Assignment: Real-Life Industry Use Cases of Basic Linux Commands

Course: Linux Administration | Level: Beginner to Intermediate

Submission Date: [Before the next class]

Objective:

This assignment will help you understand how basic Linux commands, user and group management, file ownership changes, and system-level commands are applied in real-world industry scenarios. You will execute the commands and observe the real-time output to strengthen your understanding.

Scenario:

You have just joined an IT company as a **Linux System Administrator**. Your first task is to set up a secure file system, manage user permissions, and monitor system performance.

You will perform the following:

1. **Use basic Linux commands** to navigate, manipulate files, and check system information.
2. **Manage user and group permissions** to ensure data security.
3. **Change ownership of files and directories** for proper access control.
4. **Execute system-level commands** to monitor system health.

Task 1: Basic Linux Commands in a Real-World Scenario

Scenario:

Your manager asks you to set up a project directory for a new team and verify system details before installation.

Steps & Commands:

1. **Check current logged-in user and system information**

```
ubuntu@ip-172-31-24-202:~$ whoami
ubuntu
ubuntu@ip-172-31-24-202:~$ uname -a
Linux ip-172-31-24-202 6.8.0-1024-aws #26-Ubuntu SMP Tue Feb 18 17:22:37 UTC 2025 x86_64 x86_64 x86_64 GNU/Linux
ubuntu@ip-172-31-24-202:~$
```

`whoami`: Displays the currently login user

`uname -a`: displays following information

- Kernel Name
- Host Name
- Kernel Version
- Compilation Details
- Architecture
- Operating System

2. **Navigate to the `/projects` directory and list contents**

```
ubuntu@ip-172-31-24-202:~$ cd /projects
ubuntu@ip-172-31-24-202:/projects$ ls -l
total 0
ubuntu@ip-172-31-24-202:/projects$
```

`cd`: change current directory to /projects

`ls -l`: total 0 indicates the combined block size of contents is zero.

3. **Create a new project directory and verify it**

```
ubuntu@ip-172-31-24-202:/projects$ sudo mkdir projectB
ubuntu@ip-172-31-24-202:/projects$ ls -l
total 4
drwxr-xr-x 2 root root 4096 May 13 10:56 projectB
ubuntu@ip-172-31-24-202:/projects$
```

`mkdir`: create a new directory

`ls -l`: shows following information

- total 4: Directory occupies 4KB of Disk Space
- permissions
- Number of hard links
- Owner
- Size (Same as Total 4)
- When it was created.

4. **Create a sample file inside `projectB`**

```
ubuntu@ip-172-31-24-202:/projects$ echo "Welcome to projectB" > projectB/README.txt
ubuntu@ip-172-31-24-202:/projects$ cat projectB/README.txt
Welcome to projectB
ubuntu@ip-172-31-24-202:/projects$
```

`touch:` Used to create files

`echo:` used to add data in file

`cat:` used to display data in file

Task 2: User and Group Permissions Management

Scenario:

A new employee, **John**, joins the **developers** team. He needs access to **projectB**, but shouldn't be able to modify system files.

Steps & Commands:

1. **Create a new user `john` and add him to the `developers` group**

```
ubuntu@ip-172-31-24-202:/projects$ sudo groupadd developers
ubuntu@ip-172-31-24-202:/projects$ sudo useradd -m -G developers john
ubuntu@ip-172-31-24-202:/projects$ sudo passwd john
New password:
Retype new password:
passwd: password updated successfully
ubuntu@ip-172-31-24-202:/projects$
```

`groupadd:` Make a group

`useradd:` add user

- `-m:` A home folder
- `-G:` Add to the group

2. **Verify user and group**

```
ubuntu@ip-172-31-24-202:/projects$ id john
uid=1001(john) gid=1002(john) groups=1002(john),1001(developers)
ubuntu@ip-172-31-24-202:/projects$
```

