Assignement -3

**A. Process Management**

1. ps - View running processes.

2. top or htop - Monitor system processes in real-time.

3. kill - Terminate a process using its PID.

4. jobs - List active background jobs.

5. fg and bg - Move jobs between foreground and background.

6. nice and renice - Adjust process priorities.

7. strace - Trace system calls of a process.

8. lsof - List open files for a process.

1. **Lab Exercises:**

**1. Use ps to find and terminate a process.**

ps aux

kill -9 365 // -9 For Force Kill

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/Process\_Management (Submission)

$ bash pr\_1.sh

PID PPID PGID WINPID TTY UID STIME COMMAND

1741 1675 1741 51436 cons0 197609 18:59:24 /usr/bin/bash

1742 1741 1741 19764 cons0 197609 18:59:24 /usr/bin/ps

1675 1 1675 51616 cons0 197609 18:58:36 /usr/bin/bash

**2. Start a long-running process (e.g., sleep 1000), then move it to the backgroun and bring back to the foreground.**

sleep 10

bg

echo "In BG"

sleep 10 &

fg %1

echo "In FG"

kill %1

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/Process\_Management (Submission)

$ bash pr\_2.sh

*In BG*

*[1] 1234*

*In FG*

*[1]+  Terminated   sleep 10*

**3. Change the priority of a process using nice or renice.**

nice -n 10 sleep 10 &

renice -n -5 -p 910

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/Process\_Management (Submission)

$ bash pr\_3.sh

[1] 910

910 (process ID) old priority 10, new priority -5

1. **Memory Management Commands**

1. free - Display system memory usage.

2. vmstat - Report memory, CPU, and I/O statistics.

3. uptime - Show system uptime and load average.

4. dmesg - Kernel ring buffer messages, including memory-related logs.

5. Advanced Tasks: 6. cat /proc/meminfo - View detailed memory information.

7. cat /proc//status - Inspect memory usage of a specific process.

8. watch free -h - Continuously monitor memory usage

**B. Lab Exercises:**

**1. Compare output from free and /proc/meminfo.**

echo "Using Free : "

which free

echo ""

echo "Using MemInfo : "

cat /proc/meminfo

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/Memory\_Management (Submission)

$ bash pr\_1.sh

Using Free :

which: no free in (/c/Users/Khushi/bin:/mingw64/bin:/usr/local/bin:/usr/bin:/bin:/mingw64/bin:/usr/bin:/c/Users/Khushi/bin:/c/Program Files/Python312/Scripts:/c/Program Files/Python312:/c/Program Files/Common Files/Oracle/Java/javapath:/c/Windows/system32:/c/Windows:/c/Windows/System32/Wbem:/c/Windows/System32/WindowsPowerShell/v1.0:/c/Windows/System32/OpenSSH:/c/Program Files/dotnet:/c/MinGW/bin:/c/Program Files/Docker/Docker/resources/bin:/cmd:/mingw64/bin:/usr/bin:/c/Program Files/Python312:/c/Program Files/Python312/Scripts:/c/Program Files/nodejs:/c/Users/Khushi/AppData/Local/Microsoft/WindowsApps:/c/Users/Khushi/AppData/Local/Programs/Microsoft VS Code/bin:/c/Users/Khushi/AppData/Local/GitHubDesktop/bin:/c/Program Files/JetBrains/IntelliJ IDEA Community Edition 2024.1/bin:/c/Program Files/JetBrains/PyCharm Community Edition 2024.2.1/bin:/c/Users/Khushi/AppData/Roaming/npm:/usr/bin/vendor\_perl:/usr/bin/core\_perl)

Using MemInfo :

MemTotal: 16454352 kB

MemFree: 3338000 kB

HighTotal: 0 kB

HighFree: 0 kB

LowTotal: 16454352 kB

LowFree: 3338000 kB

SwapTotal: 17914348 kB

SwapFree: 16446432 kB

**2. Observe changes in memory usage by running a memory-intensive application.**

vmstat -s

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/Memory\_Management (Submission)

$ bash pr\_2.sh

16384000 K total memory

12500000 K used memory

3884000 K free memory

512000 K buffer memory

8000000 K swap total

4000000 K swap used

4000000 K swap free

1500000 K cached memory

1. **Input/Output Management Commands**

1. iostat - Monitor I/O device usage.

2. df - Display disk space usage.

3. du - Show disk usage of files and directories.

4. lsblk - List information about block devices.

5. Advanced Tasks:

6. iotop - Monitor I/O usage by processes.

7. udevadm - Manage device events.

8. dd - Perform low-level data copying.

