OPERATING SYSTEMS LAB

LAB – 1

2017 – EE – 82	**ABDULLAH - KHALID**
2017 – EE – 85	**SHEHRIYAR BHATTI**
2017 – EE – 94	**SALMAN AHMAD**

QUESTION – 1

(a)

```
salman@salman-VirtualBox:~$ more /proc/cpuinfo
```

```
salman@salman-VirtualBox:~$ lscpu
```

Processor:

A processor is an electric circuitry that executes instructions comprising a computer program. The processor performs arithmetic, logic, controlling and input / output instructions in the program.

Cores:

Core is an execution unit inside the CPU that receives and executes instructions.

(b)

```
cpu cores       : 1
```

(c)

```
CPU(s):                          1
```

```
processor       : 0
```

(d)

```
CPU MHz:                           2904.002
```

(e)

```
salman@salman-VirtualBox:~$ free -m
              total        used        free      shared  buff/cache   available
Mem:           2992         801        1026          14        1165        2009
Swap:          1162           0        1162
```

Total physical memory = 2992 MB.

(f)

Free memory = 1026 MB.

(g)

```
salman@salman-VirtualBox:~$ vmstat -f
        12270 forks
```

Forks = 12270

(h)

```
salman@salman-VirtualBox:~$ more /proc/stat
```

```
ctxt 2217295
```

Context Switches = 2217295

Question – 2

```
salman@salman-VirtualBox:~$ cd Desktop
salman@salman-VirtualBox:~/Desktop$ cd intro-code
salman@salman-VirtualBox:~/Desktop/intro-code$ gcc cpu.c -o cpu
salman@salman-VirtualBox:~/Desktop/intro-code$ ./cpu
```

```
salman@salman-VirtualBox:~$ ps -r
    PID TTY      STAT   TIME COMMAND
  12292 pts/0    R+     0:36 ./cpu
```

```
    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
  12292 salman    20   0    2356    588    524 R  97.7   0.0   6:04.13 cpu
```

(a)

The Process ID (PID) of the process running the CPU command is 12292.

(b)

It consumes 97.7 % CPU.

Actual Physical Memory Consumed = 588 Kb

Virtual Memory = 2356 Kb

% Memory = 0.0

(c)

It's current state is = Running.

Question – 3

```
salman@salman-VirtualBox:~/Desktop/intro-code$ gcc cpu-print.c -o cpu-print
salman@salman-VirtualBox:~/Desktop/intro-code$ ./cpu-print
```

```
salman@salman-VirtualBox:~$ ps -e
    PID TTY          TIME CMD
```

```
  12490 pts/0    00:00:02 cpu-print
```

```
salman@salman-VirtualBox:~$ ps -r
    PID TTY      STAT   TIME COMMAND
  12490 pts/0    R+     0:14 ./cpu-print
```

(a)

PID = 12490.

(b)

```
salman@salman-VirtualBox:~$ pstree -p -s 12490
systemd(1)───systemd(10436)───gnome-terminal-(12441)───bash(12448)───cpu-print(+
```

PID = 12490.

Parent process PID = 12448

Ancestor PID :

Gnome-terminal PID 12441

Bash PID 12448

Systemd PID 10436

(c)

```
salman@salman-VirtualBox:~$ ./cpu-print > /tmp/tmp.txt &
[1] 12514
```

Question – 4

```
salman@salman-VirtualBox:~/Desktop/intro-code$ gcc memory1.c -o memory1
salman@salman-VirtualBox:~/Desktop/intro-code$ ./memory1


Program : 'memory_1'
--------------------


PID : 12571
Size of int : 4

Press Enter Key to exit.
```

```
salman@salman-VirtualBox:~/Desktop$ top -p 2151
```

```
    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   2151 salman    20   0    6276   4940    956 S   0.0   0.2   0:00.00 memory1
```

```
salman@salman-VirtualBox:~/Desktop/intro-code$ gcc memory2.c -o memory2
salman@salman-VirtualBox:~/Desktop/intro-code$ ./memory2


Program : 'memory_2'
--------------------


PID : 2375
Size of int : 4
```

```
salman@salman-VirtualBox:~/Desktop$ top -p 2375
```

```
    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   2375 salman    20   0    6272   4944    964 S   0.0   0.2   0:00.00 memory2
```

Question – 5

```
salman@salman-VirtualBox:~/Desktop$ mkdir disk-files
salman@salman-VirtualBox:~/Desktop$ cd intro-code
```

```
salman@salman-VirtualBox:~/Desktop/intro-code$ cp foo.pdf ../disk-files
```

