ROASS

Parallel Computing
74.451/74.785

Parallel Computing

- Dr. Parimala Thulasiraman
  557 Machray Hall
- 474-8856
- thulasir@cs.umanitoba.ca

- courses.cs.umanitoba.ca (451)
- www.cs.umanitoba.ca/~cs785

Course Outline

1. **Introduction and overview**
2. **Models of Parallel Computers**
3. **Message Passing Computing and MPI**
4. **Shared Memory Systems and OpenMP**
5. **Introduction to Multithreading**
6. **Interconnection Networks**
7. **Designing Parallel Algorithms**
8. **Performance and Scalability of Parallel Systems**
9. **Theoretical Models of Computation**
10. **Advanced topics: Multithreaded Architectures**

Readings

- Ananth Grama, Vipin Kumar, Anshul Gupta, and George Karypis, An Introduction to Parallel Computing: Design and Analysis of Algorithms, Addison-Wesley, 2003.
- Ian Foster, Design and Building Parallel Programs, Addison Wesley, 1995 (Downloadable).
- Barry Wilkinson and Michael Allen, Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers, Prentice Hall, 1999.

Evaluation

- UnderGraduate
  - **Assignments: 30%**
  - **Midterm: 25%**
  - **Final Examination: 55%**
- Graduate
  - **Assignments: 20%**
  - Paper Presentations: 15%
  - **Midterm: 25%**
  - **Project: 40%**

Important Dates

- Nov. 11, Tuesday: Remembrance day
- Dec. 3: Last day of class
- Midterm: October 23
- Final Exam: Dec. 9, In class

Paper Presentations (2): for graduate students

- Each student will present one paper on either topic 9 or 10.
- Each student will select a paper that applies parallel computing to an application. The paper could be related to the project they are working on or any other paper that shows the relevance of parallel computing for an application. For example, the student could pick an area such as computational biology and specifically select a paper that designs and implements a parallel algorithm for protein folding.

Projects (Graduate Students)

- *Project Selection*: In early October the graduate students will be required to submit a proposal on their topic of interest.
  - I will individually discuss the goal, especially on the feasibility of methodology described in the proposal.
  - Depending on the problem, you can select to implement the algorithm either using MPI or OpenMP. MPI and OpenMP will be introduced at the beginning of the term.
- *Proposal presentation*: They will be required to give a brief presentation on their proposal in class. **(5 minutes)**
- *Project work*: You will be w orking on your projects individually.
- *Deliverables*: You will present your work at the end of the term (in-class, may be with in couple of weeks of the official end of cla sses) and hand in a report.

Proposal Write-Up

- Problem Statement
- Challenges
- Approaches
- Expected Results

Project Report

- Title Page
- Introduction
- Problem Statement
- Literature review
- Proposed Solution(approach)
- Results and Discussions
- Possible Extensions
- Conclusions
- References
- Appendix(Code)

Grader/TA

- Mr. Towhid Islam
- Grader