Operating System Security Fundamentals (Linux & Windows)

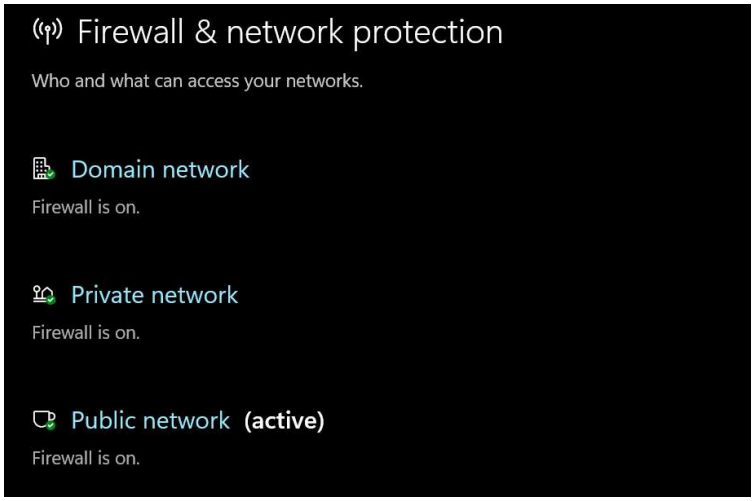
1] Windows OS Security

Administrator user and Standard user

- In Windows, an Administrator account has full control over the PC, allowing software installation, system changes, and access to all files.
- A Standard User account has limited permissions for everyday tasks like browsing and email, requiring administrator approval (password prompt) for critical actions, making it safer against malware.

Least Privilege Principle

- The least privilege principle is a security concept that states that a user, application, or system process should be given only the minimum level of access or permissions required to perform its intended task, and nothing more.
- This principle helps reduce security risks by limiting the potential damage caused by accidents, misuse, or cyber attacks.

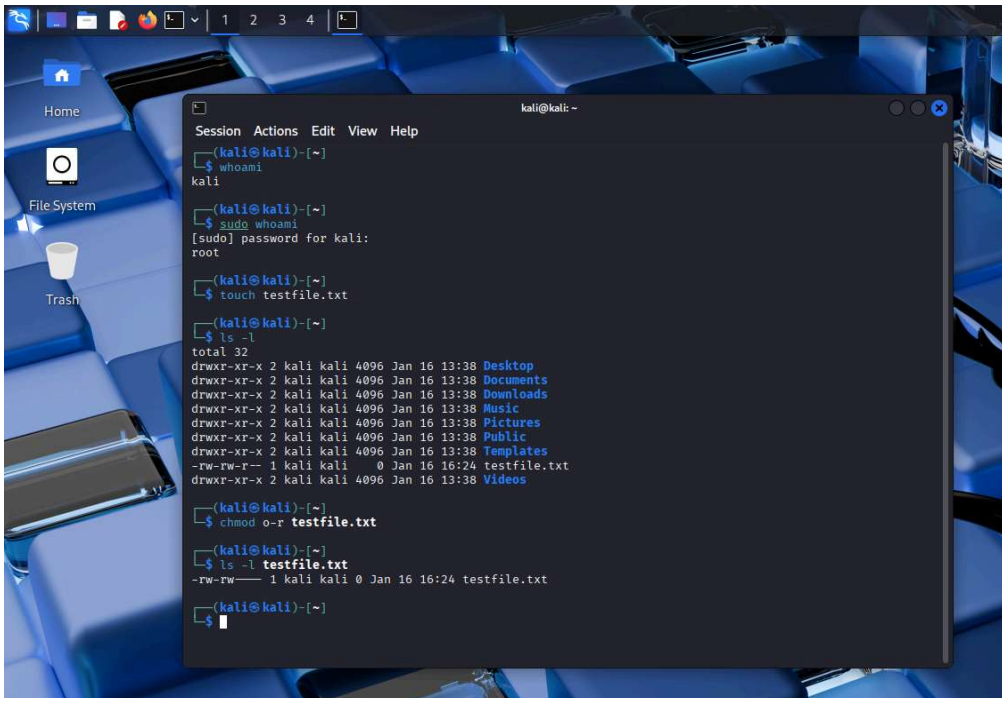


Summary and Observation:

- Checked user accounts and understood the difference between administrator and standard user privileges, observing the use of UAC for controlled access.
- Verified that Windows Defender real-time and cloud-based protection were enabled to protect against malware and threats.
- Explored Windows Firewall settings and confirmed that firewall protection was active for all network profiles.
- Reviewed running processes and startup applications using Task Manager, noting that unnecessary services increase the attack surface.

- Checked Windows Update status and observed the importance of regular patching for OS security.
- Gained an overall understanding of Windows OS hardening practices and least privilege principle.

2] Linux OS Security



`touch` → command to create or update a file

`ls -l` → list files or directories in long format (shows detailed information)

`ls -l` is used to view file permissions, ownership, and access control details in Linux.

