

## LAB1

### Question 1:

a) command - lscpu

- (I) Architecture - x86\_64
- (II) Byte Order - Little Endian
- (III) Address sizes - 39 bits Physical, 48 bits virtual

b) command - lscpu

- (I) Cores - 4
- (ii) Sockets - 1
- (III) CPU's - 4

c) command - lscpu

- (I) L1 - 256KiB (L1d- 128KiB , L2d-128KiB)
- (II) L2-1MiB
- (III) L3 - 6MiB

d) command - cat meminfo

Total memory - 7799196 KiB  
Free Memory - 1914660 KiB

e) command - top

Total - 362  
Running - 1  
Sleeping - 361  
Stopped - 0  
Zombie - 0

```
Aug 1 14:48
labuser@sl2-121: /proc

labuser@sl2-121:/proc$ xdg-open kallsyms
labuser@sl2-121:/proc$ xdg-open kcore
gio: file:///proc/kcore: No application is registered as handling this file
labuser@sl2-121:/proc$ xdg-open keys
labuser@sl2-121:/proc$ xdg-open kmsg
labuser@sl2-121:/proc$ xdg-open mdstat
labuser@sl2-121:/proc$ xdg-open misc
labuser@sl2-121:/proc$ xdg-open stat
labuser@sl2-121:/proc$ xdg-open modules
labuser@sl2-121:/proc$ xdg-open version
labuser@sl2-121:/proc$ xdg-open zoneinfo
labuser@sl2-121:/proc$ lscpu
Architecture:           x86_64
CPU op-mode(s):         32-bit, 64-bit
Byte Order:              Little Endian
Address sizes:          39 bits physical, 48 bits virtual
CPU(s):                 4
On-line CPU(s) list:    0-3
Thread(s) per core:     1
Core(s) per socket:     4
Socket(s):              1
NUMA node(s):           1
Vendor ID:              GenuineIntel
CPU family:              6
Model:                  60
Model name:              Intel(R) Core(TM) i5-4440 CPU @ 3.10GHz
Stepping:                3
CPU MHz:                 1076.782
CPU max MHz:             3300.0000
CPU min MHz:             800.0000
BogoMIPS:                6185.88
Virtualization:          VT-x
L1d cache:              128 KiB
L1i cache:              128 KiB
L2 cache:                1 MiB
L3 cache:                6 MiB
NUMA node0 CPU(s):      0-3
Vulnerability Itlb multihit: KVM: Mitigation: Split huge pages
```

```
Aug 1 16:28
labuser@sl2-121: ~/Downloads/lab1/subprocess

labuser@sl2-121: ~/Downloads/lab1/strace
labuser@sl2-121: ~/Downloads/lab1/subprocess

top - 16:28:57 up 12 days, 23:44, 2 users, load average: 0.60, 0.46, 0.35
Tasks: 362 total, 1 running, 361 sleeping, 0 stopped, 0 zombie
%Cpu(s): 3.1 us, 0.8 sy, 0.0 ni, 95.5 id, 0.1 wa, 0.0 hi, 0.5 st, 0.0 st
MiB Mem : 7616.4 total, 725.5 free, 3162.8 used, 3728.1 buff/cache
MiB Swap: 4096.0 total, 4096.0 free, 0.0 used, 3515.0 avail Mem

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM    TIME+  COMMAND
 46088 labuser   20   0  445656 99344 66288 S   4.0   1.3   6:21.21 Xorg
 46261 labuser   20   0  4464788 250460 105288 S   3.3   3.2   6:16.54 gnome-shell
 51422 labuser   20   0  828072 63912 44072 S   2.7   0.8   1:13.53 gnome-terminal-
 50849 labuser   20   0   16.4g 187564 106452 S   2.0   2.4   1:28.39 chrome
 51790 labuser   20   0   24.5g 304224 106840 S   2.0   3.9   0:44.88 chrome
 50808 labuser   20   0   16.6g 364656 174180 S   1.3   4.7   2:21.35 chrome
 51821 labuser   20   0   32.5g 300348 107512 S   1.3   3.9   1:55.43 chrome
 50850 labuser   20   0   16.3g 113156 82224 S   0.7   1.5   0:32.14 chrome
 53446 labuser   20   0   24.5g 165480 104824 S   0.3   2.1   0:11.62 chrome
 56273 root        20   0      0      0      0 I   0.3   0.0   0:00.04 kworker/3:4-events
 56311 labuser   20   0   8444   4120  3168 R   0.3   0.1   0:00.22 top
    1 root      20   0 169840 14172 8476 S   0.0   0.2   0:37.47 systemd
    2 root      20   0      0      0      0 S   0.0   0.0   0:00.13 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-events_highpri
    9 root      0 -20      0      0      0 I   0.0   0.0   0:00.00 mm_percpu_wq
```

