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-172-31-16-28:~$ free -h
               total        used        free      shared  buff/cache   available
Mem:           914Mi       705Mi        71Mi       2.7Mi       295Mi       209Mi
Swap:             0B          0B          0B
ubuntu@ip-172-31-16-28:~$
```

Part 2: System Statistics

1. Run: **`vmstat 5 5`**
2. Observe:
    - Memory usage
    - Swap in/out
    - CPU idle time

```
ubuntu@ip-172-31-16-28:~$ 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  73200   8692 293436    0    0   218    56  251    1  0  0 99  0  0  0
 0  0      0  73200   8692 293476    0    0     0     1  217  344  0  0 100  0  0  0
 0  0      0  73200   8692 293476    0    0     0     0  209  338  0  0 100  0  0  0
 0  0      0  73200   8692 293476    0    0     0     0  211  345  0  0 100  0  0  0
 0  0      0  73200   8692 293476    0    0     0     0  214  345  0  0 100  0  0  0
ubuntu@ip-172-31-16-28:~$
```

Part 3: Load Average Interpretation

1. Run: **uptime**
2. Note the:
    - 1-minute
    - 5-minute
    - 15-minute load averages

```
ubuntu@ip-172-31-16-28:~$ uptime
 18:48:46 up 44 min,  1 user,  load average: 0.00, 0.00, 0.00
ubuntu@ip-172-31-16-28:~$
```

Part 4: Correlation Exercise

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

This means processes are waiting and not executing. This might be due to tasks stuck in sleep, lack of ram memory which causes processes to wait, or processes might be waiting for some slow I/O operations.

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 many apps need memory at the same time and system slows down due to using swap. Optimise the process when programs use too much memory unnecessarily or keep running in the background when they're not needed.