Cybersecurity

Penetration Test Report

Rekall Corporation

Penetration Test Report

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Document History

Version	Date	Author(s)	Comments
001	February 7, 2025	Prude-Turner, Krushonta; Roscoe, Leondra; Schultz, Patrick; Thomas, Gertrise; Varner, Shantel; Walls, TaSheria	

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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.

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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.

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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.

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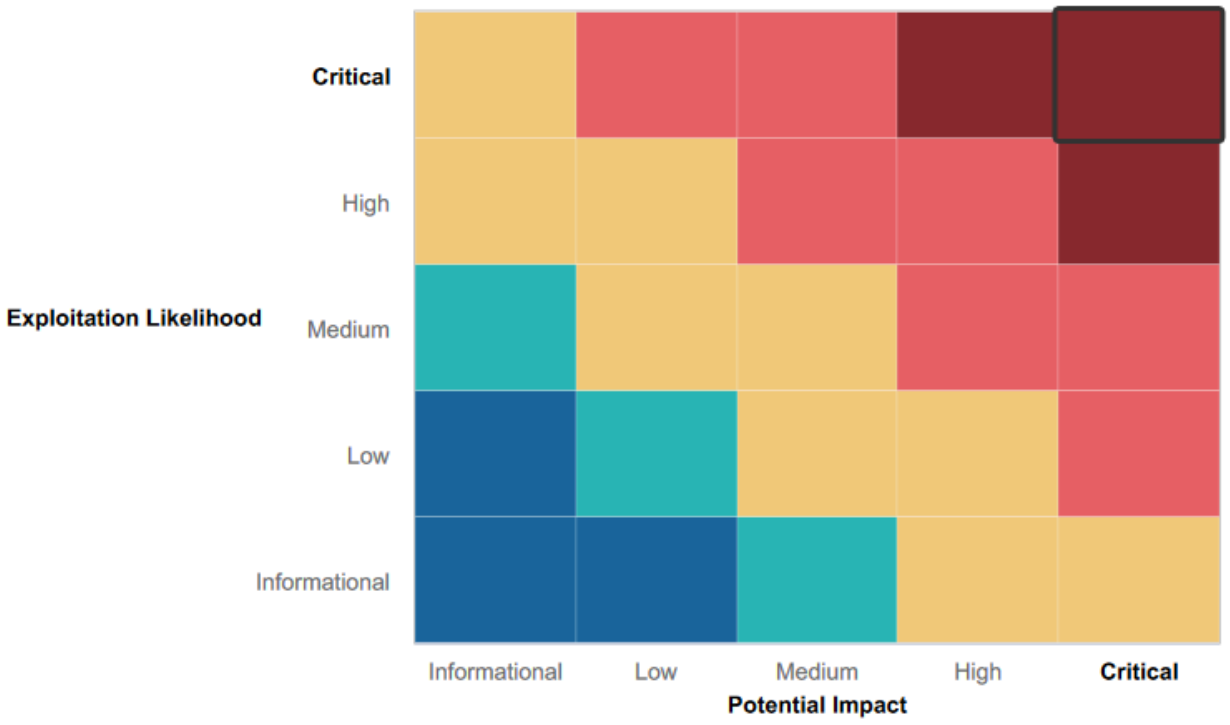
Executive Summary of Findings

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:



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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.

- The Contact Us page of the web app thwarted the use of Cross-Site Scripting (XSS), SQL Injection, Command Injection, Cross-Site Request Forgery, Buffer Overflow, Phishing.
- There was difficulty gaining access to data and machines using Metasploit, while attempting attacks on the Linux and Windows systems.
- Data validation is present, however it can be bypassed.

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.

- The application is vulnerable to XSS, which could let attackers alter data, run unauthorized scripts, and access restricted files.
- SLMail server has known vulnerabilities that could allow remote code execution and unauthorized shell access.
- Linux and Windows systems demonstrate instances of data vulnerability and exposure.
- The Apache web server is outdated and vulnerable to several security risks.
- Initial Nmap scan shows several open ports, suggesting exposed network services.
- WHOIS data and other info from open-source tools can be used by attackers.
- Unauthorized access to password hashes could allow offline cracking, leading to privilege escalation.
- Open ports facilitate file enumeration and may expose the system to unauthorized access.

