

## Assignment 2

### Task 1: Basic Linux Commands

#### 1. Create Project Directory and Navigate:

```
mkdir /var/www/ProjectX  
cd /var/www/ProjectX
```

- **Explanation:**  
Creates the `ProjectX` directory in `/var/www` (commonly used for web files) and changes into that directory.

```
ubuntu@ip-172-31-22-130:~$ sudo mkdir /var/www/ProjectX  
ubuntu@ip-172-31-22-130:~$ cd /var/www/ProjectX  
ubuntu@ip-172-31-22-130:/var/www/ProjectX$
```

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#### 2. Create Files for Frontend and Backend:

```
touch index.html app.py README.md
```

- **Explanation:**  
Creates three empty files: `index.html` (frontend), `app.py` (backend), and `README.md` (documentation).

```
ubuntu@ip-172-31-22-130:/var/www/ProjectX$ sudo touch index.html app.py README.md
```

#### 3. Check Current Working Directory:

```
pwd
```

- **Explanation:**  
Prints the full path of the current directory to confirm you are in `/var/www/ProjectX`.

```
ubuntu@ip-172-31-22-130:/var/www/ProjectX$ pwd  
/var/www/ProjectX
```

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#### 4. List Files with Detailed Information:

```
ls -l
```

- **Explanation:**

Lists files in the current directory with details (permissions, owner, size, and timestamp).

```
/var/www/ProjectX
ubuntu@ip-172-31-22-130:/var/www/ProjectX$ ls -l
total 0
-rw-r--r-- 1 root root 0 May  7 13:27 README.md
-rw-r--r-- 1 root root 0 May  7 13:27 app.py
-rw-r--r-- 1 root root 0 May  7 13:27 index.html
```

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## 5. Display System Disk Usage:

```
df -h
```

- **Explanation:**

Shows disk usage of file systems in a human-readable format (MB/GB).

```
ubuntu@ip-172-31-22-130:/var/www/ProjectX$ df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root        6.8G  1.8G  5.0G  26% /
tmpfs            458M   0  458M   0% /dev/shm
tmpfs            183M  880K  182M   1% /run
tmpfs            5.0M   0   5.0M   0% /run/lock
efivarfs         128K   3.6K  120K   3% /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
```

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## 6. View File Content:

```
echo "Welcome to ProjectX" > README.md
cat README.md
```

- **Explanation:**

Writes a welcome message into `README.md` and displays the content to verify.

```
root@ip-172-31-22-130:/var/www/ProjectX# echo "Welcome to ProjectX" > README.md
root@ip-172-31-22-130:/var/www/ProjectX# cat README.md
Welcome to ProjectX
```

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## Task 2: User and Group Permission Management

### 1. Create Developer Group and Users:

```
groupadd devteam
useradd bhatti
useradd malik
usermod -aG devteam bhatti
usermod -aG devteam malik
```

- **Explanation:**

Creates a group named devteam, adds users bhatti and malik, and associates them with the group.

```
root@ip-172-31-22-130:/var/www/ProjectX# groupadd devteam
root@ip-172-31-22-130:/var/www/ProjectX# useradd bhatti
root@ip-172-31-22-130:/var/www/ProjectX# useradd malik
root@ip-172-31-22-130:/var/www/ProjectX# useradd -aG devteam bhatti
root@ip-172-31-22-130:/var/www/ProjectX# usermod -aG devteam bhatti
root@ip-172-31-22-130:/var/www/ProjectX# usermod -aG devteam malik
```

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## 2. Assign Group Ownership of Project Directory:

```
chgrp -R devteam /var/www/ProjectX
```

- **Explanation:**

Changes the group ownership of the ProjectX directory to devteam recursively.

```
root@ip-172-31-22-130:/var/www/ProjectX# usermod -aG devteam malik
root@ip-172-31-22-130:/var/www/ProjectX# chgrp -R devteam /var/www/ProjectX/
root@ip-172-31-22-130:/var/www/ProjectX# |
```

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## 3. Set Directory Permissions (Read/Write for Developers, Read-Only for Others):

```
chmod -R 770 /var/www/ProjectX
```

- **Explanation:**

Grants read, write, and execute permissions to the owner and group, and no permissions to others.

```
root@ip-172-31-22-130:/var/www/ProjectX# chgrp -R devteam /var/www/ProjectX
root@ip-172-31-22-130:/var/www/ProjectX# chmod -R 770 /var/www/ProjectX
```

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## 4. Verify Permissions:

```
ls -ld /var/www/ProjectX
```

- **Explanation:**  
Shows detailed information about the `ProjectX` directory, including ownership and permissions.

```
root@ip-172-31-22-130:/var/www/ProjectX# ls -ld /var/www/ProjectX
drwxrwx--- 2 root devteam 4096 May  7 13:27 /var/www/ProjectX
```

---

## 5. Check User Group Memberships:

```
groups bhatti
```

- **Explanation:**  
Displays all groups that user `bhatti` belongs to, confirming group assignment.

```
root@ip-172-31-22-130:/var/www/ProjectX# groups bhatti
bhatti : bhatti devteam
```