Question 2:

command: `cat /proc/<pid>/status`

- (a) memory\_1.c: VmSize-6272 KB: VmRSS-4932KB
- (b) memory\_2.c: VmSize-10176 KB: VmRSS-8500KB
- (c) memory\_3.c: VmSize-6272 KB: VmRSS-4960KB
- (d) memory\_4.c: VmSize-6272 KB: VmRSS-4908KB

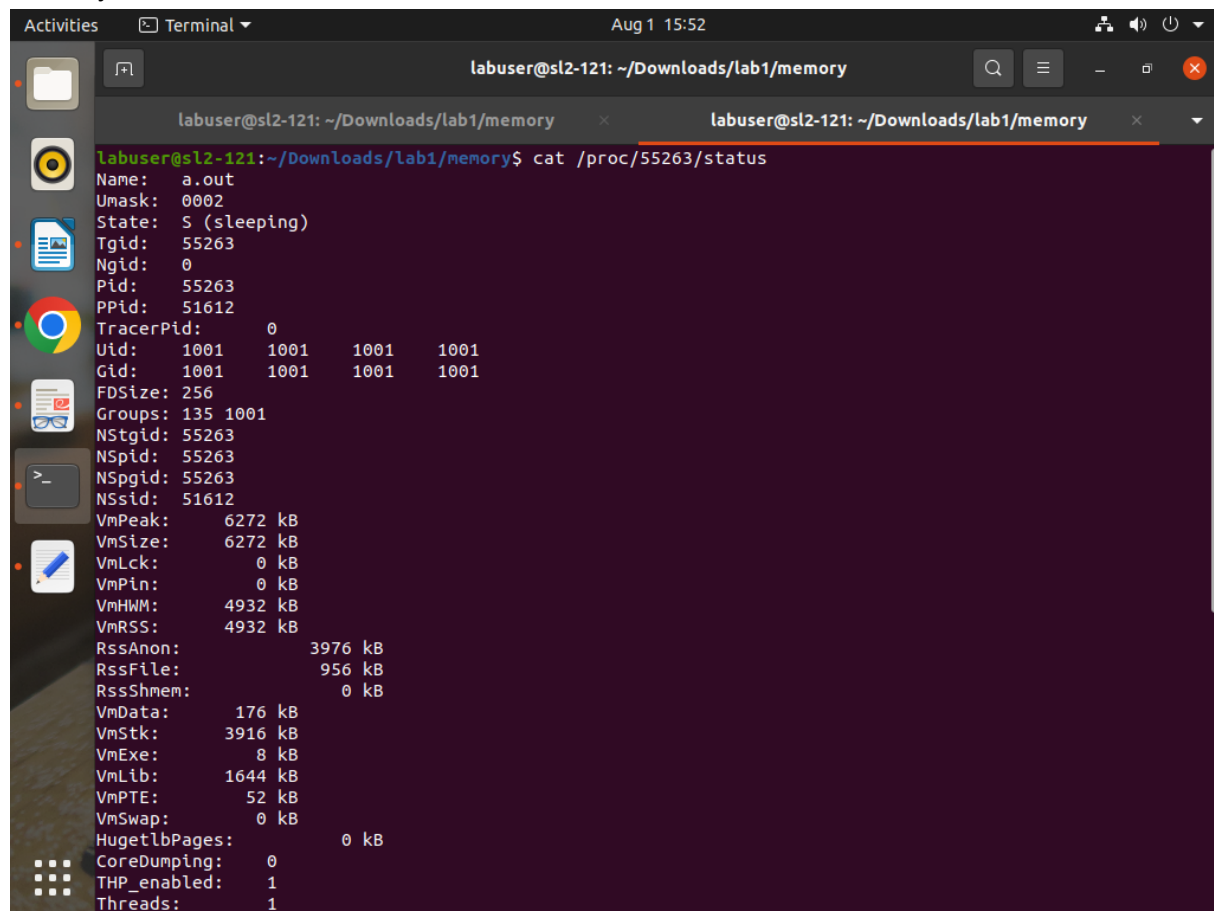
//VmSize is how much virtual memory the process has in total. This includes all types of memory, both in RAM and swapped out.

//VmRSS is the measure of how much RAM the process is actually using. VmSize includes RSS, plus things like shared libraries and memory mapped files.

VmSize is the amount of memory allocated during code, since value of ARRAY\_SIZE is same in memory\_1, memory\_3, memory\_4 VmSize is same in those 3.

in memory\_3 we assigned values for array and hence VmRSS is more since we need more space for making operations.

