Set-UID Program Vulnerability

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Introduction:

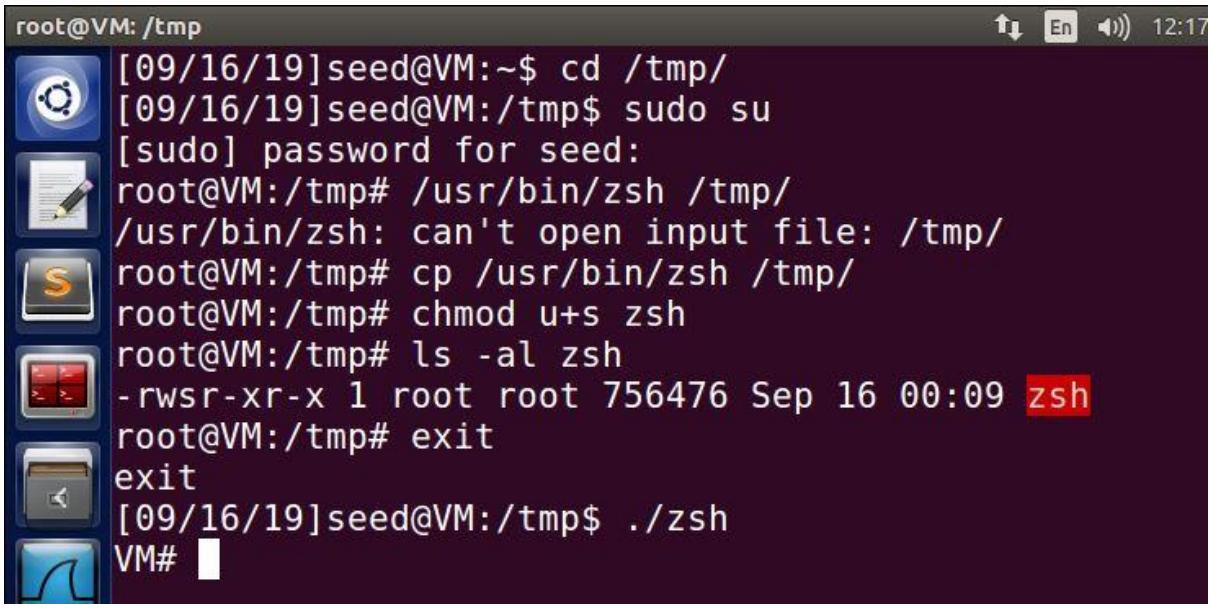
The objective of this lab two-fold: (1) Appreciate its good side: understand why Set-UID is needed and how it is implemented. (2) Be aware of its bad side: understand its potential security problems.

Task 1

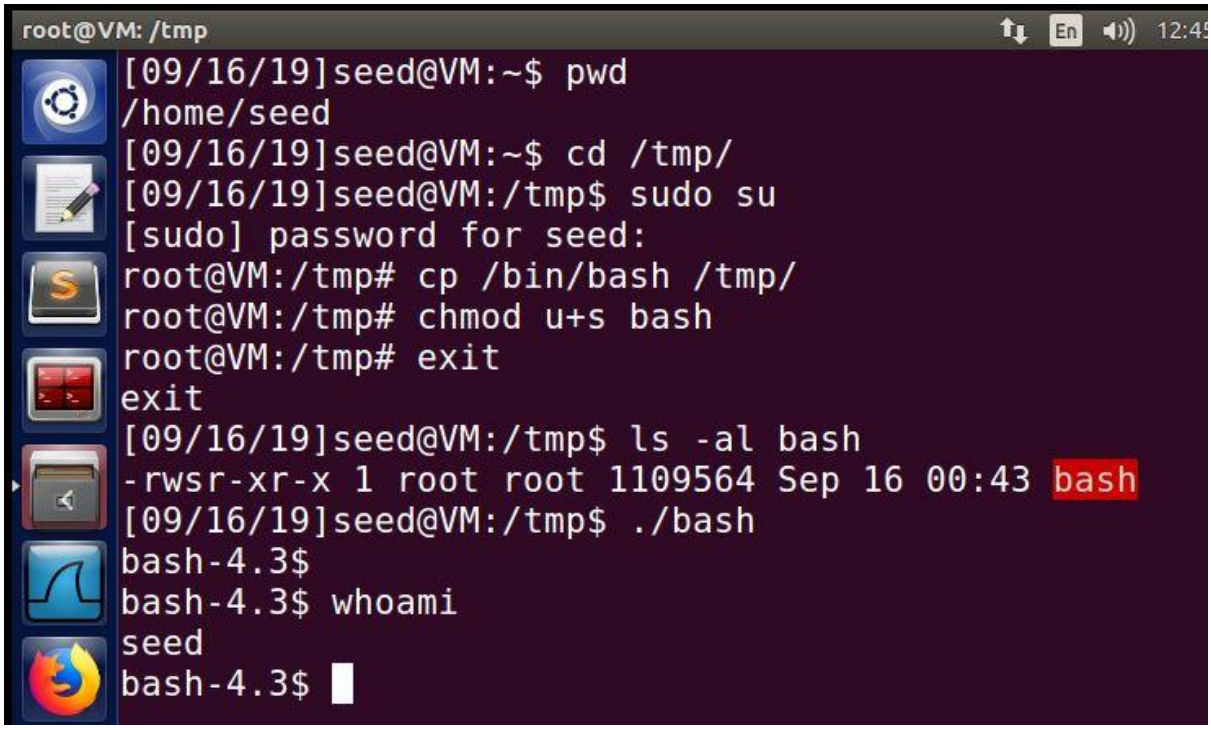
I copied the program to change the password. But it didn't change, When copying passwd to /tmp/,it lost root's privileges. This means, when a user tries to change the password, they are running the passwd command. And this passwd program is owned by the root. Therefore, the user is provided with a temporary root access. Hence, and we cannot change the password without root privileges. Since the passwd program was copied but would not be as set-UID program as any copy of the set-UID program won't be able to work as the original version of the set-UID.

