MINOR PROJECT 1: Linux IAM & Hardening

Name: *Charu Jain*
Course: *CEH*
Sem: *5th Sem*
ERP: *6604218*
College: *Rungta College of Engineering & Technology, Bhilai*

1. PROJECT OVERVIEW

Objective:

To design and implement a secure user/group and permission model on an Ubuntu server, detect and fix 3 misconfigurations, and maintain evidence of all configurations and auditing.

Tools & Environment:

- Ubuntu Server (Lab VM)
- Kali Linux (Attacker VM – for testing)
- sudo access enabled

2. Baseline Policy Document

Role	Privileges	Sudo Access	File Access
Admin	*Manage users, services, and software*	*useradd, usermod, systemctl, apt*	*Full access to /srv/project*
Dev	*Modify project files, restart app service*	*systemctl restart/status project.service only*	*Write to /srv/project, read-only for others*
Auditor	*Read logs and audit evidence only*	*None*	*Read-only /srv/project,*

Role	Privileges	Sudo Access	File Access
			/var/log/audit

3. Implementation Steps

a) User and group creation

commands:

- sudo groupadd
- sudo useradd

b) Configure Sudoers (Least Privilege)

Created /etc/sudoers.d/roles-admin and /etc/sudoers.d/roles-dev

c) Step 3: Secure Project Directory

sudo mkdir -p /srv/project

sudo chown :proj /srv/project

sudo chmod 770 /srv/project

sudo setfacl -m g:dev:rwx /srv/project

sudo setfacl -m g:auditor:r-x /srv/project

Verification:

getfacl /srv/project

d) Enable auditing

sudo apt install auditd -y

sudo systemctl enable auditd --now

sudo auditctl -w /etc/passwd -p wa -k identity

sudo auditctl -w /etc/sudoers -p wa -k identity

e) Vulnerability Discovery & Fixes

1	World-writable /etc/cron.d/test	Unauthorized users could add jobs	sudo chmod 600 /etc/cron.d/test	
2	Sudo NOPASSWD for devs	Privilege escalation	Removed from /etc/sudoers.d/roles-dev	
3	Weak permissions on /srv/project	Read/write for all users	sudo chmod 770 /srv/project and reset ACL	

f) Network Check

Scanned and Verified

sudo ss -tulpn > ~/evidence/ports_after_closure.txt

sudo lsof -i -Pn > ~/evidence/open_sockets_after.txt

```
sudo nmap -p 8080 127.0.0.1 > ~/evidence/nmap_8080_check.txt
```

g) Remediation Checklist

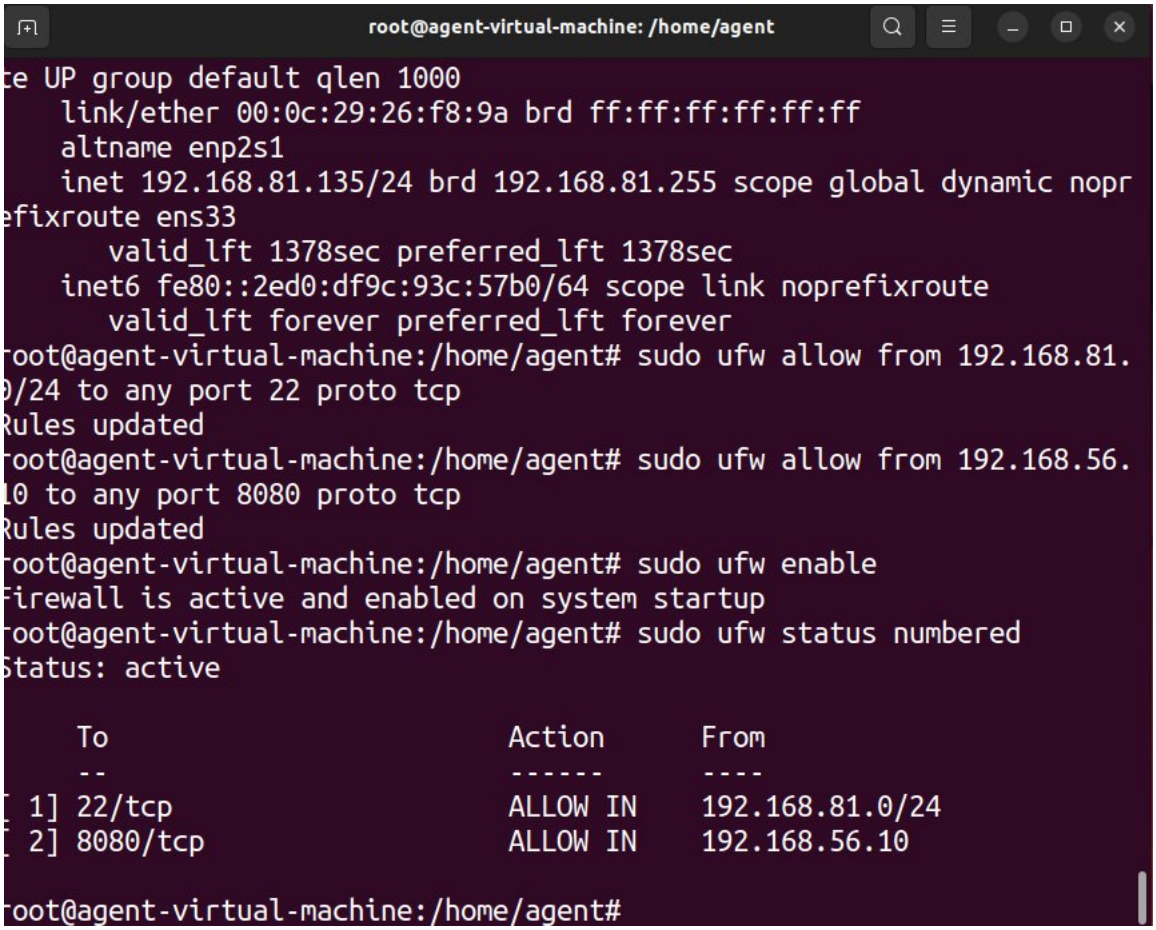
Task	Status
Remove world-writable files	✅
Disable unnecessary sudo NOPASSWD	✅
Lock down file permissions	✅
Enable audit logging	✅
Close unused ports	✅
Generate evidence folder	✅

