

# Linux & Networking Lab

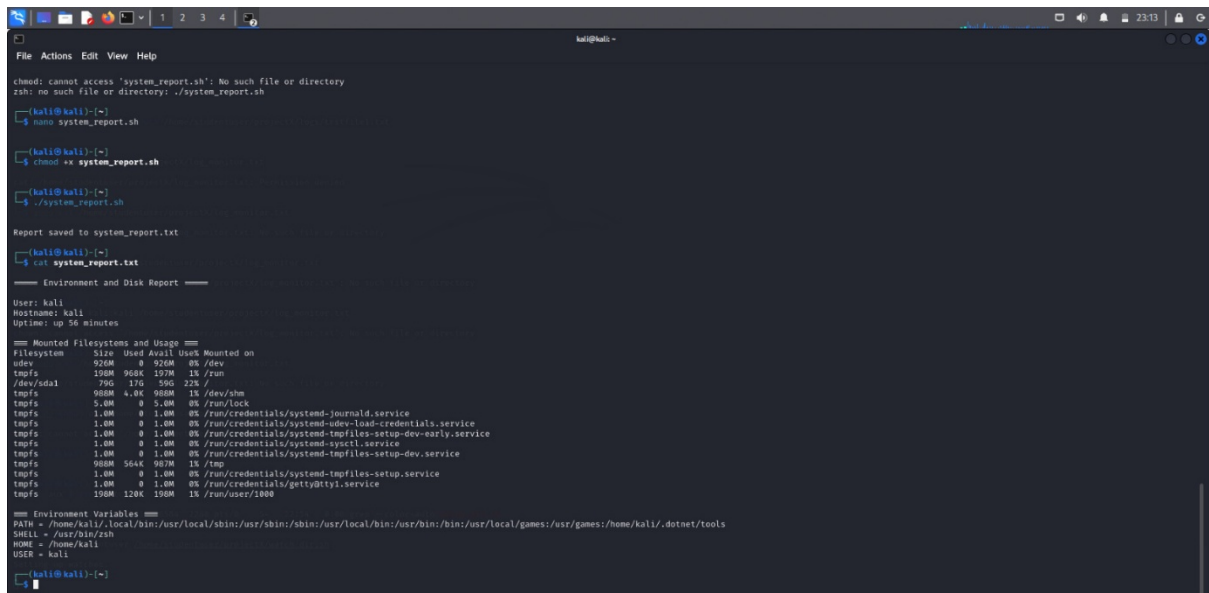
## Task 1: Linux Essentials & File Permissions

**Goal:** Demonstrate basic file management and permission handling.

**What I did:**

- Created test files in /home/studentuser/projectX/
- Used chmod, chown, and ls -l to adjust and verify permissions.
- Faced and resolved Permission denied issues using sudo and proper file ownership.

**Learning:** Understanding Linux permissions is essential for security. Properly managing rwx rights avoids unauthorized access and maintains file integrity.



```
File Actions Edit View Help
chmod: cannot access 'system_report.sh': No such file or directory
zsh: no such file or directory: ./system_report.sh

kali@kali:~$ nano system_report.sh

kali@kali:~$ chmod +x system_report.sh

kali@kali:~$ ./system_report.sh

Report saved to system_report.txt

kali@kali:~$ cat system_report.txt

===== Environment and Disk Report =====

User: kali
Hostname: kali
Uptime: up 56 minutes

===== Mounted Filesystems and Usage =====
Filesystem      Size  Used Avail Use% Mounted on
udev            926M   0 926M   0% /dev
tmpfs           160M  96K 157M   1% /run
/dev/sda1       79G   17G  59G  22% /
tmpfs           900M  4.0K 900M   1% /dev/shm
tmpfs           5.0M   0 5.0M   0% /run/lock
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-journald.service
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-udev-load-credentials.service
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev-early.service
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-sysctl.service
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev.service
tmpfs          900M 564K 907M   1% /tmp
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-tmpfiles-setup.service
tmpfs           1.0M   0 1.0M   0% /run/credentials/getty@tty1.service
tmpfs          190M 120K 190M   1% /run/user/1000

===== Environment Variables =====
PATH = /home/kali/.local/bin:/usr/local/sbin:/usr/sbin:/sbin:/usr/local/bin:/usr/bin:/bin:/usr/local/games:/usr/games:/home/kali/.dotnet/tools
SHELL = /usr/bin/zsh
HOME = /home/kali
USER = kali

kali@kali:~$
```

## Task 2: Networking Toolkit PoC

**Goal:** Use basic networking commands to analyze system connectivity.

**Tools used:** ping, traceroute, ifconfig, ip a, netstat, ss

**What I did:**

- Checked live IP status with ping
- Used netstat and ss to list open ports
- Inspected the routing table using route -n

**Learning:** These tools are crucial for diagnosing network issues. I understood how to trace routes, check connectivity, and find listening services.

