

COMPUTATIONAL MATH, SCIENCE AND ENGINEERING DEPARTMENT

MICHIGAN STATE UNIVERSITY

Me

## CMSE 822, Parallel Processing

### Let's get started

CMSE 822, FS21, W.F. Punch

COMPUTATIONAL MATH, SCIENCE AND ENGINEERING DEPARTMENT

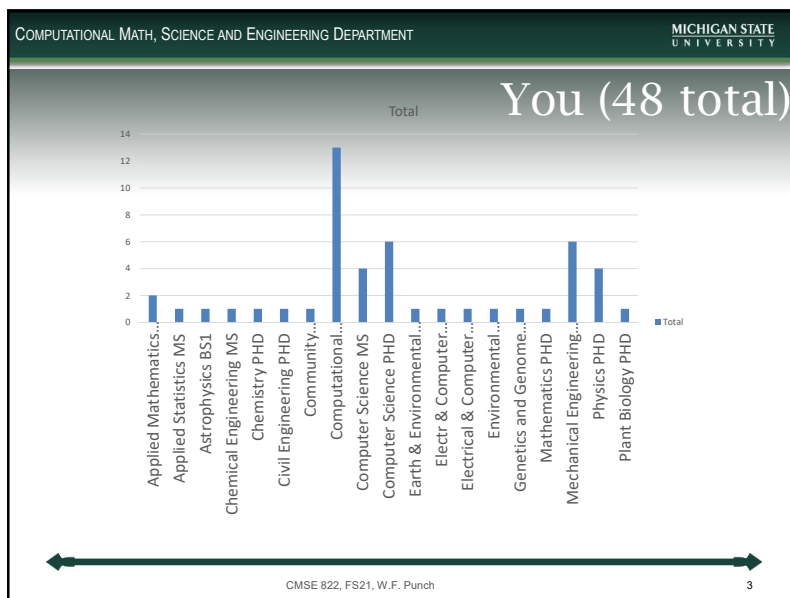
MICHIGAN STATE UNIVERSITY

## Me

### Bill Punch:

- grad of THE Ohio State University
- ugrad BioChem/Chem
- Area is AI, Evolutionary Computation
- CMSE Grad Director
- Associate Director, HPCC
- Associate Prof, CMSE (long time CSE faculty as well)

CMSE 822, FS21, W.F. Punch



COMPUTATIONAL MATH, SCIENCE AND ENGINEERING DEPARTMENT

MICHIGAN STATE UNIVERSITY

## Covid

### Let's get this out of the way:

- At this moment, we are in-person
  - masks required in-doors
  - vaccines up to a certain level
  - fill out the form (see the Syllabus)
- We are going to follow the rules of the university going forward
  - if you need an exemption, there's a form
    - see the Syllabus


CMSE 822, FS21, W.F. Punch

COMPUTATIONAL MATH, SCIENCE AND ENGINEERING DEPARTMENT MICHIGAN STATE UNIVERSITY

## What if we have to Pivot

Let's continue in an honest tone. I believe there is a 50/50 chance that we will have to pivot sometime during the semester.

Class is setup to make that straight-forward. We can do it if we have to. We'll cross the bridge when we come to it.




CMSE 822, FS21, W.F. Punch 5

COMPUTATIONAL MATH, SCIENCE AND ENGINEERING DEPARTMENT MICHIGAN STATE UNIVERSITY

## Syllabus

Let's take a look




CMSE 822, FS21, W.F. Punch 6

COMPUTATIONAL MATH, SCIENCE AND ENGINEERING DEPARTMENT MICHIGAN STATE UNIVERSITY

## D2L for handin

- I know that other CMSE classes like to use git, and I think it's a great tool, but it is a tool with a purpose
- Git is good for multiple people doing development work in concert
- Git is not a CMS/handin system




CMSE 822, FS21, W.F. Punch 7

COMPUTATIONAL MATH, SCIENCE AND ENGINEERING DEPARTMENT MICHIGAN STATE UNIVERSITY

## Why are we here?

There are a couple of reasons to want to study parallel processing:

- theory
- CS hardware software
- go fast!



CMSE 822, FS21, W.F. Punch 8

## Going fast

We want to walk a fine line between all the CS level stuff and the practical stuff that can help you solve problems.

We have to do a little of both

CMSE 822, FS21, W.F. Punch

9

## Why do I need all these details?



CMSE 822, FS21, W.F. Punch

10

## Honda Civic



CMSE 822, FS21, W.F. Punch

11

## Ariel Atom

For traversing a Formula 1 type course the Atom is one of the fastest commercial cars available.

Wicked fast. And reasonably priced (starting at \$80K).

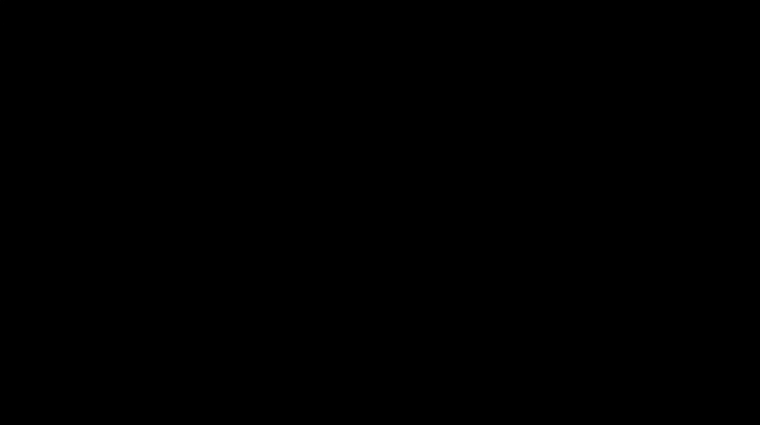
<https://www.arielna.com/arielatom>

CMSE 822, FS21, W.F. Punch

12

COMPUTATIONAL MATH, SCIENCE AND ENGINEERING DEPARTMENT MICHIGAN STATE UNIVERSITY

<https://www.youtube.com/watch?v=mbsYPXAJhxU>




COMPUTATIONAL MATH, SCIENCE AND ENGINEERING DEPARTMENT MICHIGAN STATE UNIVERSITY

## We look at details to go fast

To build a fast car, reasonably priced, you find the essence of what makes a good car and build that.

To build a fast program/parallel program, you have to understand how the program runs.



CMSE 822, FS21, W.F. Punch 14


COMPUTATIONAL MATH, SCIENCE AND ENGINEERING DEPARTMENT MICHIGAN STATE UNIVERSITY

## C++

There are lots of languages out there, why work with C++?

"Because you're a C++ programmer, there's an above-average chance you're a performance freak. If you're not, you're probably sympathetic to their point of view (If you're not at all interested in performance, shouldn't you be in the Python room down the hall?)"

Effective Modern C++, Scott Meyers




CMSE 822, FS21, W.F. Punch 15

COMPUTATIONAL MATH, SCIENCE AND ENGINEERING DEPARTMENT MICHIGAN STATE UNIVERSITY

## C++, fast and modern

- C/C++ is the standard by which the speed of most programming languages is gauged ("nearly as fast as C/C++")
- C++ is a modern, developing language (4 major updates since 2011)
- Most performance toolkits use C/C++



CMSE 822, FS21, W.F. Punch 16

## C++, but not too much

Like hardware, C++ is useful but our job is not to become C++ wizards. I want to hit a few high spots that I think will be helpful, but a full language tour would take a full semester and that is not us.



## Do the survey

As long as we are in person we will do programming and other exercises in small groups.

I'll form the groups, based on experience.

Do the survey!

