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SAP ID: 60004240019
Subject: Operating System.

EXPERIMENT. (1)

* **Aim :-** To explore the internal commands of Linux & write shell scripts.

* **Theory :-**

Internal commands in LINUX:

Internal commands are built into the shell & do not require separate execution files. Some important internal commands include:

- echo :- Displays messages or variable values.
- pwd :- Prints the current working directory.
- cd :- changes the current directory.
- set :- Displays shell variables & options.
- export :- sets environment variables.

Shell Scripting:

A shell script is a file containing a seq. of LINUX commands executed in a batch. It helps automate tasks such as process management, system monitoring, & file handling.

Key Linux commands used in the scripts :-

- sort :- sorts txt data.
- grep :- Searches for patterns in files.
- awk :- Processes & formats txt.
- whoami :- Displays currently logged-in user.
- logname :- Displays the login name of the user.
- uname :- shows system information.
- lsb_release :- Displays Linux distribution details.

Shell scripts for various Tasks:-

1. Display Top 10 processes by CPU usage:-

```
echo "Top 10 Processes by CPU usage:"
ps -eo pid, comm, %CPU --sort=-%CPU | head -11
```

2. Display Processes with highest memory usage:-

```
echo "Processes with highest memory usage:"
ps -eo pid, comm, %mem --sort=-%mem | head -11
```

3. Display current Logged-in user & Logname:-

```
echo "current user: $(who ami)"
echo "Logname: $(logname)"
```

4. Display system Information:-

```
echo "Home Directory : $Home"
echo "Operating System Type : $(uname -o)"
echo "current path setting : $PATH"
echo "current working directory : $(pwd)"
```

5. Display OS version, Release Number, Kernel Version.

```
echo "OS Version : $(lsb_release -d | awk -F':' '{print $2}')"
echo "Release Number : $(lsb_release -r | awk -F':' '{print $2}')"
echo "Kernel Version : $(uname -r)"
```

6. Illustrating the use of sort, grep, awk.

- Sorting a file Alphabetically:
  `sort filename.txt`

- Finding a specific word in a file:
  `grep "pattern" filename.txt`

- Using awk to Print specific columns:
  `awk '{print $1, $3}' filename.txt`

* Conclusion :-

This experimend explored essential Linux internal commands & shell scripting. techniques for system monitoring & information retrieval. Though scripts tasks such as proces management, user information display, & os version checking were automated. Additionally, commands like sort, grep & awk were demonstrated for efficient txt processing. Mastering these commands & scripting techniques enhances productivity & system administration skills.

1. Top 10 processes in descending order

```
student@student-virtual-machine:~/Desktop/C11/60004230025$ echo "top 10 processes in descending order"
top 10 processes in descending order
student@student-virtual-machine:~/Desktop/C11/60004230025$ ps axl | head -n 10
F   UID     PID    PPID PRI  NI    VSZ   RSS WCHAN  STAT TTY        TIME COMMAND
4     0       1       0  20   0 168040 12376 -      Ss   ?          0:04 /sbin/init splash
1     0       2       0  20   0      0     0 -      S    ?          0:00 [kthreadd]
1     0       3       2   0 -20      0     0 -      I<   ?          0:00 [rcu_gp]
1     0       4       2   0 -20      0     0 -      I<   ?          0:00 [rcu_par_gp]
1     0       5       2   0 -20      0     0 -      I<   ?          0:00 [slub_flushwq]
1     0       6       2   0 -20      0     0 -      I<   ?          0:00 [netns]
1     0      11       2   0 -20      0     0 -      I<   ?          0:00 [mm_percpu_wq]
1     0      12       2  20   0      0     0 -      I    ?          0:00 [rcu_tasks_kthread]
1     0      13       2  20   0      0     0 -      I    ?          0:00 [rcu_tasks_rude_kthread]
student@student-virtual-machine:~/Desktop/C11/60004230025$
```

2. Processes with highest memory usage

```
For more details see ps(1).
student@student-virtual-machine:~/Desktop/C11/60004230025$ ps -eo pid,ppid,cmd,%mem,%cpu --sort=%mem | head
    PID    PPID CMD                         %MEM %CPU
      2       0 [kthreadd]                   0.0  0.0
      3       2 [rcu_gp]                     0.0  0.0
      4       2 [rcu_par_gp]                 0.0  0.0
      5       2 [slub_flushwq]               0.0  0.0
      6       2 [netns]                      0.0  0.0
     11       2 [mm_percpu_wq]               0.0  0.0
     12       2 [rcu_tasks_kthread]          0.0  0.0
     13       2 [rcu_tasks_rude_kthread]     0.0  0.0
     14       2 [rcu_tasks_trace_kthread]    0.0  0.0
student@student-virtual-machine:~/Desktop/C11/60004230025$
```

3. Current logged-in users and no. of users

```
student@student-virtual-machine:~/Desktop/C11/60004230025$ who -u
student  tty2         2025-02-03 10:51  old         1527 (tty2)
```

4. Current shell, home directory, operating system type, current working directory

```
student@student-virtual-machine:~/Desktop/C11/60004230025$ whoami
student
student@student-virtual-machine:~/Desktop/C11/60004230025$ uname
Linux
student@student-virtual-machine:~/Desktop/C11/60004230025$ pwd
/home/student/Desktop/C11/60004230025
```

5. Display OS version, release number

```
student@student-virtual-machine:~/Desktop/C11/60004230025$ uname -a
Linux student-virtual-machine 6.5.0-15-generic #15~22.04.1-Ubuntu SMP PREEMPT_DYNAMIC Fri Jan 12 18:54:30 UTC 2 x86_64 x86_64 x86_64 GNU/Linux
student@student-virtual-machine:~/Desktop/C11/60004230025$ uname -r
6.5.0-15-generic
```

6. Use of sort, grep, awk

```
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat > abc
orange
kiwi
grapes
mangoes
student@student-virtual-machine:~/Desktop/C11/60004230025$ ls
abc  file1.txt  file3.py  move_here
student@student-virtual-machine:~/Desktop/C11/60004230025$ touch ssh
student@student-virtual-machine:~/Desktop/C11/60004230025$ sort abc>lmn.txt
student@student-virtual-machine:~/Desktop/C11/60004230025$ sort abc
grapes
kiwi
mangoes
orange
student@student-virtual-machine:~/Desktop/C11/60004230025$ ls
abc  file1.txt  file3.py  lmn.txt  move_here  ssh
student@student-virtual-machine:~/Desktop/C11/60004230025$ cat lmn.txt
grapes
kiwi
mangoes
orange
student@student-virtual-machine:~/Desktop/C11/60004230025$ S
```

```
student@student-virtual-machine:~/Desktop/C11/60004230025$ awk '{print $1 "\t" $2}' abc
orange
kiwi
grapes
mangoes
```