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```
File Actions Edit View Help
# at 5 a.m every week with:
# 0 5 * * 1 tar -zcf /var/backups/home.tgz /home/
# For more information see the manual pages of crontab(5) and cron(8)
#
# # h dom mon dow command
# 1. Print 'Good morning!' every day at 8 AM
0 8 * * * echo "Good morning!" >> /home/studentuser/greetings.txt

# 2. Backup /home/studentuser/projectX every Sunday at 1 AM
0 1 * * 0 tar -czf /home/studentuser/projectX_backup_${date +%Y/%m/%d}.tar.gz /home/studentuser/projectX

# 3. Delete .log files older than 7 days every Friday at midnight
0 0 * * 5 find /home/studentuser/projectX/ -name "*.log" -type f -mtime +7 -delete

--(kali@kali)-[~]
└─$ tar -czf /home/studentuser/projectX_backup_test.tar.gz /home/studentuser/projectX
tar: Removing leading '/' from member names
tar: /home/studentuser/projectX: Cannot stat (child): : Permission denied
/home/studentuser/projectX_backup_test.tar.gz: Cannot open: Permission denied
tar (child): Error is not recoverable: exiting now
tar: Child returned status 2
tar: Error is not recoverable: exiting now
--(kali@kali)-[~]
└─$ sudo tar -czf /home/studentuser/projectX_backup_test.tar.gz /home/studentuser/projectX
tar: Removing leading '/' from member names
--(kali@kali)-[~]
└─$ sudo tar -czf ~/projectX_backup_test.tar.gz /home/studentuser/projectX
tar: Removing leading '/' from member names
--(kali@kali)-[~]
└─$ sudo tar -tzf /home/studentuser/projectX_backup_test.tar.gz
home/studentuser/projectX/
home/studentuser/projectX/log_monitor.txt
home/studentuser/projectX/scripts/
home/studentuser/projectX/scripts/backup.sh
home/studentuser/projectX/logs/
home/studentuser/projectX/logs/welcome_20250728_222931.txt
home/studentuser/projectX/logs/test1.txt
home/studentuser/projectX/logs/testfile.txt
home/studentuser/projectX/welcome.txt
home/studentuser/projectX/watch_dir.sh
--(kali@kali)-[~]
```

## Mini Server Monitor Script

**Goal:** Create a script to monitor system health.

**Script actions:**

- Captured CPU and RAM usage
- Monitored disk space
- Logged results to a file with timestamps