Output : -rw-r--r-- 1 kali kali 0 Jan 16 12:24 testfile.txt

`-` → regular file

rw- : read, write for owner

r– : read only for groups

r– : read only for others

`1` = one reference to this file

kali : File is owned by user kali

kali : File belongs to group kali

0 : Size is in bytes since `touch` created an empty file, size is `0`.

Jan 16 12:24 : Last modification time

chmod o-r testfile.txt

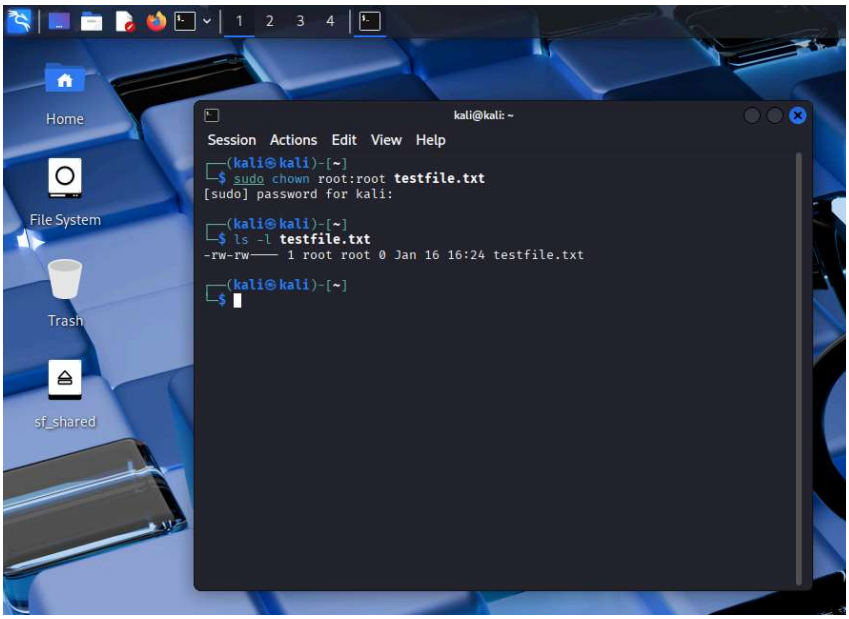
`chmod` = change mode; Used to change file permissions in Linux

o : others

- : remove permissions

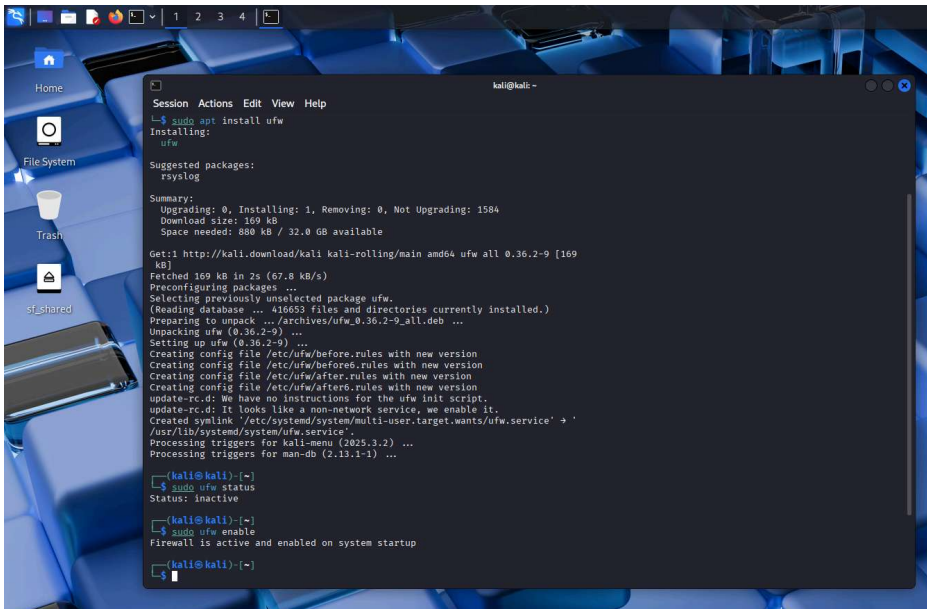
r : read permission

This command **removes read permission from others** for the file `testfile.txt`.