`uid:` user id

`gid:` His own Group Id

`groups:` groups john belongs to

3. **Change group ownership of `projectB` to `developers`**

```
ubuntu@ip-172-31-24-202:/projects$ sudo chown :developers /projects/projectB
ubuntu@ip-172-31-24-202:/projects$
```

4. **Modify permissions so that only the group can write**

```
ubuntu@ip-172-31-24-202:/projects$ sudo chmod 770 /projects/projectB
ubuntu@ip-172-31-24-202:/projects$ ls -ld /projects/projectB
drwxrwx--- 2 root developers 4096 May 13 10:59 /projects/projectB
ubuntu@ip-172-31-24-202:/projects$
```

`chmod`: set permission

- Owner: read, write and execute
- Group: read, write and execute
- Others: no permissions

Task 3: Changing File Ownership

Scenario:

John is now the lead developer and should be the owner of `projectB`.

Steps & Commands:

1. **Change ownership of `projectB` to `john`**

```
ubuntu@ip-172-31-24-202:/projects$ sudo chown john:developers /projects/projectB
ubuntu@ip-172-31-24-202:/projects$
```

2. **Verify the ownership change**

```
ubuntu@ip-172-31-24-202:/projects$ ls -ld /projects/projectB
drwxrwx--- 2 john developers 4096 May 13 10:59 /projects/projectB
ubuntu@ip-172-31-24-202:/projects$
```

Task 4: System-Level Monitoring Commands

Scenario:

Your manager asks you to check system resource usage before installing a heavy application.

Steps & Commands:

1. **Check system uptime**

```
ubuntu@ip-172-31-24-202:/projects$ uptime
 11:27:14 up 41 min,  1 user,  load average: 0.47, 0.11, 0.04
ubuntu@ip-172-31-24-202:/projects$
```

`uptime`: showing following information

- Current time
- Uptime: The system has been running for 41 minutes
- Active users: 1
- Load Average: CPU workload

2. **Monitor disk usage**

```
ubuntu@ip-172-31-24-202:/projects$ df -h
Filesystem       Size  Used Avail Use% Mounted on
/dev/root        6.8G  2.3G  4.5G  34% /
tmpfs            458M     0  458M   0% /dev/shm
tmpfs            183M  892K  182M   1% /run
tmpfs            5.0M     0  5.0M   0% /run/lock
efivarfs         128K  3.8K  120K   4% /sys/firmware/efi/efivars
/dev/nvme0n1p16  881M   79M  741M  10% /boot
/dev/nvme0n1p15  105M  6.1M   99M   6% /boot/efi
tmpfs             92M   12K   92M   1% /run/user/1000
ubuntu@ip-172-31-24-202:/projects$
```

`df -h`: Displays disk space usage information in human readable mode(-h)

3. **Check memory usage**

```
ubuntu@ip-172-31-24-202:/projects$ free -m
               total        used        free      shared  buff/cache   available
Mem:             914         376         181           2         513         537
Swap:              0           0           0
ubuntu@ip-172-31-24-202:/projects$
```

Free -m: Displays memory/RAM usage numbers in megabytes (MB)

4. **Monitor running processes**

```
ubuntu@ip-172-31-24-202:/projects$ ps aux --sort=-%mem | head -5
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root        2174  1.1  4.3 667488 41084 ?        Ssl  11:27   0:01 /usr/libexec/fwupd/fwupd
root        1175  0.1  4.0 1922120 37636 ?       Ssl  10:50   0:02 /usr/lib/snapd/snapd
root         193  0.0  2.8 288952 27008 ?        SLsl 10:45   0:00 /sbin/multipathd -d -s
root         697  0.0  2.4 110000 23040 ?        Ssl  10:45   0:00 /usr/bin/python3 /usr/share/unatt
ended-upgrades/unattended-upgrade-shutdown --wait-for-signal
ubuntu@ip-172-31-24-202:/projects$
```

- `ps aux`: Lists all running processes with details.
- `--sort=-%mem`: Sorts processes by memory usage (highest first).
- `head -5`: Shows only the top 5 memory-consuming processes.
