Assignment # 1 PDC Fall 2024 (For All Sections)

Release date: 27/09/2024, Submission date: 13/10/24 11:59 pm on Google Classroom

* This assignment is part of the syllabus. Question may be asked in Midterm # 2 and Final Exam based on the learning done while doing this assignment.

Task # 1 (Ubuntu and Vritualbox installation)

a) Compile and run OpenMP and MPI program posted with this assignment on a Ubuntu Machine or Virtualbox laptop. Document key steps of this installation exercise.

b) Use task manager (windows) and $top command (unix/linux) to view hardware characteristics of your hardware e.g. cores, size of caches (L1, L2 and L3) and all other details relate to our course.

c) Download, Run and document information about CPU using CPU-Z utility from the following link. https://www.cpuid.com/softwares/cpu-z.html

Task # 2 (Handwritten + MS Excel)

a) Write C serial code (i.e. single thread) to measure execution times of serial_test.c using various array sized. See attached sample code for sizes and run for all sizes.

b) Write OpenMP and MPI programs to multiply two double matrix using a single thread and using varying number of threads (OpenMP) and processes (MPI). See attached code samples. Now vary the problem size (demintion of the matrix) to 100x100, 500x500, 1000x1000, 2500x2500 in your problem.

c) Calculate all formulas mentioned in chapter # 2 Section 2.6 textbook # 1 on paper for **each run of the program** along with the draw both type of graphs using Excel (again for each run of the program).

Helpful Videos

- OpenMP https://www.youtube.com/watch?v=f1aVTx5g43o
- MPI https://www.youtube.com/watch?v=c0C9mQaxsD4 , https://www.youtube.com/watch?v=q9OfXis50Rg

Instructions

- Sample code is provided, but it is not necessary to use it unmodified. You are encouraged to modify it to reflect your learning of OpenMP and MPI.
- All code is generated using ChatGPT. Ensure to verify and corrected run it for different input (problem) sizes and document output as directed in in the above questions.
- Viva: You will be asked to modify any code and compile and run the program with varying parameters.
- Handwritten submission shall be done by the CR for the whole class in a marked envelope.
- Snaps submitted to Google classroom (GCR). GCR submission shall be used during viva.

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