**EXPERIMENT No. 4**

**Aim :-** Process Management and Memory management

1. Execution of Process Management Commands like ps, pstree, nice, kill, pkill, killall, xkill, fg, bg, pgrep, renice, etc.
2. Execution of Memory Management Commands like free, /proc/meminfo, top, htop, df, du, vmstat, demidecode, sar, pagesize, etc

Objective

Outcome-

**What is a Process?**

An instance of a program is called a Process. In simple terms, any command that you give to your Linux machine starts a new process.

Having multiple processes for the same program is possible.

Types of Processes:

* Foreground Processes: They run on the screen and need input from the user. For example Office Programs
* Background Processes: They run in the background and usually do not need user input. For example Antivirus.
* fg jobname

## Top

This utility tells the user about all the running processes on the Linux machine.

| **Field** | **Description** | **Example 1** | **Example 2** |
| --- | --- | --- | --- |
| PID | The process ID of each task | 1525 | 961 |
| User | The username of task owner | Home | Root |
| PR | Priority Can be 20(highest) or -20(lowest) | 20 | 20 |
| NI | The nice value of a task | 0 | 0 |
| VIRT | Virtual memory used (kb) | 1775 | 75972 |
| RES | Physical memory used (kb) | 100 | 51 |
| SHR | Shared memory used (kb) | 28 | 7952 |

## PS

This command stands for 'Process Status'.

This command is similar to 'top' command but the information displayed is different.

To check all the processes running under a user, use the command

Ps ux

You can also check the process status of a single process, use the syntax -

ps PID

## Kill

This command **terminates running processes** on a Linux machine.

To use these utilities you need to know the PID (process id) of the process you want to kill

Syntax -

kill PID

To find the PID of a process simply type

pidof Process name

## NICE

Linux can run a lot of processes at a time, which can slow down the speed of some high priority processes and result in poor performance.

To avoid this, you can tell your machine to prioritize processes as per your requirements.

This priority is called Niceness in Linux, and it has a value between -20 to 19. The lower the Niceness index, the higher would be a priority given to that task.

The default value of all the processes is 0.

To start a process with a niceness value other than the default value use the following syntax

nice -n 'Nice value' process name

If there is some process already running on the system, then you can 'Renice' its value using syntax.

renice 'nice value' -p 'PID'

## B) Memory Management Commands

## DF

This utility reports the free disk space(Hard Disk) on all the file systems.

If you want the above information in a readable format, then use the command

'df -h'

## Free

This command shows the free and used memory (RAM) on the Linux system.

**htop**

Every Linux administrator and users have must come across the situation where the system has reached its saturation point and it starts consuming all of the resources allocated to it. At this particular time, we wholeheartedly want to identify the processes responsible for consuming such high resource usage. To identify such processes, we have many tools and commands available nowadays, but the best among all is **htop.**

htop allows you to monitor processes running on the system along with their full command lines. We can perform tasks related to processes (killing, renicing) without entering their PIDs. Htop allows us to sort the processes on the basis of CPU, Memory and Time Interval. It also allows us to sort all the processes owned by a particular user.

**vmstat**

*vmstat*command in Linux/Unix is a***performance monitoring command*** of the system as it gives the information about processes, memory, paging, block IO, disk and CPU scheduling. All these functionalities makes the command *vmstat*also known as ***virtual memory statistic reporter***

vmstat [options][delay [count]]

**Output:**

1. fg

Text

Description automatically generated

1. ps -ef

Calendar

Description automatically generated with medium confidence

1. top

Text

Description automatically generated with medium confidence

1. kill pid



Text

Description automatically generated

1. pkill



1. nice

Calendar

Description automatically generated with medium confidence

1. df -h

Text

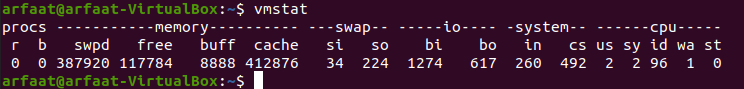
Description automatically generated

1. htop

A picture containing graphical user interface

Description automatically generated

1. vmstat

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**Conclusion**:- Memory management and process management commands executed successfully.