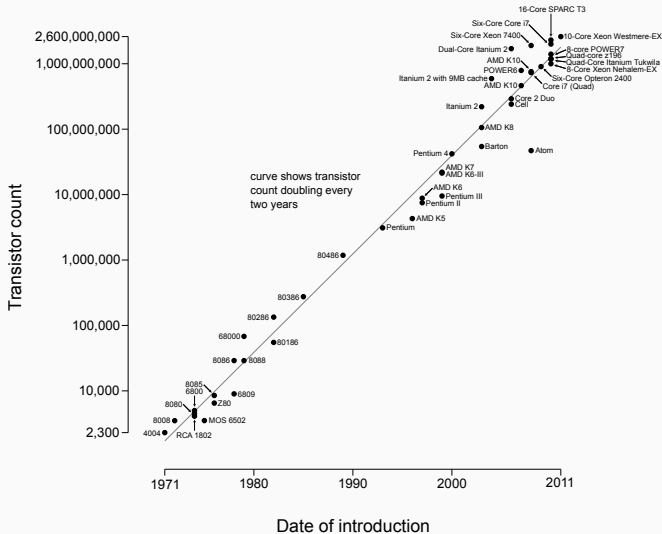# Introduction to Parallel Computing

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how is speed measured?

- Hertz

course objectives

- understand common parallel architectures
- design and analyze parallel algorithms
- write efficient parallel programs

course content

- parallel architectures
- C programming
- Pthreads
- OpenMP
- MPI
- performance analysis
- parallel algorithm design
- collective communication operations
- matrix algorithms
- sorting algorithms
- graph algorithms

assignments

- four (4) assignments (serial, Pthreads/OpenMP, MPI, ???)
    - all assignments are to be written in C or C++
- do your own work
- use each other as resources only
- due dates are strict (no partial credit for late assignments)

exams

- two (2) in-class exams (closed book / note)
- one (1) in-class final exam (closed book / open note) [cumulative]

grading

- point distribution
  - assignments: 12.5% each (??%total)
  - exams: 15% each
  - final: 20%

scholastic conduct

- Work must be completed in a manner consistent with the College of Saint Benedict's & Saint John's University's codes for academic honesty (read that here → Academic Catalog → Academic Policies and Regulations → Rights and Responsibilities).
- Copying another's work, allowing (even negligently) others to copy your work, relying heavily on information that you found on the web, is cheating and grounds for penalties in accordance with the institutional policies.
- There will be an absolutely zero tolerance policy. Any copying issues that will arise will be automatically reported to the institution.

office hours

- stop by anytime
- my calendar

teaching philosophy

Your job is to empower those you teach; when you do for them what they should be doing for themselves, you create dependency rather than empowerment.

It is easy to give in to the frustration that results from seeing amazing possibilities for the people you are teaching, and you want it more for them than they want it for themselves.

Don't give in to that frustration!

- Based on passage from "Resisting Happiness" by Matthew Kelly

expectations

- prepare for class (do the reading!)
- participate in class
- be respectful

serial algorithms

- some algorithms that will be relevant to this course:
  - finding min/max values in array
  - matrix-vector and matrix-matrix multiplication
  - Gaussian elimination
  - depth-first, breadth-first, and best-first traversals
  - minimum spanning tree
  - single source shortest path
  - quicksort, radix sort, bucket sort, counting sort, sample sort
  - A* and IDA* heuristic search

questions?

notecards

- given name
- preferred name and pronunciation
- anything you would like me to know about you
- at least one of the following:
    - reason for taking the class
    - what you are hoping to learn from the class

activity

- stand up
- think of the number 1
- repeat while there is at least one other person standing
    - find another (just one) person standing
    - whoever is thinking of a higher number, adds the other persons number to theirs
    - whoever is thinking of a lower number, sits down
    - in the event of a tie, the taller of the two people sits down