

Assignment 5 - Memory & CPU Monitoring (Performance Troubleshooting)

Part 1: Memory Analysis

1. Check RAM and swap usage: free -h 2. Identify:

- Total memory
- Used memory
- Available memory
- Swap usage

```
ubuntu@ip-172-31-5-27: ~
ubuntu@ip-172-31-5-27:~$ free -h
      total        used        free      shared  buff/cache   available
Mem:    914Mi       700Mi       80Mi      2.7Mi      290Mi      214Mi
Swap:      0B         0B         0B
ubuntu@ip-172-31-5-27:~$ █
```

Part 2: System Statistics

1. Run: vmstat 5 5

2. Observe:

- Memory usage
- Swap in/out
- CPU idle time

```
ubuntu@ip-172-31-5-27:~$ 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   gu
 2  0      0  82672  12240 285532    0    0  1168   120   404    3   1   1  97   0   0   0
 0  0      0  82672  12240 285572    0    0      0    0  233   362   0   0 100   0   0   0
 0  0      0  82672  12248 285572    0    0      0    0   5  246   373   0   0 100   0   0   0
 0  0      0  82672  12248 285572    0    0      0    0   0  234   363   0   0 100   0   0   0
 0  0      0  81700  12604 288912    0    0    715    4  369   522   2   1  97   1   0   0
ubuntu@ip-172-31-5-27:~$ █
```

Part 3: Load Average Interpretation

1. Run: uptime

2. Note the:

- 1-minute
- 5-minute
- 15-minute load averages

```
ubuntu@ip-172-31-5-27:~$ uptime
 16:00:39 up 7 min,  1 user,  load average: 0.00, 0.00, 0.00
ubuntu@ip-172-31-5-27:~$ █
```

Part 4: Correlation Exercise

- High load but low CPU usage → what could be the cause?

This means the processes are not using the CPU but are waiting for the resources that may include I/O operations. This happens when many processes are blocked and waiting for the disk reads/writes, memory or in sleep which will increase the load but the CPU will remain idle.

- High swap usage → what does it indicate?

This indicates that the physical RAM is not sufficient so the system is moving the inactive memory pages to disk which means more memory usage this may lead to slower performance.

- When does adding RAM help vs optimizing processes?

Adding RAM helps when the system has high swap usage, frequent I/O that makes the system to slow down as they do not fit in the physical memory. Adding more RAM reduces the swaps.

Optimising processes helps when the memory is being used inefficiently mainly during too many processes or threads that are running. So optimizing this problem will prevent the wastage and improves the stability.