h) Summary

- ✓ Users: 3 created (alice, bob, charlie)
- ✓ Groups: 3 configured (admin, dev, auditor)
- ✓ Sudo rules: verified and validated
- ✓ ACLs: configured correctly
- ✓ Audit logs: functioning
- ✓ Ports: secure, verified closed

Supporting ScreenShots:

1) Opening ports to listen through



2) Open Ports Enumeration for System Hardening using ss Command

```
root@agent-virtual-machine:/home/agent# sudo ss -tuln
Netid State  Recv-Q Send-Q      Local Address:Port   Peer Address:Port Process
udp   UNCONN 0      0           127.0.0.53%lo:53          0.0.0.0:*
udp   UNCONN 0      0                 0.0.0.0:631         0.0.0.0:*
udp   UNCONN 0      0                 0.0.0.0:33601       0.0.0.0:*
udp   UNCONN 0      0                 0.0.0.0:5353        0.0.0.0:*
udp   UNCONN 0      0                    [::]:53837          [::]:*
udp   UNCONN 0      0                    [::]:5353           [::]:*
tcp   LISTEN 0      128               0.0.0.0:1514        0.0.0.0:*
tcp   LISTEN 0      128               0.0.0.0:1515        0.0.0.0:*
tcp   LISTEN 0      128             127.0.0.1:631         0.0.0.0:*
tcp   LISTEN 0      2048              0.0.0.0:55000       0.0.0.0:*
tcp   LISTEN 0      511               0.0.0.0:443         0.0.0.0:*
tcp   LISTEN 0      4096        127.0.0.53%lo:53          0.0.0.0:*
tcp   LISTEN 0      4096   [::ffff:127.0.0.1]:9200              *:*
tcp   LISTEN 0      2048                 [::]:55000          [::]:*
tcp   LISTEN 0      128                [::1]:631             [::]:*
tcp   LISTEN 0      4096   [::ffff:127.0.0.1]:9300              *:*
root@agent-virtual-machine:/home/agent#
```

3) Nmap scan

```
Starting Nmap 7.80 ( https://nmap.org ) at 2025-11-04 23:23 IST
Nmap scan report for 192.168.81.1
Host is up (0.0019s latency).

PORT     STATE    SERVICE
22/tcp   filtered ssh
8080/tcp filtered http-proxy
MAC Address: 00:50:56:C0:00:08 (VMware)

Nmap scan report for _gateway (192.168.81.2)
Host is up (0.00061s latency).

PORT     STATE  SERVICE
22/tcp   closed ssh
8080/tcp closed http-proxy
MAC Address: 00:50:56:EB:29:82 (VMware)

Nmap scan report for 192.168.81.128
Host is up (0.0022s latency).

PORT     STATE  SERVICE
22/tcp   closed ssh
8080/tcp closed http-proxy
MAC Address: 00:0C:29:82:A5:0F (VMware)

Nmap scan report for 192.168.81.254
Host is up (0.00035s latency).

PORT     STATE    SERVICE
22/tcp   filtered ssh
8080/tcp filtered http-proxy
MAC Address: 00:50:56:EF:2A:67 (VMware)

Nmap scan report for agent-virtual-machine (192.168.81.135)
Host is up (0.000057s latency).

PORT     STATE  SERVICE
22/tcp   closed ssh
8080/tcp closed http-proxy

Nmap done: 256 IP addresses (5 hosts up) scanned in 3.51 seconds
root@agent-virtual-machine:/home/agent#
```