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Executive Summary

Rekall Corporation engaged Outkast1 Associates to perform a security assessment from February 3, 2025, to February 6, 2025, without credentials or advanced knowledge of the internally facing environment. The testing was conducted to uncover as many misconfigurations and vulnerabilities as possible via a remote host provisioned specifically for this test.

Day 1 of the assessment was centered around web application vulnerabilities. Due to an error with the target site, the test could not be conducted as planned, however, 2 vulnerabilities were identified. A cross-site scripting (XSS-reflected) attack was completed on the home page, showing that it is vulnerable to malicious script. An enumeration of the webpage revealed that the robots.txt file was open and contained sensitive information that could be used for potential attacks.

Days 2 & 3 of the assessment were focused on assessing the operating systems currently being used by Rekall Corporation. Day 2 a total of 4 vulnerabilities were identified in the Linux system.
Domain Dossier (an OSINT WhoIs site1) revealed exposed open-source data. Viewdms.info revealed that up-to-date IP information is accessible online and a Nessus scan was conducted on available IPs. This exposed a critical vulnerability with Apache Struts. Using the same IP address info a Nmap scan revealed open ports and an aggressive Nmap scan revealed several IPs, one of which was a host that uses Drupal, making it susceptible to the Apache vulnerability previously identified. Using the information gathered during enumeration, a successful exploit was executed using remote code execution, giving access to sensitive data and files.

Day 3 a total of 4 vulnerabilities were identified in the Windows system. A GitLab search of totalrekall & OSINT led to an open repository containing username and hashed (hidden) password information. The hashed password was converted to plain text using a simple command line code. An Nmap scan of the provided IP exposed an open FTP port, which was easily accessed. Further investigation led to a Metasploit exploit of Rekall Corporation’s Windows system. Once in the system, lower privilege access was gained by using the credentials discovered in GitLab. Once in the system user information and a password hash were discovered using Kiwi. Once the password was uncovered lateral movement into the WinDC machine was successful.

Below OutKast1 Associates has listed detailed information regarding the vulnerabilities and remediation recommendations to help prevent the damages that could be caused should any of these vulnerabilities be maliciously exploited.

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Summary Vulnerability Overview

Vulnerability	Severity
Apache Struts 2.3.5 - 2.3.31 / 2.5x < 2.5.10.1 Jakarta Multipart Parser RCE (remote)	Critical
Sensitive Data Exposure	Critical
Metasploit RCE exploit	Critical
SLMail Pop3	Critical
Exposure of Sensitive Information	Critical
IPs visible with Nmap	Critical
FTP enumeration	High
Open Source Exposed Data	High
Task View	High
Improper Access Control	High
XSS Reflected	Medium
Open Ports via Nmap scan	Low

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

Scan Type	Total
Hosts	5
Ports	3

Exploitation Risk	Total
Critical	6
High	4
Medium	1
Low	1

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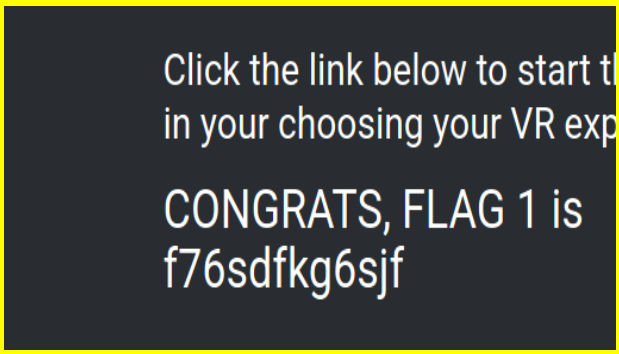
Vulnerability Findings

Vulnerability 1	Findings
Title	XSS(cross-site scripting)
Type (Web app / Linux OS / WIndows OS)	Web App
Risk Rating	Medium
Description	The script (<script>alert (hello)</script>) was successfully executed on Rekall's home page, revealing flag 1.
Images	
Affected Hosts	192.168.14.35
Remediation	Input validation & sanitation