```
File Actions Edit View Help
--(kali@kali)-[~]
└─$ sudo touch /home/studentuser/projectX/logs/test1.txt
[sudo] password for kali:
--(kali@kali)-[~]
└─$ sudo ls -l /home/studentuser/projectX/log_monitor.txt
-rw-rw-r-- 1 studentuser studentuser 51 Jul 28 22:55 /home/studentuser/projectX/log_monitor.txt
--(kali@kali)-[~]
└─$ sudo cat /home/studentuser/projectX/log_monitor.txt
[2025-07-28 22:55:37] New file detected: test1.txt
--(kali@kali)-[~]
└─$ nano ssh_audit.sh
--(kali@kali)-[~]
└─$ nano ssh_audit.sh
--(kali@kali)-[~]
└─$ chmod +x ssh_audit.sh
--(kali@kali)-[~]
└─$ sudo ./ssh_audit.sh
./ssh_audit.sh: 1: xR/bin/bash: not found
grep: /var/log/auth.log: No such file or directory
grep: /var/log/auth.log: No such file or directory
Audit saved to ssh_audit.txt
--(kali@kali)-[~]
└─$ cat ssh_audit.txt
=====
SSH Login Audit (2025-07-28 22:58:22)
[+] Last 5 Successful SSH Logins:
[-] Last 5 Failed SSH Login Attempts:
--(kali@kali)-[~]
```

## Task 4: File Watcher Script

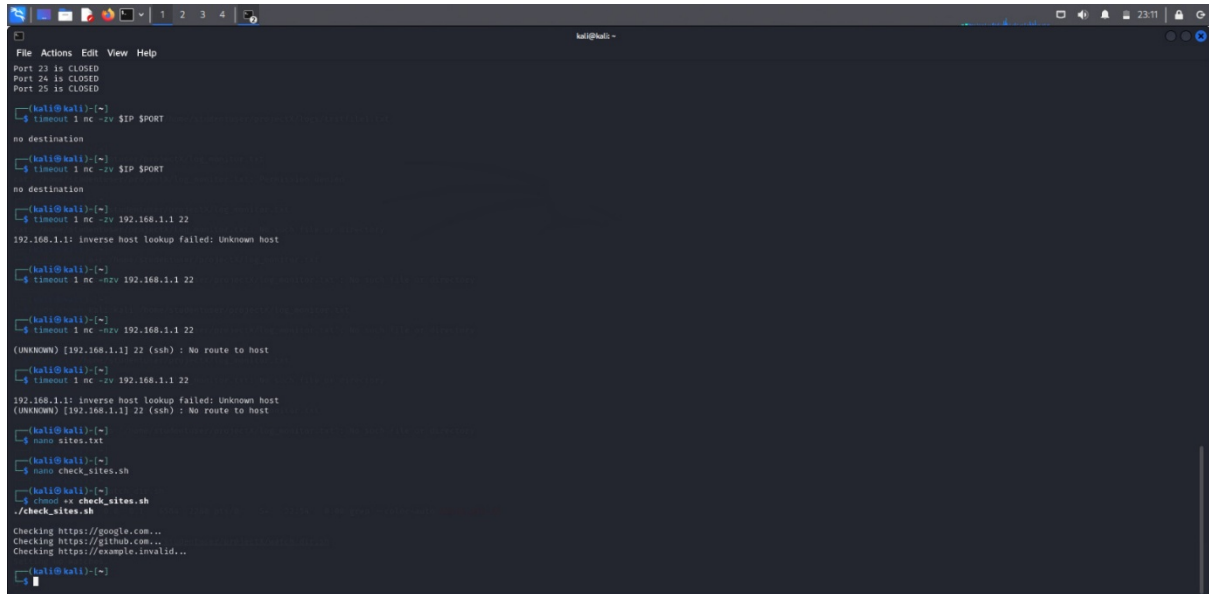
**Goal:** Watch a directory and log changes.

# Linux & Networking Lab

## What I did:

- Used inotifywait in a loop to monitor /home/studentuser/projectX/logs
- Logged file create, modify, and delete events

**Learning:** Real-time file monitoring is vital for detecting tampering or unauthorized file changes. This task introduced the concept of reactive scripting.