4) Nmap port scan command used to check specific ports (22 and 8080) on a target host

```
root@agent-virtual-machine:/home/agent# nmap -Pn -p 22,8080 192.168.56.20 -oN ~/evidence/nmap_sc
an.txt
Starting Nmap 7.80 ( https://nmap.org ) at 2025-11-04 23:24 IST
Nmap scan report for 192.168.56.20
Host is up.

PORT     STATE    SERVICE
22/tcp   filtered ssh
8080/tcp filtered http-proxy

Nmap done: 1 IP address (1 host up) scanned in 3.16 seconds
```

5) Verification of Service Termination and Port Closure using ss, lsof, and Nmap

```
root@agent-virtual-machine:/home/agent# sudo systemctl stop project.service
sudo systemctl disable project.service
sudo systemctl status project.service --no-pager
Failed to stop project.service: Unit project.service not loaded.
Failed to disable unit: Unit file project.service does not exist.
Unit project.service could not be found.
root@agent-virtual-machine:/home/agent# sudo systemctl stop project.service
Failed to stop project.service: Unit project.service not loaded.
root@agent-virtual-machine:/home/agent# sudo ss -tulpn | sed -n '1,200p'
Netid State  Recv-Q Send-Q      Local Address:Port  Peer Address:PortProcess
udp   UNCONN 0      0           127.0.0.53%lo:53         0.0.0.0:*    users:(("systemd-resolve",pid=675,fd=13))
udp   UNCONN 0      0                 0.0.0.0:631        0.0.0.0:*    users:(("cups-browsed",pid=1032,fd=7))
udp   UNCONN 0      0                 0.0.0.0:33601      0.0.0.0:*    users:(("avahi-daemon",pid=858,fd=14))
udp   UNCONN 0      0                 0.0.0.0:5353       0.0.0.0:*    users:(("avahi-daemon",pid=858,fd=12))
udp   UNCONN 0      0                    [::]:53837         [::]:*    users:(("avahi-daemon",pid=858,fd=15))
udp   UNCONN 0      0                    [::]:5353          [::]:*    users:(("avahi-daemon",pid=858,fd=13))
tcp   LISTEN 0      128               0.0.0.0:1514       0.0.0.0:*    users:(("wazuh-remoted",pid=1948,fd=4))
tcp   LISTEN 0      128               0.0.0.0:1515       0.0.0.0:*    users:(("wazuh-authd",pid=1834,fd=3))
tcp   LISTEN 0      128             127.0.0.1:631        0.0.0.0:*    users:(("cupsd",pid=963,fd=7))
tcp   LISTEN 0      2048              0.0.0.0:55000      0.0.0.0:*    users:(("python3",pid=1779,fd=42))
tcp   LISTEN 0      511               0.0.0.0:443        0.0.0.0:*    users:(("node",pid=912,fd=19))
tcp   LISTEN 0      4096        127.0.0.53%lo:53         0.0.0.0:*    users:(("systemd-resolve",pid=675,fd=14))
tcp   LISTEN 0      4096   [::ffff:127.0.0.1]:9200             *:*    users:(("java",pid=1038,fd=618))
tcp   LISTEN 0      2048                 [::]:55000         [::]:*    users:(("python3",pid=1779,fd=44))
tcp   LISTEN 0      128                 [::1]:631           [::]:*    users:(("cupsd",pid=963,fd=6))
tcp   LISTEN 0      4096   [::ffff:127.0.0.1]:9300             *:*    users:(("java",pid=1038,fd=616))
root@agent-virtual-machine:/home/agent# sudo ss -tulpn | grep ':8080'
root@agent-virtual-machine:/home/agent# sudo lsof -i :8080 -Pn
root@agent-virtual-machine:/home/agent# sudo nmap -p 8080 127.0.0.1
Starting Nmap 7.80 ( https://nmap.org ) at 2025-11-04 23:42 IST
Nmap scan report for localhost (127.0.0.1)
Host is up (0.00012s latency).

PORT     STATE  SERVICE
8080/tcp closed http-proxy

Nmap done: 1 IP address (1 host up) scanned in 0.18 seconds
root@agent-virtual-machine:/home/agent# sudo ss -tulpn > ~/evidence/ports_after_closure.txt
sudo lsof -i -Pn > ~/evidence/open_sockets_after.txt
sudo nmap -p 8080 127.0.0.1 > ~/evidence/nmap_8080_check.txt
root@agent-virtual-machine:/home/agent#
```