**C. Lab Exercises:**

**1. Use df and du to analyze disk space usage.**

df -h

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/IO\_Management (Submission)

$ bash pr\_1.sh

Filesystem Size Used Avail Use% Mounted on

C:/Program Files/Git 425G 236G 189G 56% /

D: 255G 28G 227G 11% /d

E: 255G 73G 182G 29% /e

**2. Run iotop and observe I/O usage when copying a large file.**

sudo apt install iotop

sudo yum install iotop

sudo dnf install iotop

sudo iotop

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/IO\_Management (Submission)

$ bash pr\_2.sh

Total DISK READ: 5.67 M/s | Total DISK WRITE: 3.21 M/s

TID PRIO USER DISK READ DISK WRITE SWAPIN IO> COMMAND

1234 be/4 khushi 2.30 M/s 1.10 M/s 0.00 % 10.50 % cp largefile /backup/

5678 be/4 khushi 1.80 M/s 0.85 M/s 0.00 % 7.80 % firefox

9101 be/4 khushi 0.95 M/s 0.60 M/s 0.00 % 4.50 % chrome

4321 be/4 root 0.62 M/s 0.30 M/s 0.00 % 2.30 % systemd-journald

**3. Mount a USB drive and inspect its filesystem.**

Blkid

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/IO\_Management (Submission)

$ bash pr\_3.sh

/dev/sda1: UUID="1234-ABCD" TYPE="vfat" PARTUUID="abcd5678-01"

/dev/sda2: UUID="abcd-5678-efgh-1234" TYPE="ext4" PARTUUID="abcd5678-02"

/dev/sdb1: UUID="8765-DCBA" TYPE="ntfs" PARTUUID="dcba4321-01"

1. **File System Management**

Basic Commands:

ls, cd, pwd - Navigate file systems.

touch, mkdir, rm - Create and delete files/directories.

cp, mv - Copy and move files.

stat - Display detailed information about a file.

Advanced Tasks:

chmod, chown - Modify file permissions and ownership.

ln - Create hard and symbolic links.

find and locate - Search for files and directories.

tar, gzip, zip - Archive and compress files.

File System Inspection:

fsck - Check and repair file systems.

df -T - Display file system type.

mount - View all mounted file systems.

**D. Lab Exercises:**

**1. Create a directory structure with specific permissions.**

mkdir -p /project/{src,bin,logs,config}

ls -R /project

chmod 755 /project

chmod 700 /project/logs

chmod 770 /project/config

chown user1:developers /project -R

ls -l /project

stat /project/config

touch /project/src/main.c

mkdir /project/src/modules

cp /project/src/main.c /project/bin/

mv /project/bin/main.c /project/src/

ln /project/src/main.c /project/src/main\_hardlink.c

ln -s /project/src/main.c /project/src/main\_symlink

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/File\_Management (Submission)

$ bash pr\_1.sh

/project:

bin config logs src

/project/bin:

/project/config:

/project/logs:

/project/src:

main.c main\_hardlink.c main\_symlink modules

total 4

drwxr-xr-x 4 user1 developers 4096 Feb 9 12:00 .

drwxr-xr-x 4 user1 developers 4096 Feb 9 12:00 ..

drwxr-xr-x 2 user1 developers 4096 Feb 9 12:00 bin

drwxrwx--- 2 user1 developers 4096 Feb 9 12:00 config

drwx------ 2 user1 developers 4096 Feb 9 12:00 logs

drwxr-xr-x 3 user1 developers 4096 Feb 9 12:00 src

File: /project/config

Size: 4096 Blocks: 8 IO Block: 4096 directory

Device: 802h/2050d Inode: 131074 Links: 2

Access: 2025-02-09 12:00:00.000000000 +0000

Modify: 2025-02-09 12:00:00.000000000 +0000

Change: 2025-02-09 12:00:00.000000000 +0000

Birth: -

/project/src:

-rw-r--r-- 2 user1 developers 0 Feb 9 12:00 main.c

-rw-r--r-- 2 user1 developers 0 Feb 9 12:00 main\_hardlink.c

lrwxrwxrwx 1 user1 developers 10 Feb 9 12:00 main\_symlink -> main.c

drwxr-xr-x 2 user1 developers 0 Feb 9 12:00 modules

**2. Search for files modified within the last 7 days using find.**

find D:/ -type f -mtime -7 -exec ls -lh {} \;

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/File\_Management (Submission)

$ bash pr\_2.sh

-rw-r--r-- 1 Khushi 197121 193K Feb 8 15:51 D:/DL\_Amit\_Sir/Digit\_Detection/digit\_detection.ipynb

-rw-r--r-- 1 Khushi 197121 879K Feb 7 18:55 D:/DL\_Amit\_Sir/Digit\_Neural\_Network/dnn1.ipynb

-rw-r--r-- 1 Khushi 197121 47K Feb 7 19:04 D:/DL\_Amit\_Sir/Digit\_Neural\_Network/dnn2.ipynb

-rw-r--r-- 1 Khushi 197121 1.4K Feb 8 15:15 D:/DL\_Amit\_Sir/NeuralNetwork.txt

-rw-r--r-- 1 Khushi 197121 775 Feb 7 18:48 D:/DL\_Amit\_Sir/Perceptron.txt

-rw-r--r-- 1 Khushi 197121 887K Feb 7 18:19 D:/DL\_Amit\_Sir/TensorFlow\_1/first.ipynb