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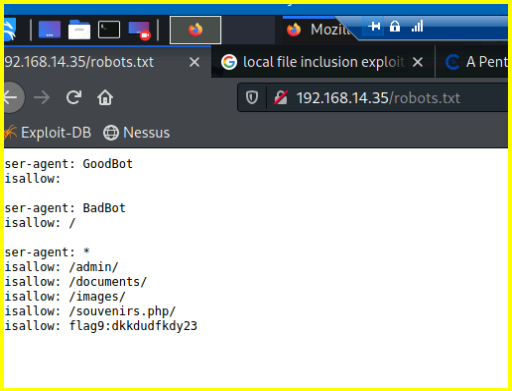
Vulnerability 2	Findings
Title	Sensitive Data Exposure
Type (Web app / Linux OS / WIndows OS)	Web app
Risk Rating	Critical
Description	Enumeration of the website led to the discovery of the robots.txt file that is open, exposing sensitive & unlisted directories/files.
Images	
Affected Hosts	192.168.14.35
Remediation	Remove sensitive or unlisted files/directories from robots.txt

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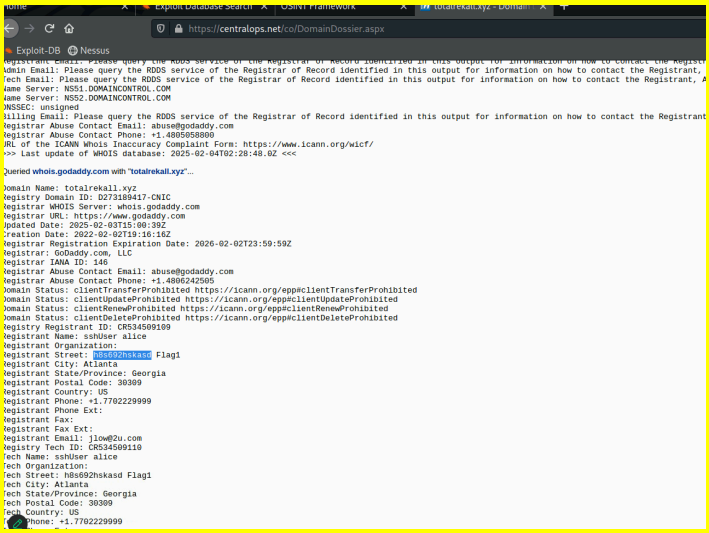
Vulnerability 3	Findings
Title	Open Source Exposure Data
Type (Web app / Linux OS / WIndows OS)	Linux OS
Risk Rating	High
Description	The OSINT Framework was used to access Domain Dossier, where the domain (totalrekall.xyz) was entered to reveal data that can be used for phishing or brute force attacks.
Images	
Affected Hosts	totalrekall.xyz
Remediation	Redact or mask WhoIs information

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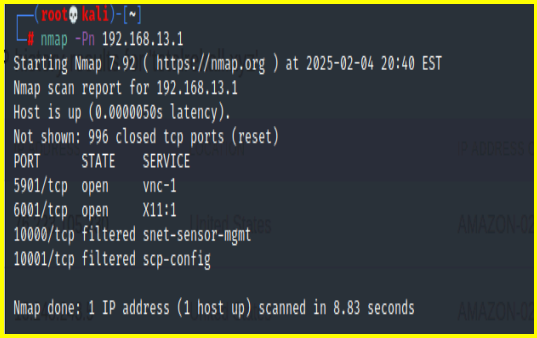
Vulnerability 4	Findings
Title	Open Ports visible via Nmap Scan
Type (Web app / Linux OS / WIndows OS)	Linux OS
Risk Rating	Low
Description	Nmap scan revealed ports that are open and may be used for malicious exploit
Images	
Affected Hosts	192.168.13.1
Remediation	Close unnecessary ports and restrict access with a firewall

