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Parallel Programming
Course Introduction

Oregon State University

Mike Bailey

mjb@cs.oregonstate.edu

course.introduction.pptx
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What this Course Is

This course is all about parallel programming on the **desktop** and in a distributed environment (e.g., cluster) for applications that you are attempting to accelerate to improve user interaction and simulation and computational performance

The goals of this course are to leave you **"career-ready"** (i.e., both work-ready and research-ready) for tasks that require desktop parallelism, both on a CPU and a GPU. CS 475/575 topics include:

• Parallel computing: types, limitations
• Moore's Law, Amdahl's Law
• OpenMP
• Synchronization issues in parallel computing
• Cache issues in parallel computing
• SIMD
• GPU computing
• CUDA
• OpenCL
• MPI

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Class Resources Page

Go here to find our Class Resources Page:

http://cs.oregonstate.edu/~mjb/cs575

Everything, everything, everything that you need for this class is in there somewhere (except the Canvas quizzes and tests).

I will break things out by weeks for Canvas, but each week's Canvas information will be a subset of what is on the Resources Page.

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A Special Welcome to Ecampusers!

A special welcome to all you Ecampusers!

Be assured that you will experience the exact same course that on-campus students experience. Same material, same notes, same projects, same quizzes, same tests, and same online Office Hours.

There are recorded videos that go along with the notes (they are called "LV" for "Lecture Videos" and you will see them in the same table that has links to the notes).

Like I do whenever I have Ecampus students, I will setup a time every week to do a Live Lecture so that you also can hear a discussion of the topics with the chance to ask live questions. These Live Lectures will be recorded so that if you miss them, you can catch them later. You can also ask questions in the Zoom Chat during the Live Lectures, and I will answer them in a document that I will post in the same place I post the recorded LL videos.

My Zoom-room is:
https://oregonstate.zoom.us/j/8340727662?pwd=b01tZ0hJUzdHNUtrdTRqSkdwbG4zdz09

On-campus Parallelers are welcome to come the LLs as well. Everyone learns differently, so all of you are welcome to take advantage of *any* of the class resources that help you learn!

Thanks, Ecampusers, for being here!

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Instructor

This course is being taught by:

Professor Mike Bailey
OSU Computer Science
2117 Kelley Engineering Center
mjb@cs.oregonstate.edu
541-737-2542

Welcome! I'm happy to be here. I hope you are too !

Prof. Bailey has had over 30 years experience in the computer graphics and high performance computing worlds. He has taught over 100 university classes to a total of over 10,000 university students. He has also taught over 100 professional short courses around the world.

In his spare time, he … oh, wait, there is none. Well, that's not quite true. In the spare time, he likes to dabble in K-12 outreach, particularly where he can apply computer graphics to it. Does that count as "spare time" or "more work"? ☺

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Office Hours and Other Help

Sadly, I am a compulsive email checker. That is the best way to reach me. However, I am not necessarily a compulsive email-*returner*. I prioritize my email returns. Please do not email me over small things that you really can either look up or figure out for yourself (like "When is the assignment due?"). Those emails get low priority. The really serious concept email questions get high priority.

I am a compulsive telephone ignorer. That is not a good way to reach me consistently. I will return messages, but it might take a while. Email is better. This is not meant to be a disrespectful thing. It's just that I am in and out of my office a lot, and when I am in, there are usually students in there with me.

I will hold Office Hours over the Internet on Zoom. I have my own "Zoom-Room". Its URL is:

https://oregonstate.zoom.us/j/8340727662?pwd=b01tZ0hJUzdHNUtrdTRqSkdwbG4zdz09

If it asks for a passcode, use: ZeldaDog

It's only available when I am there to "open it up" (not unlike a real room). To use this, you will need a microphone and speakers. I recommend a headset. They pickup less background noise than a microphone does, and it gives you better sound than a speaker does. There are some nice ones on Amazon because of the popularity of gaming headsets. Just be sure to get one that is compatible with a plug on your computer.

I would love it if you also have a webcam, because then I can see you and get to know you and your pets a little better. However, this is optional. And, because I often do these Office Hours from home, I sometimes get a little "help" from the following characters …
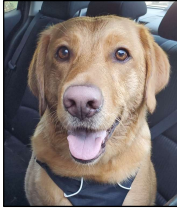
… Some Other Characters You Might "Meet"

Curie

Curie is a two-year-old Corgi. She is young and is still trying to figure out her place in the world (not unlike most of us…). When I work from home, she likes to take naps on my feet.

Zelda

Zelda is a 5-year-old Yellow Lab/Golden Retriever mix with bundles of energy Her "puppy dog eyes" get her lots of snack food.

If you don't *see* them during my home office hours, you will most certainly *hear* them.

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Class Textbook

There is no textbook for this class. The course material will consist of handouts and notes taken while watching the videos. There is nothing to pay money for. This is all free.

If you need further reference material, there are a bunch of links at the end of the Class Resources site. You're not required to go look at any of these. They are just some links that I have found useful. They are there if you need them.

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What You Should Know on the Way In:
the Course Incoming Expectations

We will use **C/C++** for this class. Above all, it would help if you are already a decent C programmer. Being comfortable with function calls, arrays, for-loops, structures, arrays of structures, structures of arrays, pointers, and linked lists is good. Coming in knowing Python will work, but will be challenging at first. It is strongly suggested that you not use this class as an opportunity to learn programming for the first time.

On the math side. You should know algebra. There will be times when we have an equation that solves for "Y given X" and I will ask, "What if we already know Y, how can we then go back and find X?". It would be good if you can do that. It is strongly suggested that you not use CS 475/575 as an opportunity to learn algebra for the first time.

Many of the assignments can be done on Linux systems, which you will have ready-access to via the OSU College of Engineering machines, such as *flip*. It would be good if you already know how to use the Linux command line and know at least one Linux-based editor (*vim* is good). It will help if you know the Linux commands:
ls, *mv*, *cp*, *mkdir*, *cd*, *pwd*, *rm*, *gcc/g++*, and diversion to a file (">").

This class does a lot of graphing of performance data. You will need access to a program that will let you enter data into a 2D table and graph it (Excel is good, but there are others). You will need to be able to copy-and-paste those tables and graphs into a word processing document, add your own text around them, and then produce a PDF file from it.

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