```
File Actions Edit View Help
Port 23 is CLOSED
Port 24 is CLOSED
Port 25 is CLOSED
kali@kali:~$ timeout 1 nc -zv $IP $PORT
no destination
kali@kali:~$ timeout 1 nc -zv $IP $PORT
no destination
kali@kali:~$ timeout 1 nc -zv 192.168.1.1 22
192.168.1.1: inverse host lookup failed: Unknown host
kali@kali:~$ timeout 1 nc -zv 192.168.1.1 22
kali@kali:~$ timeout 1 nc -zv 192.168.1.1 22
(UNKNOWN) [192.168.1.1] 22 (ssh) : No route to host
kali@kali:~$ timeout 1 nc -zv 192.168.1.1 22
192.168.1.1: inverse host lookup failed: Unknown host
(UNKNOWN) [192.168.1.1] 22 (ssh) : No route to host
kali@kali:~$ nano sites.txt
kali@kali:~$ nano check_sites.sh
kali@kali:~$ crontab -e check_sites.sh
./check_sites.sh
Checking https://google.com...
Checking https://github.com...
Checking https://example.invalid...
kali@kali:~$
```

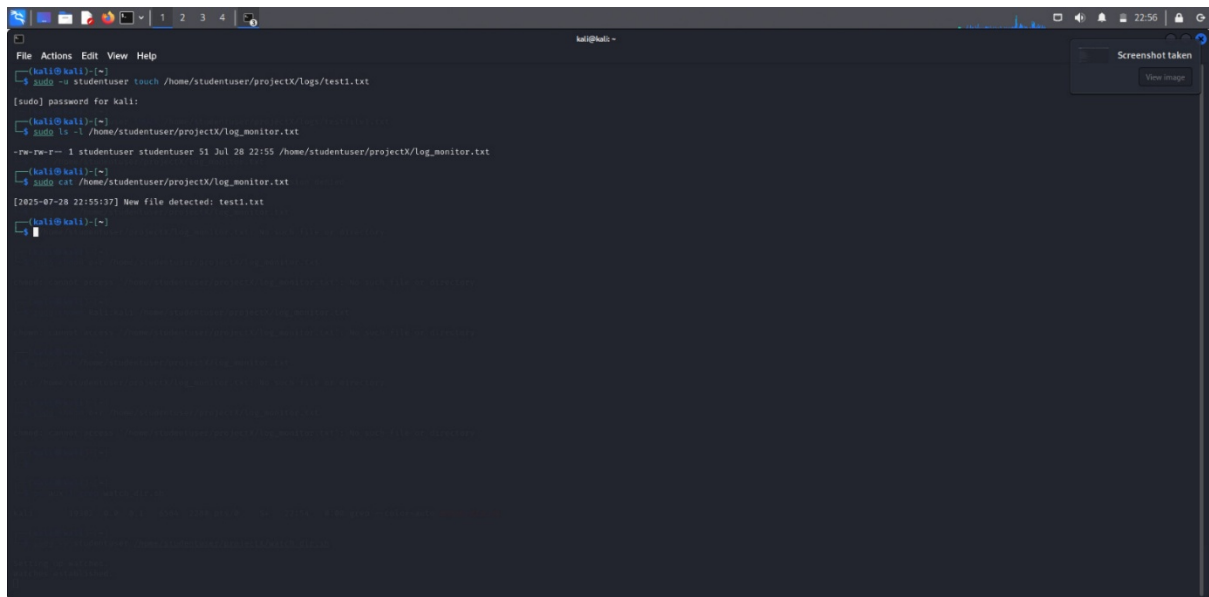
## Task 5: SSH Login Audit

**Goal:** Parse SSH login activity from /var/log/auth.log.

## Script output:

- Successful logins
- Failed login attempts
- IP addresses involved

# Linux & Networking Lab



