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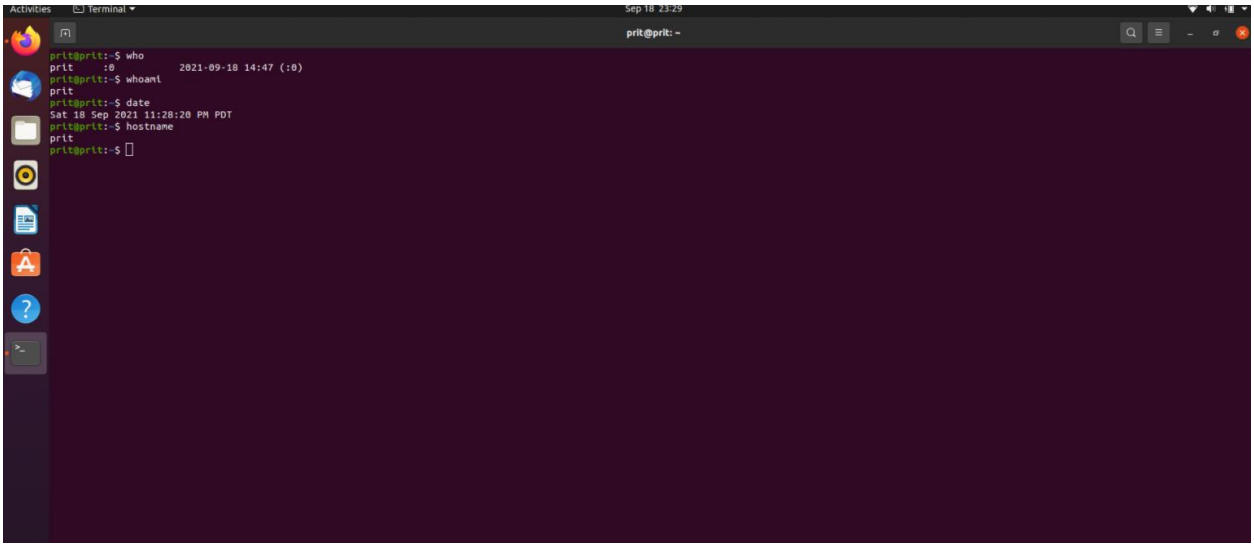
CS 646 Principles of Operating Systems

HW 1

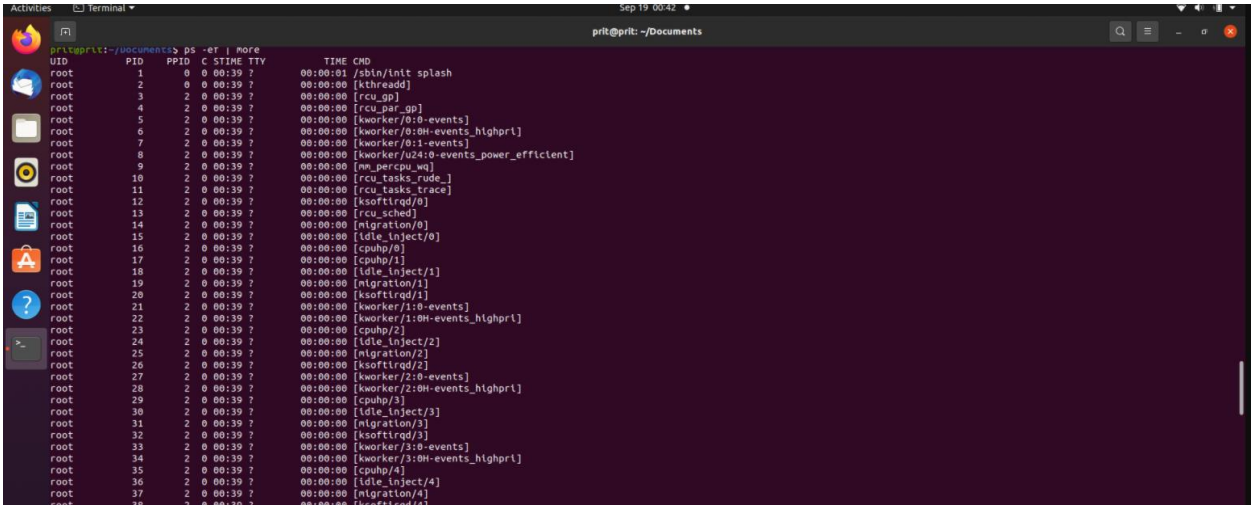
1.

