COSC 462 - 2020
Parallel Programming
George Bosilca and Piotr Luszczek
TA: ?
All you need to know about ...

- [http://icl.cs.utk.edu/classes/cosc462](http://icl.cs.utk.edu/classes/cosc462)
- Prerequisite [CS360: System Programming](http://icl.cs.utk.edu/classes/cosc462)
- C/C++, make, python/gnuplot/R

George Bosilca  
Claxton 308

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Claxton 218
Grading

• Exam(s) = 35% (cumulative)
• Homework = 40%
• Project = 25%

Exams

• 1 midterms and 1 final
• Grading
  • On paper, multiple choice
  • Some questions will require a more detailed answer
Grading

• Exam(s) = 35% (cumulative)
• Homework = 40%
• Project = 25%

Homework

• [Weekly] programming projects
  • 4-8 extra hours of work
  • Based on lectures
  • Incremental additions over the duration of the class

• Grading
  • Correctness
    • Of the result
    • Of the principle of the homework
  • Performance
    • Required for most homework
    • Except when clearly specified
<table>
<thead>
<tr>
<th>Grading</th>
<th>Project</th>
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<tbody>
<tr>
<td>• Exam(s) = 35% (cumulative)</td>
<td>• Teamwork encouraged (max 3)</td>
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<tr>
<td>• Homework = 40%</td>
<td>• Mostly topics in parallel computing not covered in class</td>
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<tr>
<td>• Project = 25%</td>
<td>• The list on the class website will be updated before the project start</td>
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<td>• One team per subject</td>
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<td>• First come / First serve</td>
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<td>• Return 5 minutes video max</td>
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<td>• Youtube, Vimeo, * with public visibility</td>
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<tr>
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<td>• Slides / Animations / Narration / Links</td>
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Textbooks

• Generic
  • *Parallel Programming in C with MPI and OpenMP*, by Michael J. Quinn
  • *An introduction to Parallel Programming*, by Peter S. Pacheco

• Specialized
  • *Using MPI, Third Edition*, by William Gropp, Ewing Lusk and Anthony Skjellum
  • *Using Advanced MPI Modern Features of the Message-Passing Interface*, by William Gropp, Torsten Hoefler, Rajeev Thakur and Ewing Lusk

• Online documents **MPI 3.1**, **OpenSHMEM**.

• Don’t hesitate to use your preferred search engine to find more information and/or examples
Homework

• Github classroom and github
• The homework will have a repo (https://github.com/COSC462-UTK/hw20) that you will fork (via the github interface or command-line tools)
  • Once a new homework has been added you will update your fork
  • git remote add XXX master
  • git pull
• Each homework will be developed in a branch with a well-defined name (hw#) (not capitals)
  • Regularly, if you create a PR on your own fork, a bot will pull the PR and test it for you on a cluster (both for correctness and performance)
    • You will be notified via email of the outcome
  • Upon deadline I will pull the branch, test it and add a file with comments and grades
  • You will be free to merge the branch in your fork (or not)
  • Most of the work is not teamwork !!!
    • We expect each one of you to keep these repo private (unless otherwise specified)
    • You will need to grant me read access to your repo (for my bot).
• Each homework will generate a library
• Automatic testing is WIP
What you will learn

• Why parallelism is important
• How to expose the parallelism available on an algorithm
• How to evaluate your algorithm scalability
• How to use parallel and distributed programming paradigms to reach your goals
  • POSIX threads, OpenMP
  • MPI, OpenSHMEM
  • CUDA
  • MPI+X