```
kali@kali: ~  
File Actions Edit View Help  
[kali@kali:~]$ sudo touch /home/studentuser/projectX/logs/test1.txt  
[sudo] password for kali:  
[kali@kali:~]$ sudo ls -l /home/studentuser/projectX/log_monitor.txt  
-rw-rw-r-- 1 studentuser studentuser 51 Jul 28 22:55 /home/studentuser/projectX/log_monitor.txt  
[kali@kali:~]$ sudo cat /home/studentuser/projectX/log_monitor.txt  
[2025-07-28 22:55:37] New file detected: test1.txt  
[kali@kali:~]$
```

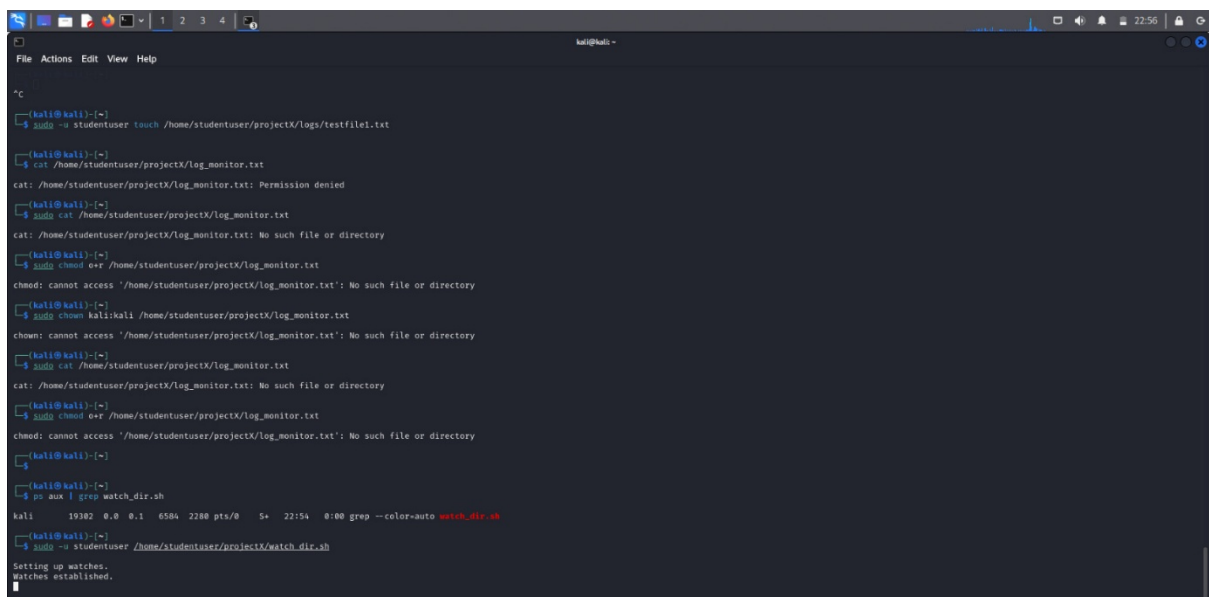
## Task 6: Crontab Practice

**Goal:** Automate a task using cron.

**What I did:**

- Wrote a cron job to back up files every hour
- Used crontab -e to schedule the job
- Verified execution with log timestamps

**Learning:** Cron is a powerful automation tool for periodic tasks like backups, cleanups, or reports. I also learned how to redirect cron output to log files for debugging.