Task 2

2a) I logged in as root and used the command **'cp /bin/zsh to /tmp',** then I the user privilege was changed by using chmod 4755 /tmp/zsh. Then I switched to normal user to see if the seed have the root privilege and the results are shown in the screen shot below:



Ans 2b) I copied **cp /bin/bash to /tmp** to see if the normal user has the root privilege or not. When I entered ./bash, it doesn't have the root privilege, because I the normal user was not given the root privilege.



Task 3

Set up for the rest of the tasks:

```
root@VM: /bin                                                    12:57 AM
[09/16/19]seed@VM:~$ cd /bin/
[09/16/19]seed@VM:/bin$ sudo su
[sudo] password for seed:
root@VM:/bin# rm sh
root@VM:/bin# ln -s zsh sh
root@VM:/bin#
```

Task 4

4a)I logged in as root account and created a file with the help of nano to enter the code in it and compiled it by using **gcc – o** command.Then I change the privilege by using chmod 4755. And switched over to normal after setting the PATH. Then I run ./bin/ls command:

```
[09/17/19]seed@VM:~$ su
Password:
root@VM:/home/seed# exit
exit
[09/17/19]seed@VM:~$ export PATH=/home/seed:$PATH
[09/17/19]seed@VM:~$ su
Password:
root@VM:/home/seed# gedit task3.c
```

```
root@VM:/home/seed# cat task3.c
#include <stdio.h>
#include <stdlib.h>
int main()
{
system("cat /etc/shadow");
return 0;
}
root@VM:/home/seed# gcc -o task3 task.c
gcc: error: task.c: No such file or directory
gcc: fatal error: no input files
compilation terminated.
root@VM:/home/seed# chmod 4755 task3.c
root@VM:/home/seed# ls -l task3
-rwxr-xr-x 1 root root 7348 Sep 17 22:24 task3
Trash home/seed#
```

```
[09/17/19]seed@VM:~$ ./task3
root:$6$NrF46O1p$.vDnKEtVFC2bXslxkRuT4FcBqPpxLqW05IoECr0XKzEEO5wj8aU3GRHW2BaodUn
4K3vgyEjwPspr/kqzAqtcu.:17400:0:99999:7:::
daemon:*:17212:0:99999:7:::
bin:*:17212:0:99999:7:::
sys:*:17212:0:99999:7:::
sync:*:17212:0:99999:7:::
games:*:17212:0:99999:7:::
man:*:17212:0:99999:7:::
lp:*:17212:0:99999:7:::
mail:*:17212:0:99999:7:::
news:*:17212:0:99999:7:::
uucp:*:17212:0:99999:7:::
proxy:*:17212:0:99999:7:::
www-data:*:17212:0:99999:7:::
backup:*:17212:0:99999:7:::
list:*:17212:0:99999:7:::
irc:*:17212:0:99999:7:::
gnats:*:17212:0:99999:7:::
nobody:*:17212:0:99999:7:::
systemd-timesync:*:17212:0:99999:7:::
systemd-network:*:17212:0:99999:7:::
systemd-resolve:*:17212:0:99999:7:::
```

```
messagebus:*:17212:0:99999:7:::
uuidd:*:17212:0:99999:7:::
lightdm:*:17212:0:99999:7:::
whoopsie:*:17212:0:99999:7:::
avahi-autoipd:*:17212:0:99999:7:::
avahi:*:17212:0:99999:7:::
dnsmasq:*:17212:0:99999:7:::
colord:*:17212:0:99999:7:::
speech-dispatcher:!:17212:0:99999:7:::
hplip:*:17212:0:99999:7:::
kernoops:*:17212:0:99999:7:::
pulse:*:17212:0:99999:7:::
rtkit:*:17212:0:99999:7:::
saned:*:17212:0:99999:7:::
usbmux:*:17212:0:99999:7:::
seed:$6$wDRrWCQz$IsBXp9.9wz9SGrF.nbihpoN5w.zQx02sht4cTY8qI7YKh00wN/sfYvDeCAcEo2Q
YzCfpZoaEVJ8sbCT7hkxXY/:17372:0:99999:7:::
vboxadd:!:17372::::::
telnetd:*:17372:0:99999:7:::
sshd:*:17372:0:99999:7:::
ftp:*:17372:0:99999:7:::
bind:*:17372:0:99999:7:::
mysql:!:17372:0:99999:7:::
[09/17/19]seed@VM:~$
```