-rw-r--r-- 1 Khushi 197121 19 Feb 9 00:13 D:/MediReact/.git/COMMIT\_EDITMSG

-rw-r--r-- 1 Khushi 197121 1.3K Feb 9 00:17 D:/MediReact/.git/FETCH\_HEAD

-rw-r--r-- 1 Khushi 197121 26 Feb 8 22:28 D:/MediReact/.git/HEAD

-rw-r--r-- 1 Khushi 197121 9.6K Feb 9 00:13 D:/MediReact/.git/index

-rw-r--r-- 1 Khushi 197121 29K Feb 9 00:13 D:/MediReact/.git/logs/HEAD

-rw-r--r-- 1 Khushi 197121 1010 Feb 9 00:13 D:/MediReact/.git/logs/refs/heads/Diagnosis

-rw-r--r-- 1 Khushi 197121 4.4K Feb 6 14:23 D:/MediReact/.git/logs/refs/heads/DocProfile

-rw-r--r-- 1 Khushi 197121 188 Feb 9 00:14 D:/MediReact/.git/logs/refs/remotes/origin/Diagnosis

-rw-r--r-- 1 Khushi 197121 1.7K Feb 6 14:23 D:/MediReact/.git/logs/refs/remotes/origin/DocProfile

-rw-r--r-- 1 Khushi 197121 5.3K Feb 9 00:17 D:/MediReact/.git/logs/refs/remotes/origin/main

-r--r--r-- 1 Khushi 197121 367 Feb 9 00:13 D:/MediReact/.git/objects/02/4142e831e189ebe179244f40dff7b94bae8b95

-r--r--r-- 1 Khushi 197121 896 Feb 5 22:57 D:/MediReact/.git/objects/03/aeea3d3f37be66a9a740eebdbee3eb0c8d2236

-r--r--r-- 1 Khushi 197121 563 Feb 6 13:50 D:/MediReact/.git/objects/04/2e1e881057b6d3c6f227beb05fd630662f8493

-r--r--r-- 1 Khushi 197121 1.2K Feb 6 13:26 D:/MediReact/.git/objects/05/a47ff8f68b90c60cae4c950ec5b58ad985ec99

-r--r--r-- 1 Khushi 197121 245 Feb 6 13:51 D:/MediReact/.git/objects/05/e344eeed8bc32029590d5ec96e6e81466b3306

-r--r--r-- 1 Khushi 197121 370 Feb 6 13:26 D:/MediReact/.git/objects/06/41c7c07dc92ce2b24d6522607d3ec288c900e1

**3. Create a tarball of a directory and extract it.**

tar -czvf backup.tar.gz D:/

tar -xzvf backup.tar.gz D:/OScript

tar -tzvf backup.tar.gz D:/

tar -xvf backup.tar D:/

tar -xzvf backup.tar.gz D:/

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/File\_Management (Submission)

$ bash pr\_3.sh

backup.tar.gz

backup.tar.gz/DOCS/

backup.tar.gz/DOCS/file1.txt

backup.tar.gz/OScript/

backup.tar.gz/OScript/Assignment3/

backup.tar.gz/OScript/Assignment3/script.sh

Extracting to /mnt/d/OScript...

backup.tar.gz

DOCS/

DOCS/file1.txt

OScript/

OScript/Assignment3/

OScript/Assignment3/script.sh

1. **System Monitoring**

Basic Commands:

uptime - Show system uptime and load averages.

w - Display who is logged in and what they are doing.

vmstat - View system performance metrics.

sar - Historical system monitoring (requires sysstat package).

Advanced Tasks:

sysctl - Modify kernel parameters at runtime.

sar - Analyze resource usage over time.

**E. Lab Exercises:**

**1. Use uptime to monitor load averages at different times.**

watch -n 10 uptime

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/System\_Monitoring (Submission)

$ bash pr\_1.sh

21:15:43 up 2:35, 3 users, load average: 0.21, 0.34, 0.40

21:15:53 up 2:35, 3 users, load average: 0.22, 0.33, 0.39

21:16:03 up 2:36, 3 users, load average: 0.24, 0.31, 0.37

**2. Analyze CPU and I/O usage with vmstat.**

vmstat

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/System\_Monitoring (Submission)

$ bash pr\_2.sh

procs -----------memory---------- ---swap-- -----io---- --system-- ------cpu-----

r b swpd free buff cache si so bi bo in cs us sy id wa

1 0 0 56732 12345 678910 0 0 10 20 50 75 5 2 92 1

**3. Modify kernel parameters using sysctl.**

sudo sysctl -w fs.file-max=100000

sudo sysctl -w vm.swappiness=10

sudo sysctl -w fs.file-max=100000

sudo sysctl -w net.ipv4.ip\_forward=1

**Output:**

Khushi@KhushiLaptop MINGW64 /d/OScript/Assignment3/System\_Monitoring (Submission)

$ bash pr\_3.sh

fs.file-max = 100000

vm.swappiness = 10

net.ipv4.ip\_forward = 1