Shell Commands: whoami, who, date, hostname

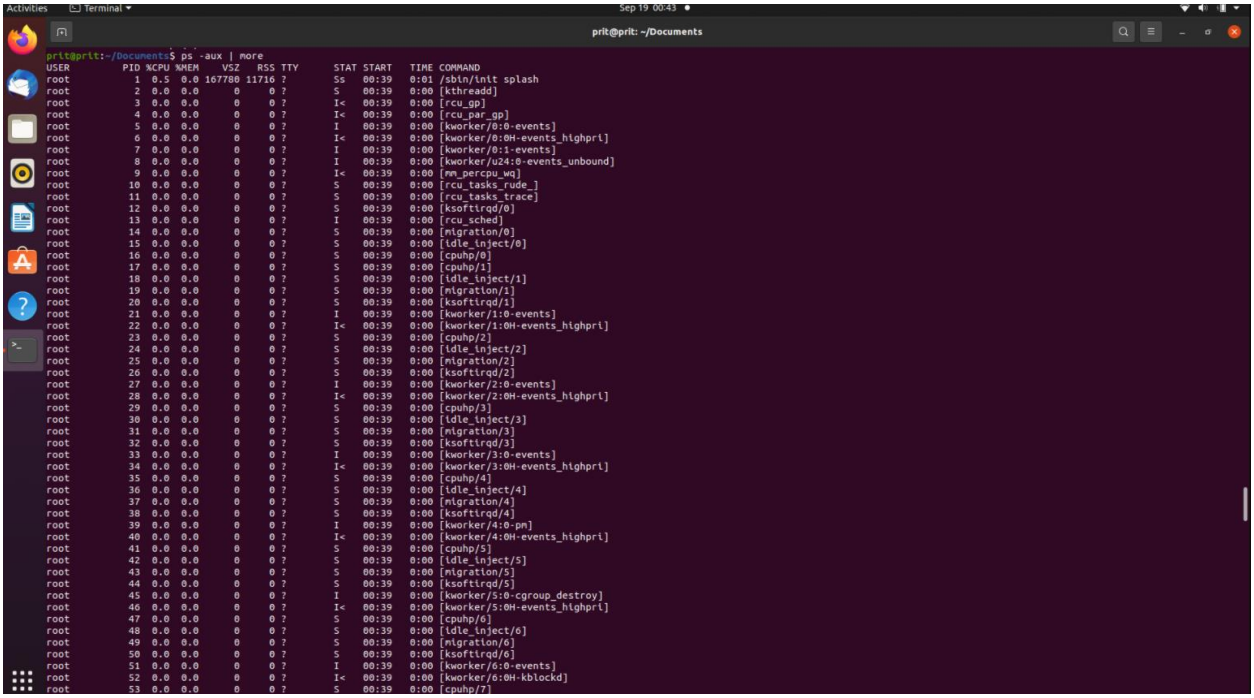


2.

“ps -ef | more” command:



“ps -aux | more” command:



To display all process, ps -e command is used. To view full format listing, ps -f is used. ps -aux displays the most amount of information of running processes including owner of the process, CPU percentage usage, memory percentage usage, running time etc.

The columns of the ps -aux command meaning:

- USER : The owner of the process
- PID : Process ID
- %CPU : Ratio of CPU time and the time the process has been running
- %MEM: Ratio of the process size and physical memory of the system
- VSZ : Virtual memory usage of the process in KiB (1024 bytes)
- RSS : Resident set size in KiB
- TTY : Controlling terminal
- STAT : Multi-character process state
- START : Starting time of the process
- TIME : Cumulative CPU time
- COMMAND : Command with all its arguments

For example,

```
prit        3259  6.3  2.2 3780232 366572 ?      Sl   00:34   0:16 /usr/lib/firefox/firefox -new-window
```

In this process, the owner is prit with process id of 3259. It uses 2.2 % of physical memory of the machine. The process started at 00:34 and is running for 16 minutes. At the very end of the line, the process is running for Firefox browser in the new window tab.

Again,

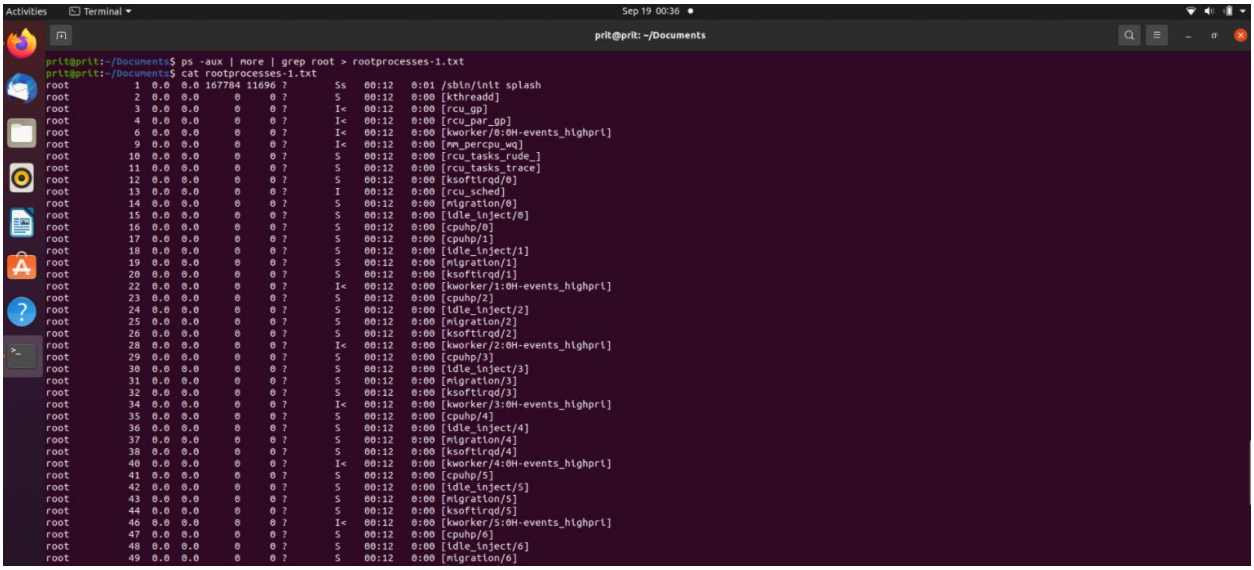
```
root          41  0.0  0.0      0     0 ?        S    00:12   0:00 [cpuhp/5]
```