Memory1.c



```
labuser@sl2-121: ~/Downloads/lab1/memory
labuser@sl2-121: ~/Downloads/lab1/memory
labuser@sl2-121: ~/Downloads/lab1/memory$ cat /proc/55263/status
Name: a.out
Umask: 0002
State: S (sleeping)
Tgid: 55263
Ngid: 0
Pid: 55263
Ppid: 51612
TracerPid: 0
Uid: 1001 1001 1001 1001
Gid: 1001 1001 1001 1001
FDSize: 256
Groups: 135 1001
NSTgid: 55263
NSpid: 55263
NSpgid: 55263
NSSid: 51612
VmPeak: 6272 kB
VmSize: 6272 kB
VmLck: 0 kB
VmPin: 0 kB
VmHWM: 4932 kB
VmRSS: 4932 kB
RssAnon: 3976 kB
RssFile: 956 kB
RssShmem: 0 kB
VmData: 176 kB
VmStk: 3916 kB
VmExe: 8 kB
VmLib: 1644 kB
VmPTE: 52 kB
VmSwap: 0 kB
HugetlbPages: 0 kB
CoreDumping: 0
THP_enabled: 1
Threads: 1
```

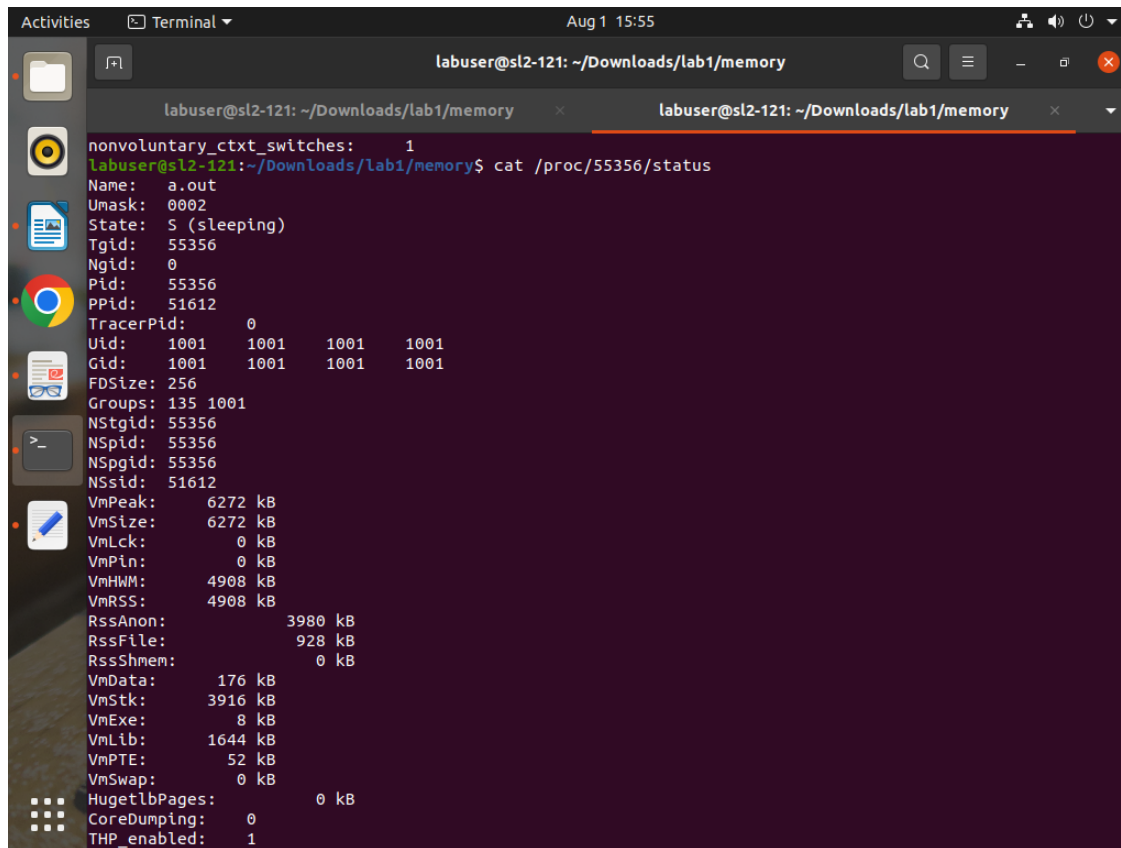
## Memory2.c

```
Activities Terminal Aug 1 15:53
labuser@sl2-121: ~/Downloads/lab1/memory
labuser@sl2-121: ~/Downloads/lab1/memory
labuser@sl2-121: ~/Downloads/lab1/memory$ cat /proc/55314/status
nonvoluntary_ctxt_switches: 0
Name: a.out
Umask: 0002
State: S (sleeping)
Tgid: 55314
Ngid: 0
Pid: 55314
PPid: 51612
TracerPid: 0
Uid: 1001 1001 1001 1001
Gid: 1001 1001 1001 1001
FDSize: 256
Groups: 135 1001
NSTgid: 55314
NSpid: 55314
NSpgid: 55314
NSSid: 51612
VmPeak: 10176 kB
VmSize: 10176 kB
VmLck: 0 kB
VmPin: 0 kB
VmHWM: 8500 kB
VmRSS: 8500 kB
RssAnon: 7688 kB
RssFile: 812 kB
RssShmem: 0 kB
VmData: 176 kB
VmStk: 7820 kB
VmExe: 8 kB
VmLib: 1644 kB
VmPTE: 52 kB
VmSwap: 0 kB
HugetlbPages: 0 kB
CoreDumping: 0
THP_enabled: 1
```