```
kali@kali: ~  
File Actions Edit View Help  
^C  
[kali@kali:~]$ sudo touch /home/studentuser/projectX/logs/testfile1.txt  
[kali@kali:~]$ cat /home/studentuser/projectX/log_monitor.txt  
cat: /home/studentuser/projectX/log_monitor.txt: Permission denied  
[kali@kali:~]$ sudo cat /home/studentuser/projectX/log_monitor.txt  
cat: /home/studentuser/projectX/log_monitor.txt: No such file or directory  
[kali@kali:~]$ sudo chmod o+r /home/studentuser/projectX/log_monitor.txt  
chmod: cannot access '/home/studentuser/projectX/log_monitor.txt': No such file or directory  
[kali@kali:~]$ sudo chown kali:kali /home/studentuser/projectX/log_monitor.txt  
chown: cannot access '/home/studentuser/projectX/log_monitor.txt': No such file or directory  
[kali@kali:~]$ sudo cat /home/studentuser/projectX/log_monitor.txt  
cat: /home/studentuser/projectX/log_monitor.txt: No such file or directory  
[kali@kali:~]$ sudo chmod o+r /home/studentuser/projectX/log_monitor.txt  
chmod: cannot access '/home/studentuser/projectX/log_monitor.txt': No such file or directory  
[kali@kali:~]$  
[kali@kali:~]$ ps aux | grep watch_dir.sh  
kali    19382  0.0  0.1  6584  2280 pts/0    S+   22:54   0:00 grep --color-auto watch_dir.sh  
[kali@kali:~]$ sudo touch /home/studentuser/projectX/watch_dir.sh  
Setting up watches.  
Watches established.  
[kali@kali:~]$
```

## Task 7: Port Scanner Script

# Linux & Networking Lab

**Goal:** Scan ports 20-25 on a given IP.

**Used tools:** nc, timeout

**Command:**

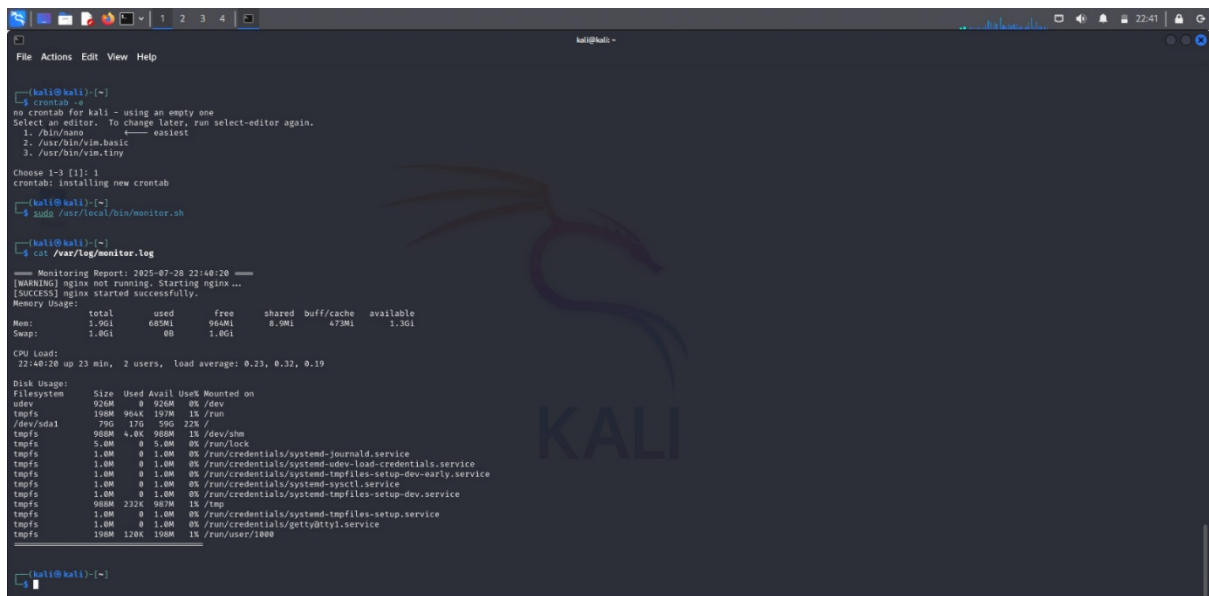
timeout 1 nc -zv 192.168.1.1 22

**Script program:**

Scanning ports 20 to 25 on 192.168.1.1...

Port 22 is OPEN

All other ports are CLOSED

A screenshot of a Kali Linux terminal window. The terminal shows the user at the prompt 'kali@kali:~' running several commands. First, they run 'crontab -e', which opens a menu to edit the crontab. They choose '1' to create a new one. Then they run 'sudo nano /usr/local/bin/monitor.sh'. Next, they run 'cat /var/log/monitor.log', which displays a detailed system monitoring report. The report includes sections for 'Monitoring Report' (timestamped 2025-07-20 22:40:20), 'Memory Usage' (showing total, used, free, shared, buff/cache, and available memory), 'CPU Load' (showing 22:40:20 up 23 min, 2 users, and load averages), and 'Disk Usage' (a table showing size, used, available, and usage percentage for various filesystems like /dev, /run, /dev/shm, and /tmp). The background of the terminal has a faint Kali Linux dragon logo and the word 'KALI' in large letters.

```
kali@kali:~$ crontab -e
no crontab for kali - using an empty one
Select an editor. To change later, run select-editor again.
1. /bin/nano
2. /usr/bin/vim.basic
3. /usr/bin/vim.tiny
Choose 1-3 [1]: 1
crontab: installing new crontab

kali@kali:~$ sudo nano /usr/local/bin/monitor.sh

kali@kali:~$ cat /var/log/monitor.log

===== Monitoring Report: 2025-07-20 22:40:20 =====
[WARNING] nginx not running. Starting nginx...
[SUCCESS] nginx started successfully.

Memory Usage:
total      used      free      shared  buff/cache   available
Mem:      1.0Gi 685Mi 964Mi 8.0Mi 473Mi 1.3Gi
Swap:      1.0Gi 0B 1.0Gi

CPU Load:
22:40:20 up 23 min,  2 users,  load average: 0.23, 0.32, 0.19

Disk Usage:
Filesystem      Size  Used Avail Use% Mounted on
udev            926M   0 926M   0% /dev
tmpfs           150M  90K 150M   1% /run
/dev/sda1        75G   17G   58G  22% /
tmpfs           980M  4.0K 980M   1% /dev/shm
tmpfs           5.0M   0 5.0M   0% /run/lock
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-journald.service
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-udev-load-credentials.service
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev-early.service
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-sysctl.service
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-tmpfiles-setup-dev.service
tmpfs           980M 222K 980M   1% /tmp
tmpfs           1.0M   0 1.0M   0% /run/credentials/systemd-tmpfiles-setup.service
tmpfs           1.0M   0 1.0M   0% /run/credentials/getty@tty.service
tmpfs          100M 120K 100M   1% /run/user/1000
```

## Task 8: Website Availability Checker

**Goal:** Check which websites are up from a list (sites.txt).

**Approach:**

- Used curl -Is <url> | head -n 1 to check HTTP status
- Logged results to site\_status.log

# Linux & Networking Lab