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## Task 3: Change Ownership

### 1. Change Ownership of Directory to Bhatti and Group Devteam:

```
chown -R bhatti:devteam /var/www/ProjectX
```

- **Explanation:**  
Sets `bhatti` as the owner and `devteam` as the group for all files and subdirectories within `ProjectX`.

```
bhatti : bhatti devteam
root@ip-172-31-22-130:/var/www/ProjectX# chown -R bhatti:devteam /var/www/ProjectX
```

---

### 2. Verify Ownership Changes:

```
ls -l /var/www/ProjectX
```

- **Explanation:**  
Displays ownership and permission details of files within `ProjectX`.

```
root@ip-172-31-22-130:/var/www/ProjectX# ls -l /var/www/ProjectX
total 4
-rwxrwx--- 1 bhatti devteam 20 May  7 13:34 README.md
-rwxrwx--- 1 bhatti devteam  0 May  7 13:27 app.py
-rwxrwx--- 1 bhatti devteam  0 May  7 13:27 index.html
root@ip-172-31-22-130:/var/www/ProjectX#
```

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### 3. Switch to User Bhatti and Create a New File:

```
su - bhatti
cd /var/www/ProjectX
touch config.yaml
ls -l
```

- **Explanation:**  
Switches to the `bhatti` user, navigates to the project directory, creates a configuration file, and lists files to verify creation.

```
root@ip-172-31-22-130:/var/www/ProjectX# su - bhatti
su: warning: cannot change directory to /home/bhatti: No such file or directory
$ cd /var/www/ProjectX
$ touch config.yaml
```

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## Task 4: System-Level Commands

### 1. Check System Resource Usage (CPU, Memory):

```
top
```

- **Explanation:**  
Continuously displays real-time information on CPU, memory usage, and running processes.

```
top - 14:00:51 up 3:44, 1 user, load average: 0.00, 0.00, 0.00
Tasks: 107 total, 1 running, 106 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 0.0 sy, 0.0 ni, 100.0 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 914.1 total, 326.5 free, 347.9 used, 394.7 buff/cache
MiB Swap: 0.0 total, 0.0 free, 0.0 used. 566.3 avail Mem
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1	root	20	0	22600	13656	9560	S	0.0	1.5	0:01.84	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kthreadd
3	root	20	0	0	0	0	S	0.0	0.0	0:00.00	pool_workqueue_release
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-rcu_g
5	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-rcu_p
6	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-slub_
7	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-netns
9	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/0:0H-events_highpri
12	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-mm_pe
13	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_rude_kthread
14	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_trace_kthread
15	root	20	0	0	0	0	S	0.0	0.0	0:00.02	ksoftirqd/0
16	root	20	0	0	0	0	I	0.0	0.0	0:00.18	rcu_sched
17	root	rt	0	0	0	0	S	0.0	0.0	0:00.05	migration/0
18	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_inject/0
19	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/0
20	root	20	0	0	0	0	S	0.0	0.0	0:00.00	cpuhp/1
21	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	idle_inject/1
22	root	rt	0	0	0	0	S	0.0	0.0	0:00.09	migration/1
23	root	20	0	0	0	0	S	0.0	0.0	0:00.03	ksoftirqd/1
25	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/1:0H-events_highpri
26	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kdevtmpfs
27	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-inet_
29	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kauditd
31	root	20	0	0	0	0	S	0.0	0.0	0:00.00	khungtaskd
32	root	20	0	0	0	0	S	0.0	0.0	0:00.00	oom_reaper
34	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-write
35	root	20	0	0	0	0	S	0.0	0.0	0:00.43	kcompactd0
36	root	25	5	0	0	0	S	0.0	0.0	0:00.00	ksmd
37	root	39	19	0	0	0	S	0.0	0.0	0:00.00	khugepaged
38	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-kinte
39	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-kbloc
40	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-blkcg
41	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	irq/9-acpi
42	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-tpm_d
43	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-ata_s
44	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-md
45	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-md_bi
46	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-edac-
47	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-devfr
48	root	-51	0	0	0	0	S	0.0	0.0	0:00.00	watchdogd
49	root	0	-20	0	0	0	I	0.0	0.0	0:00.01	kworker/1:1H-kblockd

## 2. Check Running Processes for ProjectX:

```
ps aux | grep ProjectX
```

- **Explanation:**

Lists processes that include the keyword `ProjectX`, helpful for checking if the project's services are running.

```
root@ip-172-31-22-130:/var/www/ProjectX# ps aux | grep ProjectX
root      1978   0.0  0.2  7080  2176 pts/1    S+   14:01   0:00 grep --color=auto ProjectX
```

### 3. View System Logs for Troubleshooting:

`tail -n 50 /var/log/syslog`

- **Explanation:**  
Displays the last 50 lines of the system log, useful for identifying recent errors or warnings.

