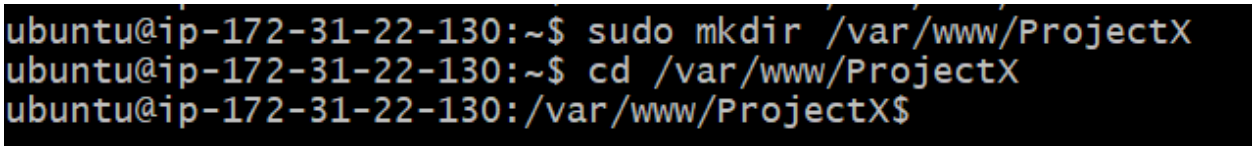
Assignment 2

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.



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2. Create Files for Frontend and Backend:

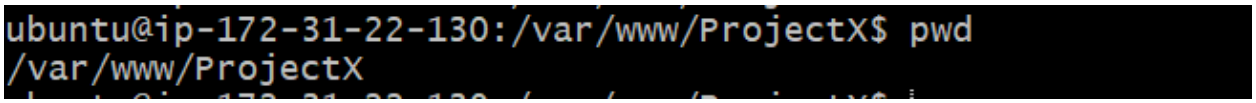
```
touch index.html app.py README.md
```

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

3. Check Current Working Directory:

```
pwd
```

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

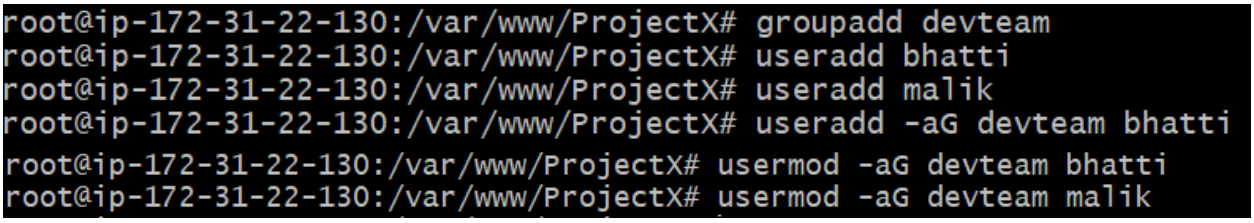
```
root@ip-172-31-22-130:/var/www/ProjectX# echo "Welcome to ProjectX" > README.md
root@ip-172-31-22-130:/var/www/ProjectX# cat README.md
Welcome to ProjectX
```

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.



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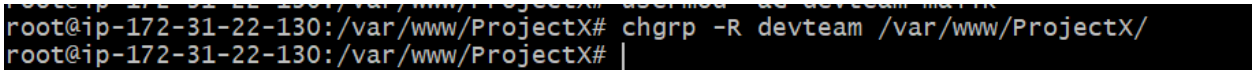
2. Assign Group Ownership of Project Directory:

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

- **Explanation:**
  Changes the group ownership of the `ProjectX` directory to `devteam` recursively.



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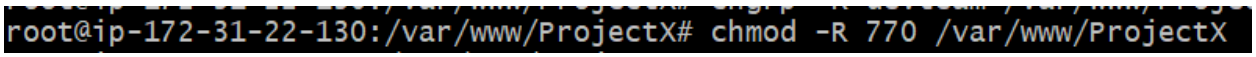
3. Set Directory Permissions (Read/Write for Developers, Read-Only for Others):

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

- **Explanation:**
  Grants read, write, and execute permissions to the owner and group, and no permissions to others.



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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
```

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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
```

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`.

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

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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
```

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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
```

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
```

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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
```

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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.