```
kali@kali: ~  
File Actions Edit View Help  
kali@kali:~$ sudo chown -R studentuser:studentuser /home/studentuser/projectX  
kali@kali:~$  
kali@kali:~$ sudo studentuser bash -c "echo 'Welcome to Linux' > /home/studentuser/projectX/welcome.txt"  
kali@kali:~$  
kali@kali:~$ sudo chmod 600 /home/studentuser/projectX/welcome.txt  
kali@kali:~$  
kali@kali:~$ sudo studentuser nano /home/studentuser/projectX/scripts/backup.sh  
kali@kali:~$  
kali@kali:~$ sudo chmod +x /home/studentuser/projectX/scripts/backup.sh  
kali@kali:~$  
kali@kali:~$ sudo studentuser /home/studentuser/projectX/scripts/backup.sh  
kali@kali:~$  
kali@kali:~$ ls /home/studentuser/projectX/logs  
ls: cannot access '/home/studentuser/projectX/logs': Permission denied  
kali@kali:~$  
kali@kali:~$ whoami  
kali  
kali@kali:~$  
kali@kali:~$ sudo ls /home/studentuser/projectX/logs  
welcome_20250728_222931.txt  
kali@kali:~$  
kali@kali:~$ nano netinfo.sh  
kali@kali:~$  
kali@kali:~$ chmod +x netinfo.sh  
kali@kali:~$  
kali@kali:~$ ./netinfo.sh  
cat network_report.txt
```

## Task 9: Environment and Disk Report

**Goal:** Generate a system info report.

**Report contents:**

- Current user: whoami
- Hostname: hostname
- Uptime: uptime
- Filesystems: df -h
- Environment: echo \$PATH, echo \$SHELL