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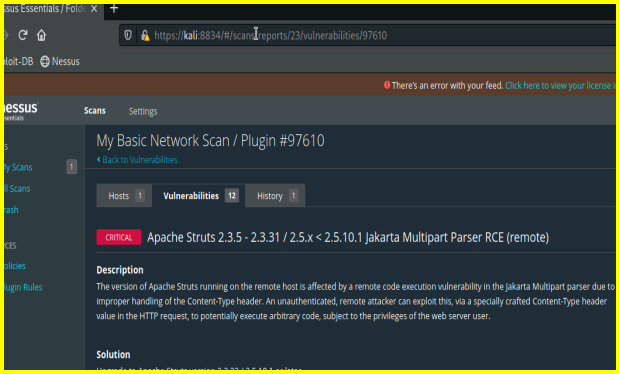
Vulnerability 5	Findings
Title	Nessus Scan
Type (Web app / Linux OS / WIndows OS)	Linux OS
Risk Rating	Critical
Description	A Nessus scan shows that Apache Struts is outdated and can be used to exploit the system if this vulnerability is present.
Images	
Affected Hosts	192.162.13.13
Remediation	Patch the identified vulnerability

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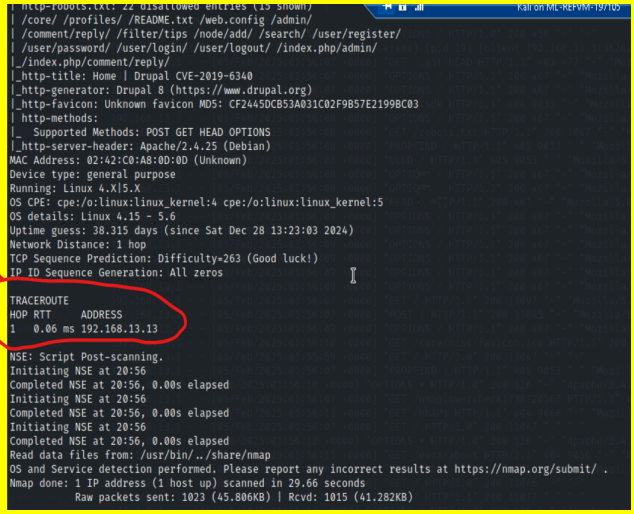
Vulnerability 6	Findings
Title	Aggressive Nmap Scan
Type (Web app / Linux OS / WIndows OS)	Linux OS
Risk Rating	Critical
Description	An aggressive Nmap scan revealed a host that is subject to the Apach Struts vulnerability, which can lead to an RCE attack
Images	
Affected Hosts	192.162.13.13
Remediation	Detect and monitor Aggressive Nmap scans. Implement NIPS

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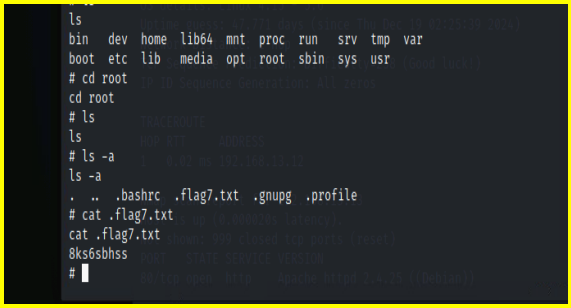
Vulnerability 7	Findings
Title	Metasploit RCE exploit
Type (Web app / Linux OS / WIndows OS)	Linux OS
Risk Rating	Critical
Description	Using the information gathered from the enumeration of the system, an RCE exploit of the system was successfully conducted using Metasploit
Images	
Affected Hosts	192.162.13.13
Remediation	Patch the identified vulnerability.