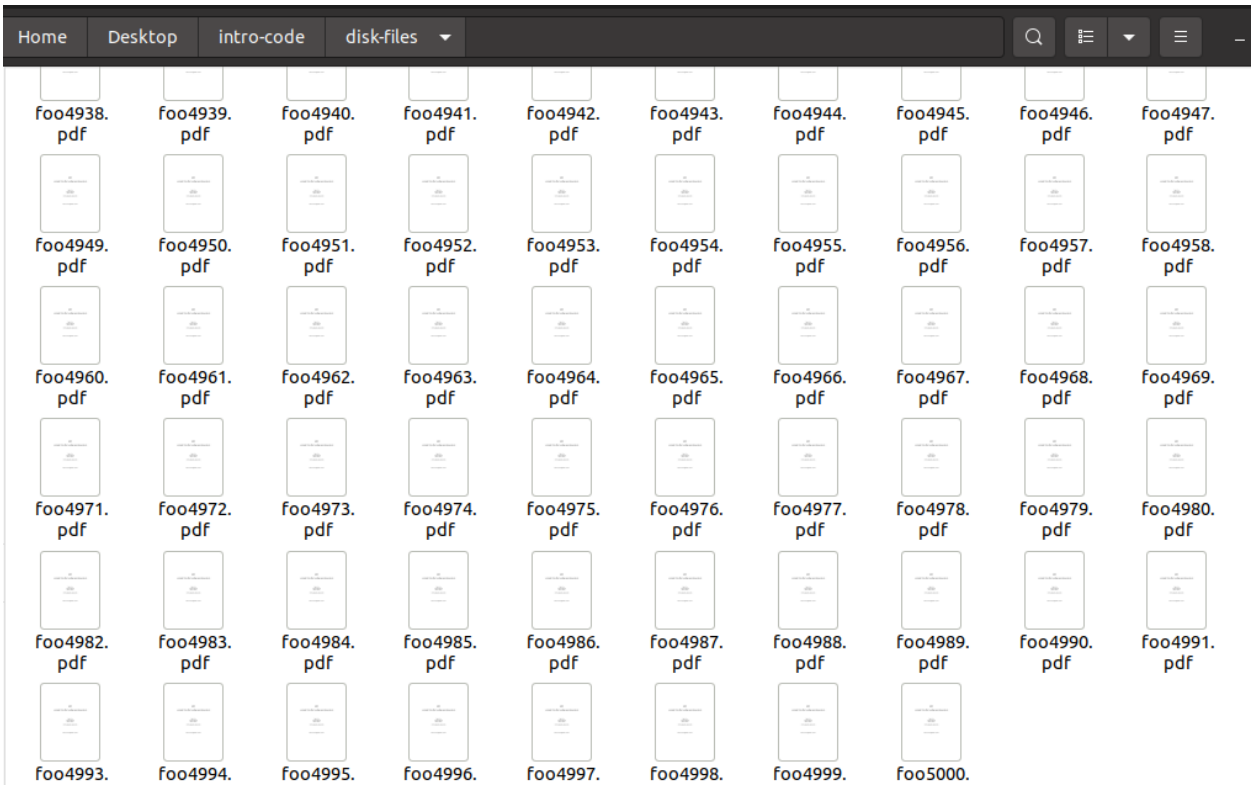
```
salman@salman-VirtualBox:~/Desktop/intro-code$ mkdir disk-files
```

```
salman@salman-VirtualBox:~/Desktop/intro-code$ cp foo.pdf disk-files
```

```
salman@salman-VirtualBox:~/Desktop/intro-code$ gcc disk.c -o disk
salman@salman-VirtualBox:~/Desktop/intro-code$ ./disk
```

```
salman@salman-VirtualBox:~/Desktop/intro-code$ gcc disk1.c -o disk1
salman@salman-VirtualBox:~/Desktop/intro-code$ ./disk1
```

```
salman@salman-VirtualBox:~/Desktop/intro-code$ ./make-copies.sh
```




```
salman@salman-VirtualBox:~/Desktop/intro-code$ ./disk
```

```
salman@salman-VirtualBox:~$ ps -r
    PID TTY      STAT   TIME COMMAND
  34776 pts/0    D+     0:07 ./disk
```

```
salman@salman-VirtualBox:~$ top -p 34776

top - 14:38:15 up 42 min,  1 user,  load average: 2.53, 2.30, 1.55
Tasks:   1 total,   0 running,   1 sleeping,   0 stopped,   0 zombie
%Cpu(s):  1.7 us,  3.0 sy, 71.0 ni,  0.0 id, 23.2 wa,  0.0 hi,  1.0 si,  0.0 st
MiB Mem :   2992.3 total,    227.6 free,    853.5 used,   1911.3 buff/cache
MiB Swap:   1162.4 total,   1054.8 free,    107.7 used.   1966.2 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
  34776 salman    20   0    2496    580    512 D   4.0   0.0   0:12.61 disk
```

```
salman@salman-VirtualBox:~$ iostat -d -x 2 4
Linux 5.8.0-44-generic (salman-VirtualBox)      16/03/2021      _x86_64_        (1 CPU)

Device            r/s     rkB/s   rrqm/s  %rrqm r_await rareq-sz     w/s     wkB/s   wrqm/s  %wrqm w_await ware
q-sz     d/s     dkB/s   drqm/s  %drqm d_await dareq-sz  aqu-sz  %util
loop0            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
loop1            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
loop10           0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
loop2            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
loop3            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
loop4            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
loop5            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
loop6            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
loop7            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
loop8            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
loop9            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
sda            397.50  37280.00     0.00   0.00    4.29    93.79   15.50   1000.00   231.00  93.71    0.35    6
4.52    0.00      0.00      0.00    0.00    0.00    0.00    1.71  94.80
scd0             0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00
0.00    0.00      0.00      0.00    0.00    0.00    0.00    0.00   0.00
```

```
salman@salman-VirtualBox:~/Desktop/intro-code$ ./disk1
```

```
salman@salman-VirtualBox:~$ ps -r
    PID TTY      STAT   TIME COMMAND
  34918 pts/0    R+     0:16 ./disk1
```

```
salman@salman-VirtualBox:~$ top -p 34918

top - 14:47:40 up 52 min,  1 user,  load average: 2.34, 2.43, 2.00
Tasks:   1 total,   1 running,   0 sleeping,   0 stopped,   0 zombie
%Cpu(s): 36.2 us, 16.6 sy, 47.2 ni,  0.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :   2992.3 total,    249.2 free,    665.6 used,   2077.5 buff/cache
MiB Swap:   1162.4 total,    980.5 free,    182.0 used.   2159.0 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
