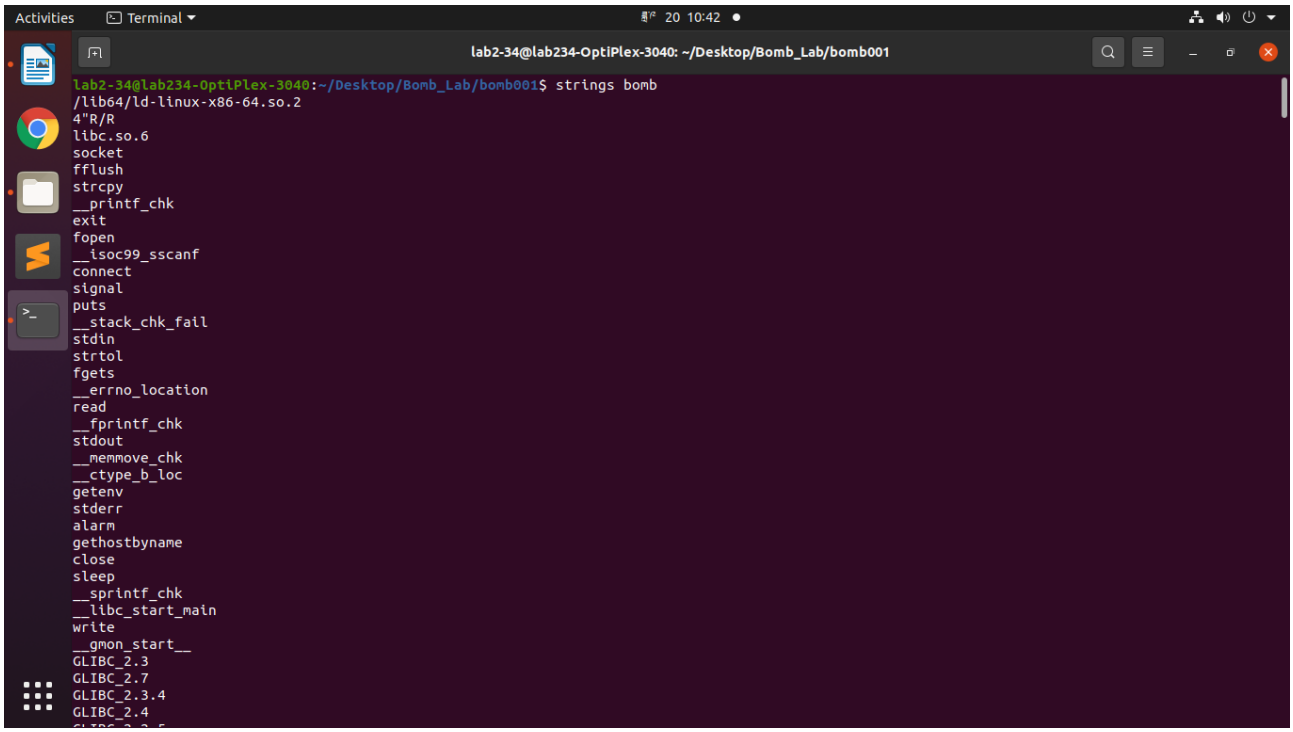
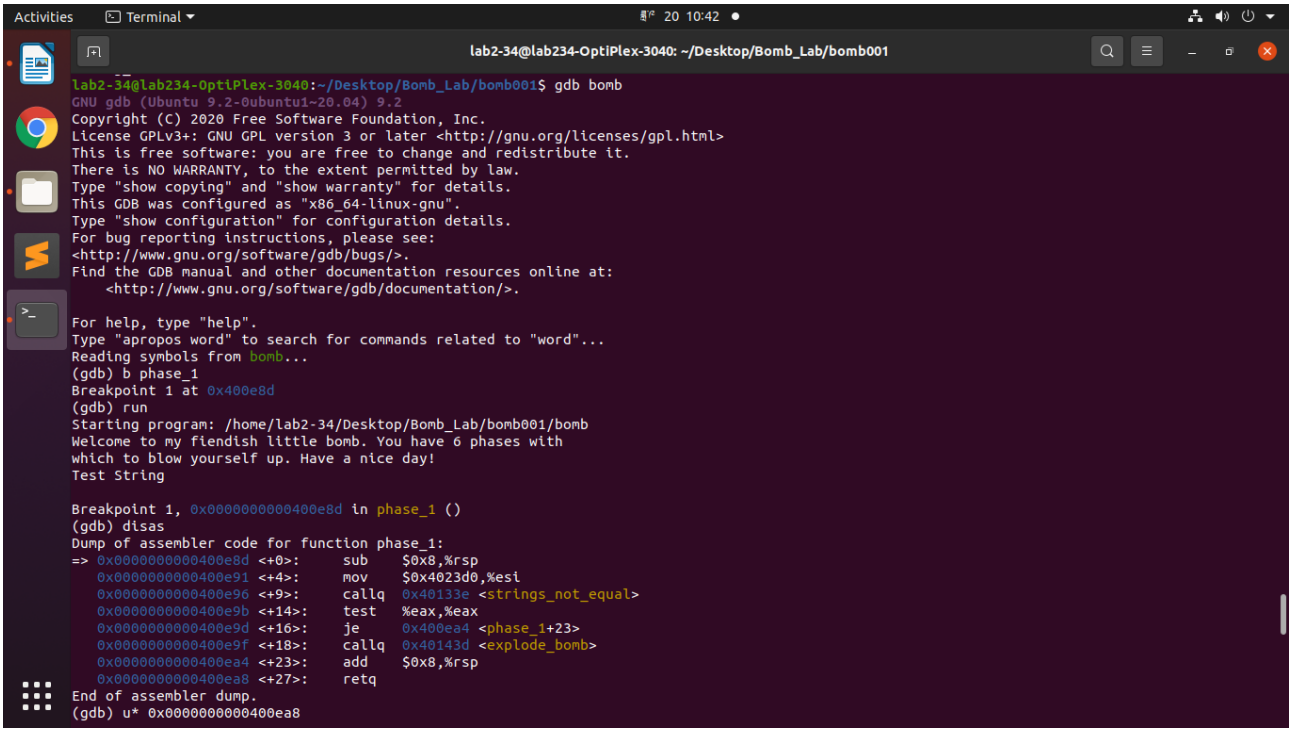
PHASE 01

Step 1) The strings bomb utility will display the printable strings in your bomb.