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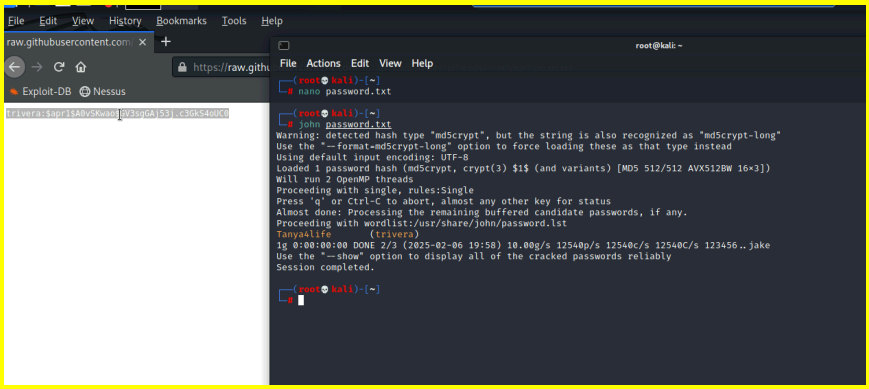
Vulnerability 8	Findings
Title	Sensitive Data Exposure
Type (Web app / Linux OS / WIndows OS)	Windows
Risk Rating	Critical
Description	A search of GitLab using the terms OSINT and Rekall revealed a repo containing a username and hashed password for Rekall Corp. That hashed password was then saved to a file and converted to plain text using the john command
Images	
Affected Hosts	totalrekall.xyz
Remediation	Revoke the credentials and remove them from GitLab

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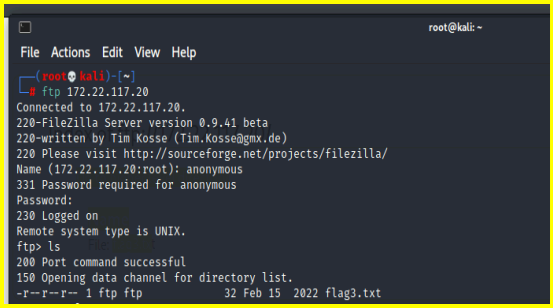
Vulnerability 9	Findings
Title	FTP Enumeration
Type (Web app / Linux OS / WIndows OS)	Windows
Risk Rating	High
Description	An Nmap scan of the provided IP exposed an open FTP port, which was exploited to gain access to Rekall Corp's Windows system
Images	
Affected Hosts	172.22.117.20
Remediation	Disable anonymous FTP access

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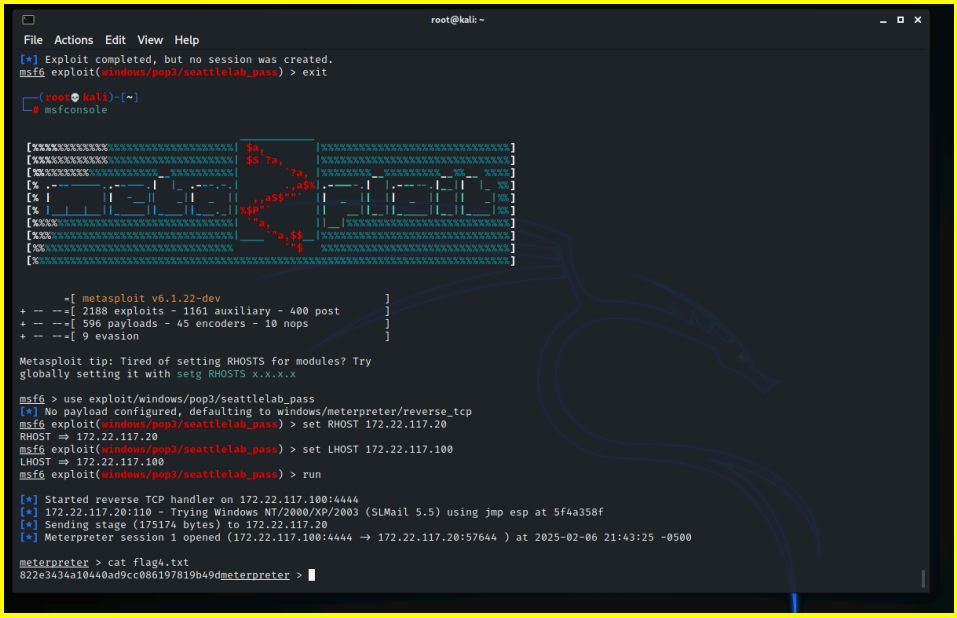
Vulnerability 10	Findings
Title	SLMail Pop3
Type (Web app / Linux OS / WIndows OS)	Windows
Risk Rating	Critical
Description	Open SLMail ports allowed for the exploitation of the Windows 10 system with meterpreter.
Images	
Affected Hosts	172.22.117.20
Remediation	Disable SLMail Pop3 Service