Task 5

5a) No! Bob compromises the integrity by having comma after the text name which is a security violence. Along with that, invocation of System function creates several risks of compromising integrity with cryptic commands, which makes it totally unsafe.

```
[09/17/19]seed@VM:~$ su root
Password:
root@VM:/home/seed# cat text
Lab1, Task5
root@VM:/home/seed# cat lab.c
#include <string.h>
#include <stdio.h>
#include <stdlib.h>
int main(int argc, char *argv[])
{
char *v[3];
if(argc < 2) {
printf("Please type a file name.\n");
return 1;
}
v[0] = "/bin/cat"; v[1] = argv[1]; v[2] = 0;
/* Set q = 0 for Question a, and q = 1 for Question b */
int q = 0;
if (q == 0){
char *command = malloc(strlen(v[0]) + strlen(v[1]) + 2);
sprintf(command, "%s %s", v[0], v[1]);
system(command);
}
else execve(v[0], v, 0);
```

```
int q = 0;
if (q == 0){
char *command = malloc(strlen(v[0]) + strlen(v[1]) + 2);
sprintf(command, "%s %s", v[0], v[1]);
system(command);
}
else execve(v[0], v, 0);
return 0 ;
}
root@VM:/home/seed# gcc -o lab lab.c
lab.c: In function ‘main’:
lab.c:19:6: warning: implicit declaration of function ‘execve’ [-Wimplicit-funct
ion-declaration]
 else execve(v[0], v, 0);
      ^
root@VM:/home/seed# chmod 4755 lab
root@VM:/home/seed# su seed
[09/17/19]seed@VM:~$ lab
Please type a file name.
[09/17/19]seed@VM:~$ lab text
Lab1, Task5
[09/17/19]seed@VM:~$ lab "text;rm text"
Lab1, Task5
[09/17/19]seed@VM:~$
```

Task 6

6 After moving to seed account and running the command myprog in order to run the prog.

```
[09/18/19]seed@VM:~$ nano mylib.c
[09/18/19]seed@VM:~$ cat mylib.c
clude <stdio.h>
void sleep (int s)
{
printf("I am not sleeping!\n");
}
[09/18/19]seed@VM:~$
```

f

```
[09/17/19]seed@VM:~$ gcc -fPIC -g -c mylib.c
[09/17/19]seed@VM:~$ gcc -shared -Wl,-soname,libmylib.s
o.1 \-o libmylib.so.1.0.1 mylib.o -lc
[09/17/19]seed@VM:~$ ls
android         Downloads          mylib.c    Pictures
bin             examples.desktop   mylib.o    Public
Customization   lib                myprog     source
Desktop         libmylib.so.1.0.1  myprog.c   Templates
Documents       Music              passwd     Videos
[09/17/19]seed@VM:~$
```

Here, I used the LD_PRELOAD variable and compiled the .myprog program and let it run normally. LD_PRELOAD variable is used as system's default sleep function. This proves that the sleep() function is not overridden as shown in the screen shot below:

```
root@VM:/home/seed# gcc -o myprog myprog.c
myprog.c: In function 'main':
myprog.c:3:2: warning: implicit declaration of function
 'sleep' [-Wimplicit-function-declaration]
  sleep(1);
  ^
root@VM:/home/seed# chmod 4755 myprog myprog.c
root@VM:/home/seed# myprog
I am not sleeping!
root@VM:/home/seed# export LD_PRELOAD=./libmylib.so.1.0
.1
root@VM:/home/seed# myprog
I am not sleeping!
root@VM:/home/seed# exit
exit
```

```
[09/17/19]seed@VM:~$ export LD_PRELOAD=./libmylib.so.1.
0.1
[09/17/19]seed@VM:~$
```

```
[09/17/19]seed@VM:~$ gedit myprog.c
[09/17/19]seed@VM:~$ gcc -o myprog myprog.c
myprog.c: In function ‘main’:
myprog.c:4:1: warning: implicit declaration of function
 ‘sleep’ [-Wimplicit-function-declaration]
 sleep(1);
 ^
[09/17/19]seed@VM:~$ myprog
```

```
I am not sleeping!
```