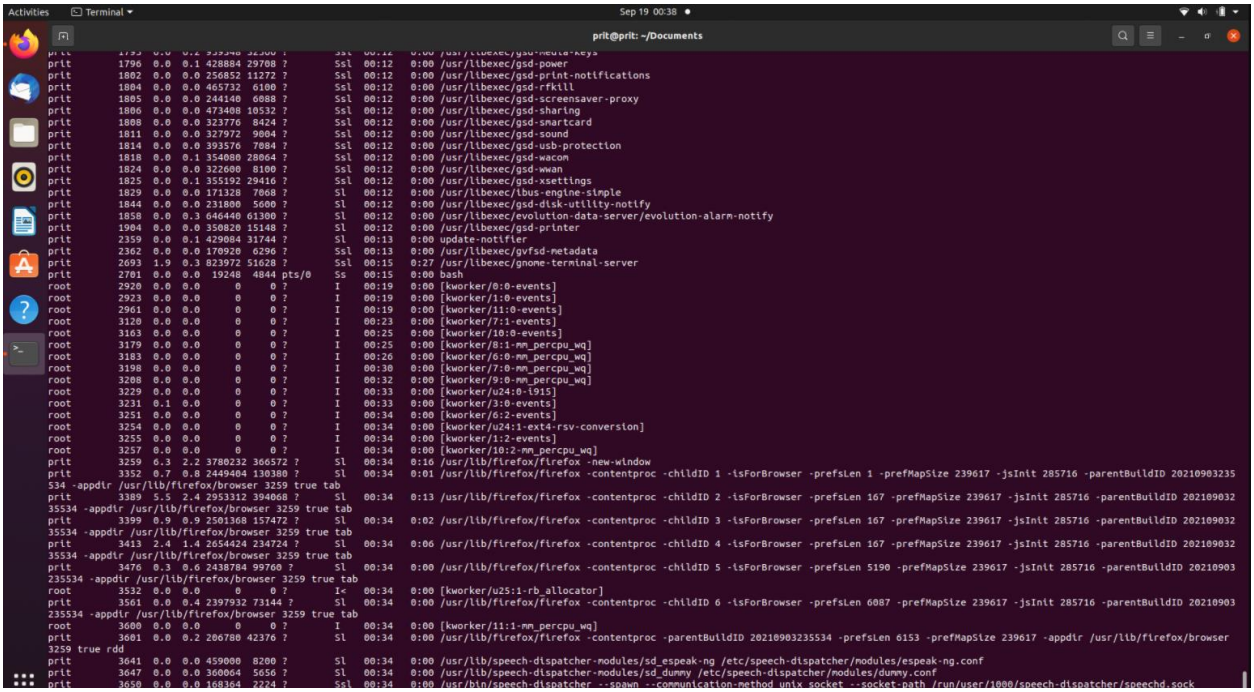
In this process, owner of it is root and the process ID is 41. It does not use any memory. The process started at 00:12 and the cumulative runtime for this process is 0.

rootprocesses-1.txt, rootprocesses-2.txt, my-processes-1.txt and my-processes-2.txt are attached in the zip file. Most processes which are under ‘root’ owner start at the start of the system and in most cases, the processes do not show any memory usage in ps command. The starting time of the root processes 1 and 2 are different as the system was restarted in between.

However, the processes which are under ‘prit’ owner depend on the user. After starting the system, the owner starts some processes such as opening browser, opening terminal. These processes can be found in the my-processes-1.txt and my-processes-2.txt files. In the first file, the Firefox browser was open. The result can be found in the process list. But in the second file, the Firefox browser was not launched. So, the details of that process cannot be found inside my-processes-2.txt file. These processes use the most memory and CPU time.

In the below figures, the command line of sorting the root and my processes are shown:





3. Python code file is attached inside the zip file. The code runs for values from 1 to sqrt(N) for more efficiency.

It returns True if the input number is perfect number and otherwise returns False.

Here's a screenshot:

```
D:\Courses\CS 646 Principal of Operating System\HW1\Submission-HW1>py perfectNumberMultithreading.py
Number: 1500
Number of threads: 1
False

D:\Courses\CS 646 Principal of Operating System\HW1\Submission-HW1>py perfectNumberMultithreading.py
Number: 8128
Number of threads: 1500
True
```