```
kali@kali: ~  
File Actions Edit View Help  
kali@kali:~$ sudo mkdir -p /home/studentuser/projectX/logs  
kali@kali:~$  
kali@kali:~$ sudo mkdir -p /home/studentuser/projectX/scripts  
kali@kali:~$  
kali@kali:~$ sudo mkdir -p /home/studentuser/projectX/scripts  
kali@kali:~$  
kali@kali:~$ sudo mkdir -p /home/studentuser/projectX/scripts  
kali@kali:~$  
kali@kali:~$ sudo chown -R studentuser:studentuser /home/studentuser/projectX  
kali@kali:~$  
kali@kali:~$ sudo studentuser bash -c "echo 'Welcome to Linux' > /home/studentuser/projectX/welcome.txt"  
kali@kali:~$  
kali@kali:~$ sudo chmod 600 /home/studentuser/projectX/welcome.txt  
kali@kali:~$  
kali@kali:~$ sudo studentuser nano /home/studentuser/projectX/scripts/backup.sh  
kali@kali:~$  
kali@kali:~$ sudo chmod +x /home/studentuser/projectX/scripts/backup.sh  
kali@kali:~$  
kali@kali:~$ sudo studentuser /home/studentuser/projectX/scripts/backup.sh  
kali@kali:~$  
kali@kali:~$ ls /home/studentuser/projectX/logs  
ls: cannot access '/home/studentuser/projectX/logs': Permission denied  
kali@kali:~$  
kali@kali:~$ whoami  
kali  
kali@kali:~$  
kali@kali:~$ sudo ls /home/studentuser/projectX/logs  
welcome_20250728_222931.txt  
kali@kali:~$
```

# Linux & Networking Lab

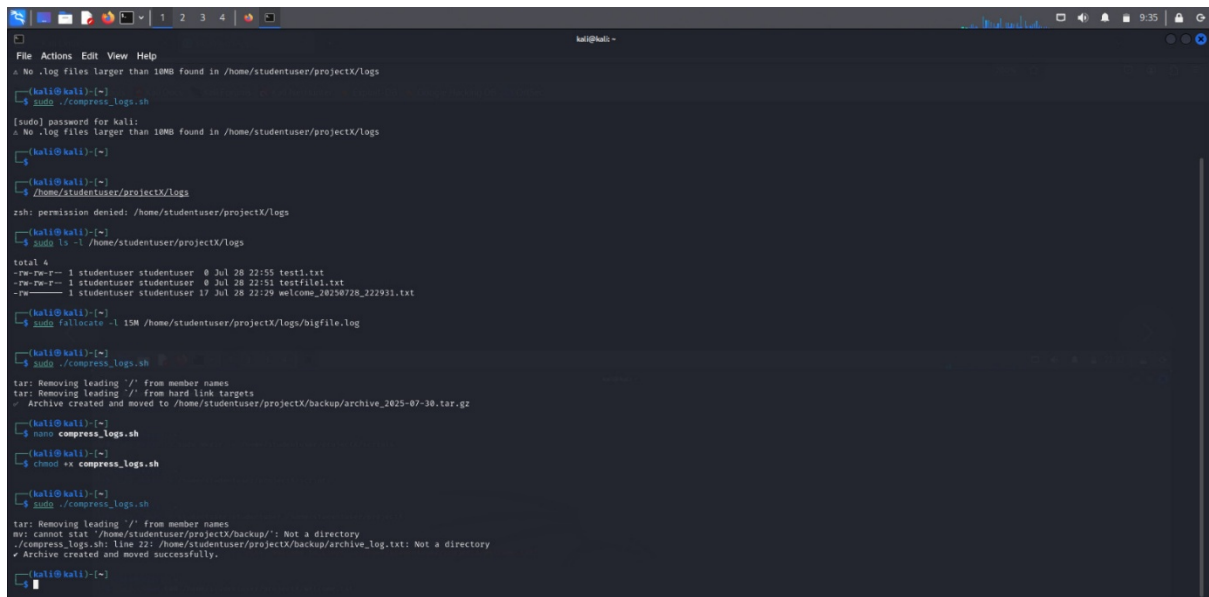
## Task 10: Compress & Archive Automation

**Goal:** Find and compress .log files >10MB in /home/studentuser/projectX/logs.

### Process:

- Used find with -size +10M
- Archived matching files into archive\_YYYYMMDD.tar.gz
- Moved archive to backup/ folder

**Learning:** This is useful for log rotation and cleanup. Regularly compressing and archiving large logs saves disk space and improves performance.



```
kali@kali: ~  
File Actions Edit View Help  
# No .log files larger than 10MB found in /home/studentuser/projectX/logs  
kali@kali:~$ sudo ./compress_logs.sh  
[sudo] password for kali:  
# No .log files larger than 10MB found in /home/studentuser/projectX/logs  
kali@kali:~$  
kali@kali:~$ cd /home/studentuser/projectX/logs  
zsh: permission denied: /home/studentuser/projectX/logs  
kali@kali:~$ sudo ls -l /home/studentuser/projectX/logs  
total 4  
-rw-rw-r-- 1 studentuser studentuser 0 Jul 28 22:55 testfile.txt  
-rw-rw-r-- 1 studentuser studentuser 0 Jul 28 22:51 testfile1.txt  
-rw-rw-r-- 1 studentuser studentuser 17 Jul 28 22:29 welcome_20250728_222931.txt  
kali@kali:~$ sudo fallocate -l 15M /home/studentuser/projectX/logs/bigfile.log  
kali@kali:~$ sudo ./compress_logs.sh  
tar: Removing leading '/' from member names  
tar: Removing leading '/' from hard link targets  
✓ Archive created and moved to /home/studentuser/projectX/backup/archive_2025-07-30.tar.gz  
kali@kali:~$ nano compress_logs.sh  
kali@kali:~$ chmod +x compress_logs.sh  
kali@kali:~$ sudo ./compress_logs.sh  
tar: Removing leading '/' from member names  
mv: cannot stat '/home/studentuser/projectX/backup/': Not a directory  
./compress_logs.sh: line 22: /home/studentuser/projectX/backup/archive_log.txt: Not a directory  
✓ Archive created and moved successfully.  
kali@kali:~$
```