CAAM 420/520: Computational Science II

Better name: Parallel Computing

Instructor: Christina Taylor

CAAM 420/520:
Course and Syllabus Overview

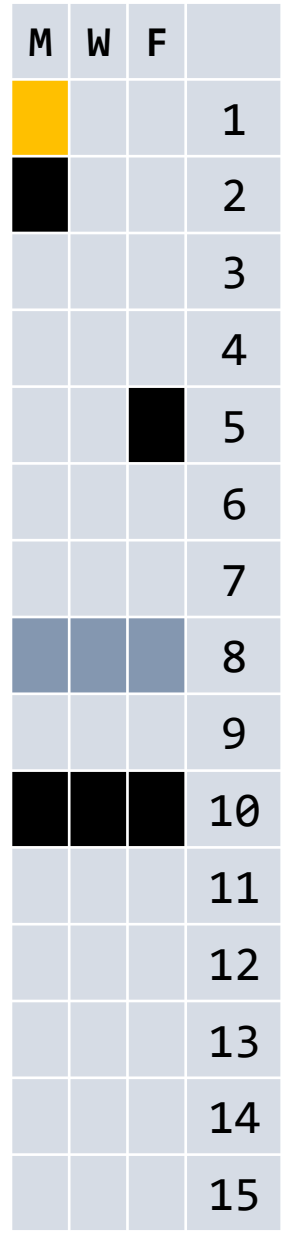
Section: Pre-Parallelism

Date: 1/9/2023

M: Course and Syllabus Overview

W: Programming in C/C++

F: Compiling and Running C/C++ Code



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Course Goal #1:

" Promote and expose students to professional standards in computing and communication. "

- Code will be graded for correctness *and style*
- Collaboration must be cited
- If there are issues with your code, communicate it!

Why Coding Standards?

- Coding standards/style guides are common in industry
- They help ensure readability and thus maintainability of code
- Academia typically does not use coding standards…

Collaboration

From the syllabus:

> "**Students are encouraged to work together on code** save pledged problems. Reports and comprehension checks must be individual efforts. To promote ethical attribution **students are required to list individuals with whom they collaborated on their code**, including collaborators outside the class."

- In other words, cite who you work with
- Reports, pledged problems, and comprehension checks are solo efforts
- Anything else will be considered cheating/plagiarism

Communication

- **There are penalties for code that does not compile, hangs, or crashes** (see the syllabus/coding standards)
- **These penalties are high** (10-20%)
  - Code efficiency and style are more heavily weighted than correctness
- **BUT these penalties will be halved** if you communicate that your code has one of these issues when you turn your code in
  - You can get bonus points if you describe the problem well

Office Hours

- **Tentatively 2-3pm W/F**
- **Location: Duncan Hall 3016**
  - Go up the staircase at the end of the hall and hang a left; my office is around the corner
- There will be a survey at the end of class to make sure everyone is able to attend office hours
- If you ever need extra help outside of office hours, feel free to email me

Course Goal #2 and #3:

“Equip students to understand the benefits, limitations, and complications of parallel computing.”

“Provide students a working knowledge of OpenMP, MPI, and CUDA in C++ and the ability to quantitatively evaluate their code’s performance.”

Course Overview

The course will be split into 4 sections:

- **Pre-parallelism**
- **Non-communicating parallelism**
- **Communicating parallelism**
- **Multi-node parallelism**

There are no required textbooks, we will use Canvas and Git

Tools We Will Use

The course will be split into 4 sections:

- **Pre-parallelism:** C flavored C++
- **Non-communicating parallelism:** OpenMP
- **Communicating parallelism:** MPI
- **Multi-node parallelism:** MPI, CUDA

What Will Coursework Look Like?

- There will be no exams
- There will (tentatively) be 8 homeworks
  - 420 vs 520 Homeworks will be slightly different
  - Homeworks may contain pledged problems
  - Some homeworks will be worth more than others
  - **520:** Homeworks constitute your entire grade
  - **420:** Homeworks will constitute either 90% or 95% of your grade
- There will also be comprehension checks and 3 surveys

Comprehension Checks?

Comprehension checks will be used to help control the pace of the course

- If you are struggling, chances are other people are too
- The checks are meant to bring such issues to my attention so they can be addressed
- 420: Comprehension checks make up the remaining 5-10% of your grade
  - The actual score you get on a comprehension check does not affect your grade
  - Points for comprehension checks are for **completing them**
  - 520 students are also encouraged to take the comprehension checks, but they are not required to do so

Course Feedback

In addition to comprehension checks, we will have 3 surveys where you can give feedback on the course

- These surveys are approximately 1 month apart (the first will be 2/8)
- There is one before the drop date, the pass-fail deadline, and the end of the course
- If you wish things were different in the course, these surveys are you chance to provide feedback
  - You are always welcome to give feedback to me directly throughout the course

Late Homeworks and Extensions

You have up to 3 free homework extensions!

- You must request an extension by the due date of a homework
- You do not need to provide a reason to use these extensions

You can use at most 5 business days between all of your extensions

- Example: if you use 5 days for the first, the other two are voided
- Example: if you use 1 day on the first two, you have 3 days left for the third

Late Homeworks and Extensions

- **In the case of an emergency or excused absence,** you do not need to use your free extensions.
  - Let me know as soon as possible and we will work out a new due date.
- **No other extensions will be given**
- **Late homeworks will be docked 10%**
- **Regrades:** request must be made within 1 week of receiving your grade. Request after the deadline will not be accepted save for class-wide errors.

Some Guarantees: Consistency

Everyone should be able to get an A+/Pass

- Grades should reflect your mastery of the course material, not my feelings towards you/your performance or your standing in the class.
- Grades and +/- distinctions will be based on the given scale
- Pass/Fail: Pass is 100-70

	+		-
A	100-97	96-94	93-90
B	89-87	86-84	83-80
C	79-77	76-74	73-70
D	69-67	66-64	63-60
F		59-0	

Some Guarantees: Transparency

Grading curves will be applied transparently

- I do not intend on using a curve
- If a curve is deemed appropriate, you will be told:
  - How the curve was calculated
  - Basic course statistics before and after the curve

Time Commitment

- **Homeworks:** 4-6hrs
  - Most homeworks will be around 4hrs
    - There will likely be one or two big homeworks that hits 6hrs
  - You will have at least 1 week for every homework
  - If you find yourself exceeding 5hrs, please consider asking for help
- **Comprehension checks:** 5-10min
  - We will likely do these at the end of some classes

Absences

- Covid is still among us
  - So is the flu and everything else
- If you are sick or cannot attend class due to an emergency, you can request a recording
  - In general, lectures will not be recorded
  - The recording will go to the absent students only
  - Please do not share (without permission) the recordings for privacy's sake
  - Requests must be made by 9am the day of the lecture
- **Otherwise:** lecture slides will always be posted to Canvas after class

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Class Participation

- We will sometimes use in-class activities using “warm-calling”
  - In warm-calling, we will put everyone present into a list
  - People will take turns answering questions using the ordering on the list
  - You always have the option to get help answering
- Pros and cons:
  - Pros: You know when your turn is so you can prepare
  - Pros: Everyone gets a chance to participate
  - Cons: public speaking can be hard no matter what

Entrance Survey

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Questions?