## Memory3.c

```
Activities Terminal Aug 1 15:54
labuser@sl2-121: ~/Downloads/lab1/memory
labuser@sl2-121: ~/Downloads/lab1/memory
labuser@sl2-121: ~/Downloads/lab1/memory$ cat /proc/55332/status
nonvoluntary_ctxt_switches: 0
Name: a.out
Umask: 0002
State: S (sleeping)
Tgid: 55332
Ngid: 0
Pid: 55332
PPid: 51612
TracerPid: 0
Uid: 1001 1001 1001 1001
Gid: 1001 1001 1001 1001
FDSize: 256
Groups: 135 1001
NSTgid: 55332
NSpid: 55332
NSpgid: 55332
NSSid: 51612
VmPeak: 6272 kB
VmSize: 6272 kB
VmLck: 0 kB
VmPin: 0 kB
VmHWM: 4960 kB
VmRSS: 4960 kB
RssAnon: 3976 kB
RssFile: 984 kB
RssShmem: 0 kB
VmData: 176 kB
VmStk: 3916 kB
VmExe: 8 kB
VmLib: 1644 kB
VmPTE: 52 kB
VmSwap: 0 kB
HugetlbPages: 0 kB
CoreDumping: 0
THP_enabled: 1
```

## Memory4.c



```
labuser@sl2-121: ~/Downloads/lab1/memory
labuser@sl2-121: ~/Downloads/lab1/memory
nonvoluntary_ctxt_switches: 1
labuser@sl2-121:~/Downloads/lab1/memory$ cat /proc/55356/status
Name: a.out
Umask: 0002
State: S (sleeping)
Tgid: 55356
Ngid: 0
Pid: 55356
PPid: 51612
TracerPid: 0
Uid: 1001 1001 1001 1001
Gid: 1001 1001 1001 1001
FDSize: 256
Groups: 135 1001
NSTgid: 55356
NSpid: 55356
NSpgid: 55356
NSSid: 51612
VmPeak: 6272 kB
VmSize: 6272 kB
VmLck: 0 kB
VmPin: 0 kB
VmHWM: 4908 kB
VmRSS: 4908 kB
RssAnon: 3980 kB
RssFile: 928 kB
RssShmem: 0 kB
VmData: 176 kB
VmStk: 3916 kB
VmExe: 8 kB
VmLib: 1644 kB
VmPTE: 52 kB
VmSwap: 0 kB
HugetlbPages: 0 kB
CoreDumping: 0
THP_enabled: 1
```

### Question 3:

commands use: `./subprocesses 200050008` - to run the file

`ps aux | grep subprocesses` - to see the processes linked with subprocesses run

In this photo the first process is parent process

Everything except the last are child processes

last process is the process linked to grep command

So number of child processes are 15;

```
Aug 1 16:12
labuser@sl2-121: ~/Downloads/lab1/subprocess

labuser@sl2-121:~/Downloads/lab1/subprocess$ ./subprocesses 200050008
Roll No : 200050008
All child process created.
Process will be terminated after 3 minutes.
```

```
Aug 1 16:11
labuser@sl2-121: ~/Downloads/lab1/subprocess

labuser@sl2-121:~/Downloads/lab1/subprocess$ ps aux | grep subprocesses
labuser 55779 0.0 0.0 2480 512 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55780 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55781 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55782 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55783 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55784 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55785 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55786 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55787 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55788 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55789 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55790 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55791 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55792 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55793 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55794 0.0 0.0 2480 80 pts/0 S+ 16:11 0:00 ./subprocesses 200050008
labuser 55796 0.0 0.0 5196 2420 pts/4 S+ 16:11 0:00 grep --color=auto subprocesses
```