CS410: Parallel Computing
Spring 2024

Week1: Administrivia, Motivation for HPC

Instructors and TAs

- Instructors:
  - Milind Chabbi
  - Nikhil Hegde

Course Schedule and LMS

- Class Schedule
  - Mondays: 9:30AM to 10:20AM
  - Wednesdays: 10:30AM to 11:20AM
  - Fridays: 11:30AM to 12:20PM

- Learning Management System (Google Classroom)
  - classroom.google.com
  - Administration of homework assignments, exams, and technical discussion facilitated by Google classroom

Course Assessment

- Programming Assignments, Exams (midsem, endsem), Class Participation
  - two in-semester (40%), one midsem (20%), and one endsem (20%)
  - The assignments can be done in teams of size at most two.
  - Late submission policy:
    - Can have 4 delay slots (1 delay slot = 1 Day, cannot subdivide the slot into hours.). Beyond this, for every delay slot, you will lose 10% of the weight allotted for an assignment (where delay is observed).
    - Cannot take a delay slot for the last assignment (to help with grade submission).
  - Midsem Exam (25%), Endsem Exam (40%)
    - There will be programming-based, take home parts in these exams. Midsem take home (20%) and endsem take home (20%).
  - Class Participation (5%)
    - Google form based MCQ

Programming Assignment Execution

- You will be executing your assignment programs on IIT Dharwad's HPC cluster and GPU servers
  - An account needs to be created first
- Minimal prerequisite software: ssh, scp
  - HPC101 Workshop Materials
    - [GitHub Repo](#)
    - [Youtube link](#)

Grading Criteria

If your numerical score is at least:	Your course grade will be at least:
90	AA
80	AB
70	BB
60	BC
50	CC
45	CD
40	DD

Academic Honesty

- You are allowed to discuss general issues with other students / teams (e.g. programming techniques, clearing up confusion about requirements, etc.).

- You may discuss algorithmic issues on the discussion forum (but do not copy-paste your code!).

- You can borrow code from StackOverflow or elsewhere. However, you must acknowledge the source (e.g. provide full information / website / github repo detail as a header in the file where used.)

- Do NOT borrow code from your peers and change variable names, the order of declaration of variables and program constructs!

Syllabus and Reference Texts

- Syllabus (Broadly):
    - Motivation for High-Performance Computing / Parallel Computing
    - Parallel Computer Architecture Basics (Taxonomy)
    - Parallel Programming Models, Identifying Parallelism in Programs
    - Parallel Program Analysis and Performance Measurement

- Reference Text(s):
    - Course material
    - Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar: Introduction to Parallel Computing, Addison Wesley 2003
    - Eric Aubanel, Elements of Parallel Computing, CRC Press, 2017.

Learning Outcomes

1. Explain basic properties of parallel computer architectures and their connection with the kind of parallel programs that they can execute

2. Analyze a program for parallelism and express the parallelism in the program using a suitable parallel programming model

3. Write parallel programs using different parallel programming models and analyze the performance

4. Explain performance factors of a parallel program