Assignment 5

Part-1

Q1) Check RAM and swap usage: free –h

```
[root@MyLinuxVM ~]# free -h
               total        used        free      shared  buff/cache   available
Mem:           1.7Gi       951Mi       342Mi        18Mi       646Mi       822Mi
Swap:          2.0Gi          0B       2.0Gi
[root@MyLinuxVM ~]#
```

Q2) Identify total memory, used memory, available memory and swap usage

➔ For the above image total memory is 1.7 GB, total swap space is 2.0 GB and used memory is 951 MB, used swap space is 0 B. Available memory is 822 MB and swap usage is 0 B.

Part-2

Q1) Run vmstat 5 5 and observe –

```
[root@MyLinuxVM ~]# vmstat 5 5
procs -----------memory---------- ---swap-- -----io---- -system-- ------cpu-----
 r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs us sy id wa st
 2  0      0 281320   3844 637480    0    0  4560    99 1209 2931  8 41 24 27  0
 2  0      0 238604   3844 655408    0    0  3570   122 1335  797 20 71  5  4  0
 3  0      0 166020   3844 655528    0    0    22   104 1380 1897 21 75  2  1  0
 4  0      0 158396   3844 655736    0    0    34   170 1356 6185 22 73  4  1  0
 0  0      0 132496   3844 655744    0    0     0    91  759 1332  7 25 68  0  0
[root@MyLinuxVM ~]#
```

The free memory dropped from 281320 KB to 132496 KB. The cache increased from 637480 KB to 655744 KB. The swap in and out were 0 throughout. The system was initially 24 % idle and at the end it was 68 % idle. In the middle the CPU became too busy and was only 2-5 % idle.

Part-3

Q1) Run: uptime – Note the 1 min, 5min and 15min load averages.

```
root@MyLinuxVM ~]# uptime
00:00:12 up 12 min,  2 users,  load average: 0.04, 0.31, 0.41
root@MyLinuxVM ~]#
```

The 1min, 5min and 15min load averages are 0.04, 0.31 and 0.41.

Part-4

Q1) High load but low CPU usage -> what could be the cause?

➔ This is often caused by **I/O Wait**. It means processes are stuck waiting for the hard drive or network to respond, rather than using the CPU.

Q2) High swap space usage -> what does it indicate?

- ➔ When our physical RAM becomes full we use a part of our secondary storage to store processes and virtually increase the capacity of our physical RAM. This space is known as the swap space. When our running processes' sizes become too large – we use the swap space. And high space indicates that our system has to frequently move processes between the swap space and our physical RAM too often – (in extreme cases leading to thrashing) which decreases the CPU throughput.

Q3) When does adding RAM helps vs optimizing processes.

- ➔ We should add RAM when –
  Our available memory is consistently near zero, and the system is constantly moving data to the disk (swapping).
  We are running memory-intensive tasks such as virtual machines, large databases or high-end video editing that naturally require more space than we have.
- ➔ We should optimize processes when –
  Inefficient Algorithms- For developers, if a program is performing redundant calculations or storing temporary data inefficiently, the code itself needs to be refined.