

# Introduction to Computer Architecture.

## 1. Knowing your system (laptop/desktop) hardware specifications:

- (a) How many CPU cores does your system have? How many physical cores? How many logical cores?
- (b) What is the size of DRAM on your system?
- (c) What is the disk size on your system?
- (d) Based on whether you use Linux or Windows or MAC OS, how did you get the information you report in (a, b, c)? Mention the utilities used or command line prompts. You can give screenshots of the actual outputs.

## 2. Knowing base utilization of hardware resources on your system:

- (a) What CPU% is being used on your system? What is the per core utilization?
- (b) How much DRAM is being used on your system?
- (c) How much disk is being used on your system?
- (d) Based on whether you use Linux or Windows or MAC OS, how did you get the information you report in (a, b, c)? Mention the utilities used or command line prompts. You can give screenshots of the actual outputs.

## 3. Knowing hardware utilization on your system, with compute running:

- (a) Write a python program to create matrices of random numbers E.g.  
<https://www.geeksforgeeks.org/python/how-to-create-a-matrix-of-random-integers-in-python/>.
- (b) Write code to multiply two matrices (e.g.  
<https://www.wscubetech.com/resources/python/programs/multiply-two-matrices>).
- (c) Combine the two python programs, to initialize two matrices with random numbers and then multiplying them. Increase the size of random matrices e.g. 10x10, 100x100, 1000x1000, 10000x10000, 100000x100000.
- (d) While running your program, try to check the CPU and DRAM utilizations. Note these two numbers down. Plot two bar graphs using Python Matplotlib (e.g.  
<https://www.geeksforgeeks.org/pandas/bar-plot-in-matplotlib/>), where the x-axis is matrix size and y axis is CPU utilization or DRAM utilization.