Step 2) The GNU debugger will enable the programmer to trace the program line by line, examine memory and registers, look at both the source code and assembly code.



Step 3) Set the breakpoints on <phase 1> function so that to enable the programmer to diffuse the bomb set at phase 1. This will ensure that the bomb doesn't blow up when we run the program with the compiler. Then run the program with run command.

```
Terminal ▾                                  20 10:50
lab2-34@lab234-OptiPlex-3040: ~/Desktop/Bomb_Lab/bomb001
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from bomb...
(gdb) b phase_1
Breakpoint 1 at 0x400e8d
(gdb) run
```

Step 4) After the run command, the programmer has to enter string and here the " Test String " is entered.
The disas command is shorthand for disassemble. This command will compare two strings, one the strings input by user and another is the default string of computer system.

```
Starting program: /home/lab2-34/Desktop/Bomb_Lab/bomb001/bomb
Welcome to my fiendish little bomb. You have 6 phases with
which to blow yourself up. Have a nice day!
Test String

Breakpoint 1, 0x0000000000400e8d in phase_1 ()
(gdb) disas
Dump of assembler code for function phase_1:
=> 0x0000000000400e8d <+0>:     sub    $0x8,%rsp
   0x0000000000400e91 <+4>:     mov    $0x4023d0,%esi
   0x0000000000400e96 <+9>:     callq  0x40133e <strings_not_equal>
   0x0000000000400e9b <+14>:    test   %eax,%eax
   0x0000000000400e9d <+16>:    je     0x400ea4 <phase_1+23>
   0x0000000000400e9f <+18>:    callq  0x40143d <explode_bomb>
   0x0000000000400ea4 <+23>:    add    $0x8,%rsp
   0x0000000000400ea8 <+27>:    retq
End of assembler dump.
```

Step 5) If the string input by user and the value stored at register %esi doesn't match then the bomb set at phase 1 will explode during execution.

```
(gdb) u* 0x0000000000400ea8

BOOM!!!
The bomb has blown up.
[Inferior 1 (process 38003) exited with code 010]
(gdb)
```

Step 6) To find out the real value stored at %esi, the programmer has to type the command x/s followed by its address $0x4023d0.

```
user@user-OptiPlex-3040: ~/Downloads/Assignment 1_2/Ass...
BOOM!!!
The bomb has blown up.
[Inferior 1 (process 38003) exited with code 010]
(gdb) run
Starting program: /home/user/Downloads/Assignment 1_2/Assignment 1/bomb001/bomb
Welcome to my fiendish little bomb. You have 6 phases with
which to blow yourself up. Have a nice day!
Test String

Breakpoint 1, 0x0000000000400e8d in phase_1 ()
(gdb) disas
Dump of assembler code for function phase_1:
=> 0x0000000000400e8d <+0>:     sub    $0x8,%rsp
   0x0000000000400e91 <+4>:     mov    $0x4023d0,%esi
   0x0000000000400e96 <+9>:     callq  0x40133e <strings_not_equal>
   0x0000000000400e9b <+14>:    test   %eax,%eax
   0x0000000000400e9d <+16>:    je     0x400ea4 <phase_1+23>
   0x0000000000400e9f <+18>:    callq  0x40143d <explode_bomb>
   0x0000000000400ea4 <+23>:    add    $0x8,%rsp
   0x0000000000400ea8 <+27>:    retq
End of assembler dump.
(gdb) x/s 0x4023d0
0x4023d0:       "The moon unit will be divided into two divisions."
```

Step 7) After that run the program again and input the string that we got earlier.

```
user@user-OptiPlex-3040: ~/Downloads/Assignment 1_2/As...
0x4023d0:       "The moon unit will be divided into two divisions."
(gdb) run
The program being debugged has been started already.
Start it from the beginning? (y or n) y
Starting program: /home/user/Downloads/Assignment 1_2/Assignment 1/bomb001/bomb

Welcome to my fiendish little bomb. You have 6 phases with
which to blow yourself up. Have a nice day!
The moon unit will be divided into two divisions.

Breakpoint 1, 0x0000000000400e8d in phase_1 ()
```

Step 8) Execute the program until the end and check weather the bomb explodes or not.
Since we tracked the stored string at $esi register and input the similar string the bomb will be diffused.

```
(gdb) u* 0x0000000000400ea8
main (argc=<optimized out>, argv=<optimized out>) at bomb.c:75
75          phase_defused();                /* Drat!  They figured it out!
(gdb)
```

Step 9) Now the bomb set at phase 1 is finally diffused.

```
user@user-OptiPlex-3040:~/Downloads/Assignment 1_2/Assignment 1/bomb001$ ./bomb
Welcome to my fiendish little bomb. You have 6 phases with
which to blow yourself up. Have a nice day!
The moon unit will be divided into two divisions.
Phase 1 defused. How about the next one?
```