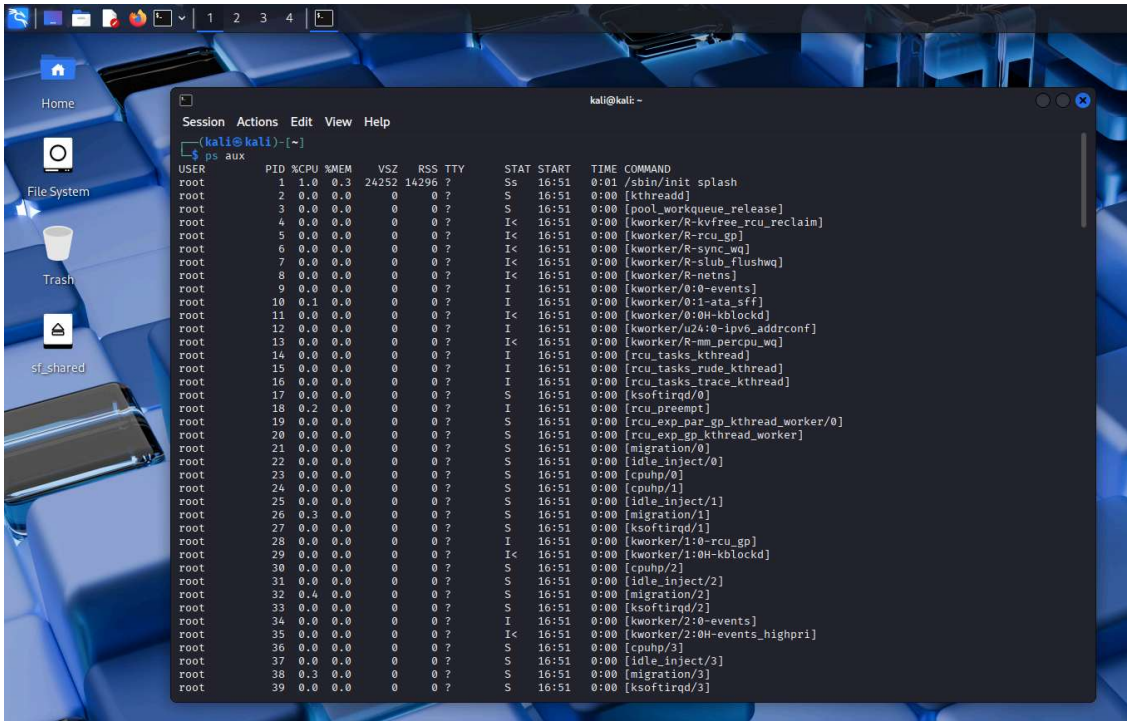
chown : to change owner from user to root

Ownership of the file changed to root, improving security control.



Ufw : Stands for Uncomplicated Firewall

Firewall helps control incoming and outgoing traffic.



Multiple processes run in the background; unnecessary services increase attack surface.

Summary & observations:

- Checked the current user and understood the difference between a normal user and root by using `sudo`, highlighting the concept of administrative privileges.
- Created a test file and analyzed file permissions using `ls -l`, learning how read, write, and execute permissions are assigned to user, group, and others.
- Modified file permissions using `chmod` and changed file ownership using `chown` to understand access control and least privilege.
- Installed and enabled UFW firewall, observing how firewalls help control network traffic and reduce the attack surface.
- Viewed running processes to understand how active services contribute to system exposure.
- Learned key Linux OS hardening practices such as limiting root access, securing file permissions, and enabling firewall protection.

OS Security Checklist (Windows & Linux)

1. User Accounts & Privileges
    - Ensure separation between administrator/root and standard users
    - Follow the least privilege principle
    - Use sudo only when administrative access is required
    - Avoid logging in as root by default (Linux)

2. Authentication & Access Control
    - Enable User Account Control (UAC) on Windows
    - Use strong passwords for all user accounts
    - Restrict access to sensitive files and system settings
    - Monitor user permissions regularly

3. File Permissions & Ownership (Linux)
    - Check file permissions using ls -l
    - Use chmod to restrict read, write, and execute access
    - Use chown to assign correct file ownership
    - Avoid giving write permissions to others unnecessarily

4. Antivirus & Malware Protection
    - Ensure Windows Defender real-time protection is enabled
    - Keep malware definitions up to date
    - Avoid downloading untrusted files or applications

5. Firewall Configuration
    - Enable Windows Firewall for all network profiles
    - Install and enable UFW firewall in Linux
    - Verify firewall status regularly
    - Allow only necessary network traffic

6. Running Processes & Services
    - Monitor active processes using Task Manager (Windows) or ps aux (Linux)
    - Identify and disable unnecessary services
    - Reduce background applications to minimize attack surface

7. Startup Applications & Services
    - Review startup programs in Windows Task Manager
    - Disable unnecessary startup services
    - Prevent unauthorized applications from running at boot

8. System Updates & Patch Management
- Enable automatic updates in Windows
- Regularly update Linux packages
- Apply security patches promptly to fix vulnerabilities

9. OS Hardening Best Practices
- Use strong passwords and screen locks
- Enable firewall and antivirus at all times
- Limit administrative access
- Keep the OS and applications updated
- Remove unused software and services

10. Monitoring & Awareness
- Regularly review system security settings
- Stay aware of common OS-level threats
- Follow secure usage practices to prevent misuse or attacks

Interview Questions:
What is OS hardening?
What are file permissions in Linux?
Why should unnecessary services be disabled?
Difference between root and normal user?
What is the least privilege principle?