```
root@ip-172-31-22-130: /var/www/ProjectX# tail -n 50 /var/log/syslog
2025-05-07T13:24:56.651570+00:00 ip-172-31-22-130 systemd[1]: Started session-25.scope - Session 25 of User ubuntu.
2025-05-07T13:25:01.889193+00:00 ip-172-31-22-130 CRON[1742]: (root) CMD (command -v debian-sa1 > /dev/null && debian-sa1 1 1)
2025-05-07T13:30:34.751636+00:00 ip-172-31-22-130 systemd[1618]: launchpadlib-cache-clean.service - Clean up old files in the Launchpadlib cache was skipped because of an
mmet condition check (ConditionPathExists=/home/ubuntu/.launchpadlib/api/launchpad.net/cache).
2025-05-07T13:30:34.769716+00:00 ip-172-31-22-130 systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-05-07T13:30:34.773176+00:00 ip-172-31-22-130 systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-05-07T13:30:34.773326+00:00 ip-172-31-22-130 systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
2025-05-07T13:31:55.124405+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: 2025-05-07 13:31:55.1239 WARN EC2RoleProvider Failed to connect to Systems Manage
with instance profile role credentials. Err: retrieved credentials failed to report to ssm. Error: EC2RoleRequestError: no EC2 instance role found
2025-05-07T13:31:55.124578+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: caused by: EC2MetadataError: failed to make EC2Metadata request
2025-05-07T13:31:55.124609+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: <?xml version="1.0" encoding="iso-8859-1"?>
2025-05-07T13:31:55.124629+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
2025-05-07T13:31:55.124649+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: #011#011 "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
2025-05-07T13:31:55.124672+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: <html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
2025-05-07T13:31:55.124690+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: <head>
2025-05-07T13:31:55.124704+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: <title>404 - Not Found</title>
2025-05-07T13:31:55.124722+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: </head>
2025-05-07T13:31:55.124736+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: <body>
2025-05-07T13:31:55.124750+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: <h1>404 - Not Found</h1>
2025-05-07T13:31:55.124764+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: </body>
2025-05-07T13:31:55.124783+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: </html>
2025-05-07T13:31:55.124798+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: #011status code: 404, request id:
2025-05-07T13:31:55.124977+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: 2025-05-07 13:31:55.1626 ERROR EC2RoleProvider Failed to connect to Systems Manag
r with SSM role credentials. error calling RequestManagedInstanceRoleToken: AccessDeniedException: Systems Manager's instance management role is not configured for account
093427367518
2025-05-07T13:31:55.225048+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: #011status code: 400, request id: ea765ad1-9c85-4000-bfac-e68e806a7548
2025-05-07T13:35:01.896583+00:00 ip-172-31-22-130 CRON[1804]: (root) CMD (command -v debian-sa1 > /dev/null && debian-sa1 1 1)
2025-05-07T13:40:34.769969+00:00 ip-172-31-22-130 systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-05-07T13:40:34.774499+00:00 ip-172-31-22-130 systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-05-07T13:40:34.774712+00:00 ip-172-31-22-130 systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
2025-05-07T13:45:01.903864+00:00 ip-172-31-22-130 CRON[1873]: (root) CMD (command -v debian-sa1 > /dev/null && debian-sa1 1 1)
2025-05-07T13:50:34.770123+00:00 ip-172-31-22-130 systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-05-07T13:50:34.773292+00:00 ip-172-31-22-130 systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-05-07T13:50:34.773426+00:00 ip-172-31-22-130 systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
2025-05-07T13:55:01.913977+00:00 ip-172-31-22-130 CRON[1913]: (root) CMD (command -v debian-sa1 > /dev/null && debian-sa1 1 1)
2025-05-07T14:00:09.028404+00:00 ip-172-31-22-130 systemd[1]: Starting sysstat-collect.service - system activity accounting tool...
2025-05-07T14:00:09.032116+00:00 ip-172-31-22-130 systemd[1]: sysstat-collect.service: Deactivated successfully.
2025-05-07T14:00:09.032452+00:00 ip-172-31-22-130 systemd[1]: Finished sysstat-collect.service - system activity accounting tool.
2025-05-07T14:01:37.164397+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: 2025-05-07 14:01:37.1639 WARN EC2RoleProvider Failed to connect to Systems Manage
with instance profile role credentials. Err: retrieved credentials failed to report to ssm. Error: EC2RoleRequestError: no EC2 instance role found
2025-05-07T14:01:37.164548+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: caused by: EC2MetadataError: failed to make EC2Metadata request
2025-05-07T14:01:37.164568+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: <?xml version="1.0" encoding="iso-8859-1"?>
2025-05-07T14:01:37.164585+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
2025-05-07T14:01:37.164602+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: #011#011 "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
2025-05-07T14:01:37.164617+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: <html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
2025-05-07T14:01:37.164632+00:00 ip-172-31-22-130 amazon-ssm-agent.amazon-ssm-agent[987]: <head>
```