  34918 salman    20   0    2496    588    520 R  51.7   0.0   0:35.15 disk1
```

```
salman@salman-VirtualBox:~$ iostat -d -x 2 4
Linux 5.8.0-44-generic (salman-VirtualBox)      16/03/2021      _x86_64_       (1 CPU)

Device            r/s     rkB/s   rrqm/s  %rrqm r_await rareq-sz     w/s     wkB/s   wrqm/s  %wrqm w_await wareq-sz
  d/s     dkB/s   drqm/s  %drqm d_await dareq-sz  aqu-sz  %util
loop0            0.02      0.34     0.00   0.00   53.93    19.09    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.06
loop1            0.02      0.11     0.00   0.00   47.50     7.48    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.07
loop10           0.00      0.00     0.00   0.00    0.00     1.27    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
loop2            0.02      0.35     0.00   0.00   26.48    18.88    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.04
loop3            0.01      0.11     0.00   0.00   51.40     8.07    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.07
loop4            0.01      0.11     0.00   0.00   30.05     8.09    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.04
loop5            0.02      0.34     0.00   0.00   60.32    17.31    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.08
loop6            0.01      0.11     0.00   0.00   48.95     8.09    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.06
loop7            0.02      0.11     0.00   0.00   31.88     7.54    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.05
loop8            0.17      5.47     0.00   0.00    8.22    31.40    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.19
loop9            0.01      0.11     0.00   0.00   21.74     8.07    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.03
sda            110.31   8278.04     4.53   3.94    7.05    75.04   12.41   4374.15    19.78  61.46   66.07   352.58
 0.00      0.00     0.00   0.00    0.00     0.00    1.61  38.53
scd0             0.01      0.03     0.00   0.00   49.85     2.30    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.06
```

```
Device            r/s     rkB/s   rrqm/s  %rrqm r_await rareq-sz     w/s     wkB/s   wrqm/s  %wrqm w_await wareq-sz
  d/s     dkB/s   drqm/s  %drqm d_await dareq-sz  aqu-sz  %util
loop0            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
loop1            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
loop10           0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
loop2            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
loop3            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
loop4            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
loop5            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
loop6            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
loop7            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
loop8            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
loop9            0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
sda             15.50   1546.00     0.00   0.00    2.23    99.74    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.04   8.60
scd0             0.00      0.00     0.00   0.00    0.00     0.00    0.00      0.00     0.00   0.00    0.00     0.00
 0.00      0.00     0.00   0.00    0.00     0.00    0.00   0.00
```