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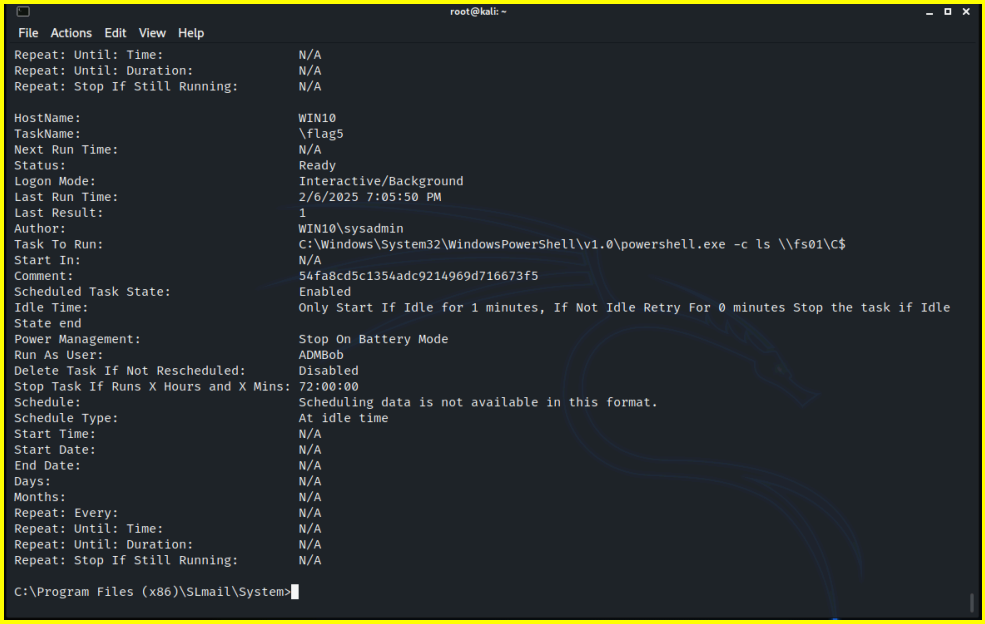
Vulnerability 11	Findings
Title	Task View
Type (Web app / Linux OS / WIndows OS)	Windows
Risk Rating	High
Description	Once inside the Windows 10 system tasks were able to be viewed, which means there is potential for them to also be maliciously manipulated.
Images	
Affected Hosts	172.22.117.20
Remediation	Apply least privilege access to tasklist.exe

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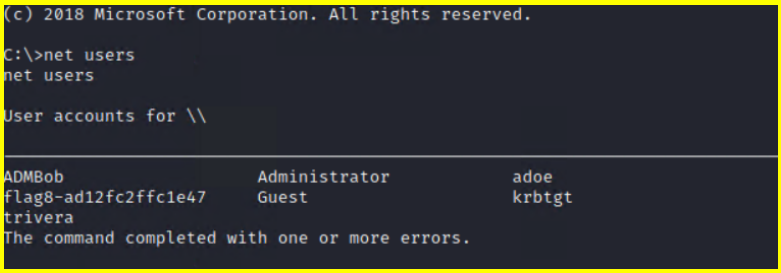
Vulnerability 12	Findings
Title	Lateral Movement into WinDC
Type (Web app / Linux OS / WIndows OS)	Windows
Risk Rating	High
Description	Exploitation of the Windows 10 system and the credentials that we were able to find in GitLab allowed for lateral movement into the WinDC system, which can be a risk for privilege escalation and other malicious tasks.
Images	
Affected Hosts	172.22.117.20
Remediation	Patch all vulnerabilities, implement least privilege access, and enforce MFA

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