Advanced Operating Systems (CS-525)

Assignment 02 — Marks: 100

Resources:

Reference document: Manual page or man page of ***top*** command
For Understanding /proc directory: https://www.youtube.com/watch?v=lLLOhqr5Io0

Task 1:

You have to write your own ***top*** command closest to the actual one. The ***top*** is an interactive command and gives a dynamic real-time view of the running system. It gives system summary information as well as a list of currently running processes. It shows real-time information and by default refreshes its output after every 3 secs. The ***top*** command takes its input from the **/proc** directory which is also known as Windows to the Linux kernel. It shows two different panels. In upper panel by default it has five lines giving the following information:

Upper panel (Summary Area)

```
top - 07:39:28 up 14:11,  1 user,  load average: 0.47, 0.50, 0.47
Tasks: 181 total,   1 running, 179 sleeping,   1 stopped,   0 zombie
%Cpu(s):  1.4 us,  1.4 sy,  0.0 ni, 97.3 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :   3910.3 total,    168.8 free,    686.4 used,   3055.1 buff/cache
MiB Swap:    975.0 total,    897.0 free,     78.0 used.   2915.3 avail Mem
```

- First line shows the *current time*, time since last *boot*, total number of *users*, and *load average* of the system over the last 1 min, 5min and 15 min
- Second line shows the total count of *processes*, count of *running* process, count of sleeping processes, count of stopped processes, and count of zombie processes
- Third line shows the CPU usage
- Fourth line shows the Physical Memory usage
- Fifth line shows the Virtual Memory usage (total, used, free and cached)

After the Summary area, the space has been provided named Input/Message Line for using your own inputs. For instance,

- by pressing ‘h’, it redirects to the help page
- by pressing ‘n’ it asks you to enter the number of processes to be displayed
- by pressing ‘u’ it asks you to enter the user for which you want the processes to be displayed
- by pressing ‘s’ you can set the time as after how much time it should refresh its output
- by pressing ‘q’ or ‘ctrl +c’ you can quit

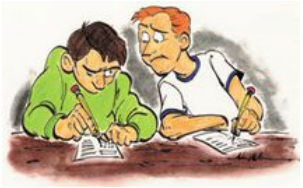
Lower panel (Task Area)

The lower panel shows the information about a particular process. For example, it shows the pid, Username, priority, nice value, virtual memory status, resident share, shared memory, state, CPU percentage, Memory percentage, time, and command.

```
    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
    555 root      20   0  416288 137520  57128 S   2.6   3.4   8:10.40 Xorg
    843 zarafsh+  20   0  392784  57088  46532 S   1.7   1.4   1:36.43 xfwm4
  78464 zarafsh+  20   0  389652  83652  64124 S   0.7   2.1   0:20.18 qterminal
  81508 root      20   0       0      0      0 I   0.7   0.0   0:03.48 kworker/0:2-pm
  18480 root      20   0  236452   7304   5980 S   0.3   0.2   1:55.37 vmtoolsd
  81579 zarafsh+  20   0    9980   3716   3260 R   0.3   0.1   0:00.14 top
      1 root      20   0  165112  10840   7972 S   0.0   0.3   0:23.78 systemd
      2 root      20   0       0      0      0 S   0.0   0.0   0:00.02 kthreadd
      3 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 rcu_gp
      4 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 rcu_par_gp
      6 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/0:0H-kblockd
      9 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 mm_percpu_wq
     10 root      20   0       0      0      0 S   0.0   0.0   0:34.83 ksoftirqd/0
     11 root      20   0       0      0      0 I   0.0   0.0   0:14.16 rcu_sched
     12 root      rt   0       0      0      0 S   0.0   0.0   0:00.81 migration/0
     13 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/0
     15 root      20   0       0      0      0 S   0.0   0.0   0:00.00 kdevtmpfs
     16 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 netns
     17 root      20   0       0      0      0 S   0.0   0.0   0:00.00 rcu_tasks_rude_
     18 root      20   0       0      0      0 S   0.0   0.0   0:00.00 kauditd
     19 root      20   0       0      0      0 S   0.0   0.0   0:00.06 khungtaskd
```

Submission Instructions:

- Create a private repository named **assignment02_rollNo** (all lower case) on you own bitbucket account
- Make your course instructor (arif@pucit.edu.pk) and course TA (mscsf19m015@pucit.edu.pk) the member of your repository (Access level minimum read).
- You have to commit your code on created repository after completion of every version of above program.
- Deadline for uploading the assignment on bitbucket account is **11:59 pm Sunday, March 28, 2021**.
- Any cheating case will result in a zero mark in this assignment and may be a grade down in the overall course as well.



TIME IS JUST LIKE MONEY.
THE LESS WE HAVE IT;
THE MORE WISELY WE SPEND IT.
Manage your time and Good Luck