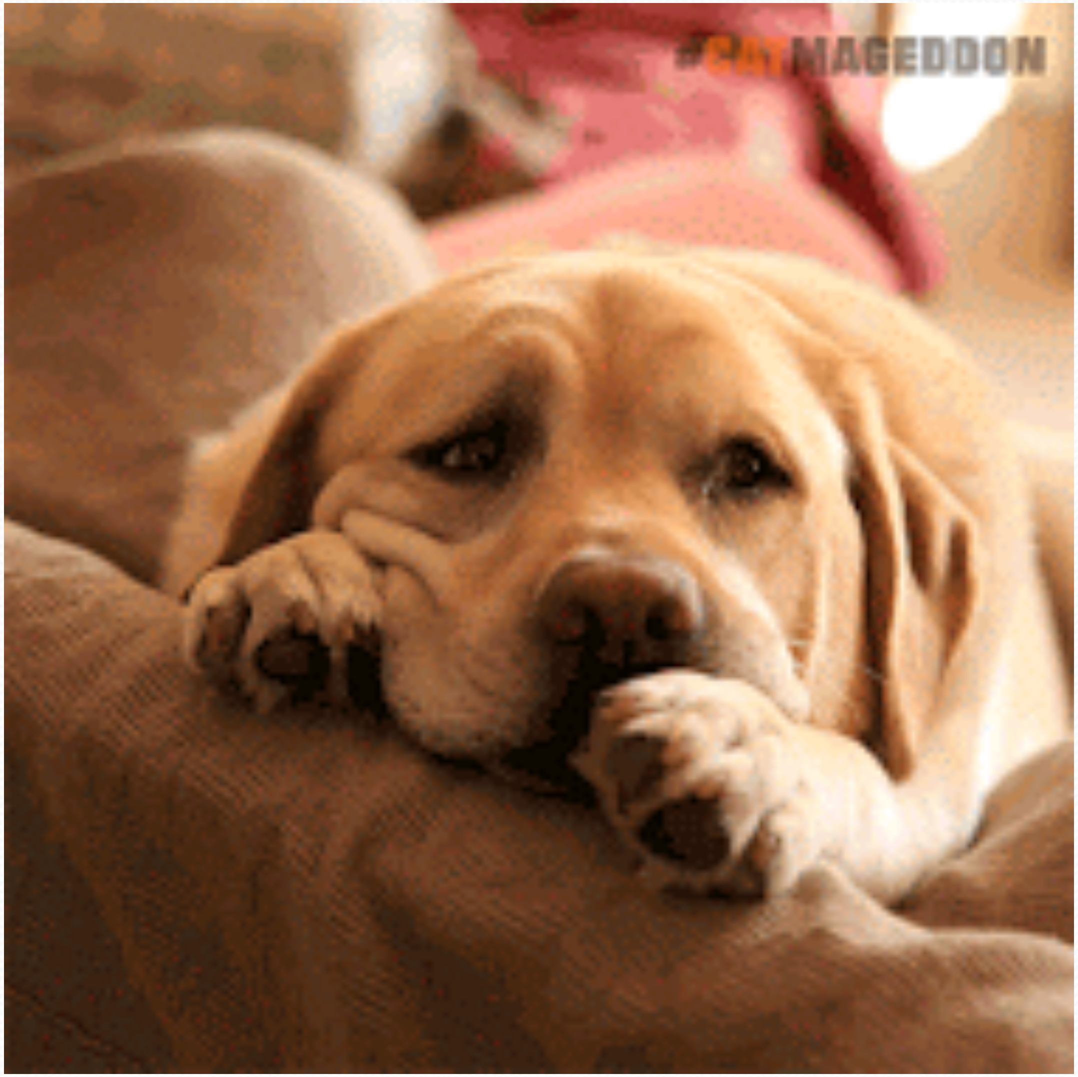

#CATMAGEDDON

m-istica

CSE 142 vs CSE 143

CSE 142

- You learned how to write programs and decompose large problems with:
  - Print statements
  - Methods
  - Control Structures
    - loops, if/else
  - File I/O
  - Arrays
  - Objects

CSE 143

- You learned to solve more complex tasks efficiently
  - Data structures to organize and model data
  - Algorithms for solving common tasks
  - More advanced language features
- Abstractions are important!

Road Map

CS Concepts

- Client/Implementer
- Efficiency
- Recursion
- Regular Expressions
- Grammars
- Searching / Sorting
- Backtracking
- Hashing
- Huffman Compression

Java Language

- Exceptions
- Interfaces
- References
- Comparable
- Generics
- Inheritance / Polymorphism
- Abstract Classes

Data Structures

- Lists
- Stacks
- Queues
- Sets
- Maps
- Priority Queues

Java Collections

- Arrays
- ArrayList 🛠
- LinkedList 🛠
- Stack
- TreeSet / TreeMap 🛠
- HashSet / HashMap 🛠
- PriorityQueue

Major themes

- Abstraction
  - Leverage existing components without understanding details
  - Create components that can be used as black boxes

- Design tradeoffs
  - Algorithm analysis - scalability and growth
  - Keeping code easy to read for maintainability

- Recursion
  - Reason about problems in terms of self-similarity
  - Write very short code to achieve complex behaviors

- Art – "A programmer who subconsciously views [themselves] as an artist will enjoy what [they do] and will do it better." (Knuth)

What project?

- Little text-processing applications
  - identify lines above 100
  - remove line-breaks
- Add a GUI to the random sentence generator
- Automate chemistry, physics, calculus problems, etc
- Find quotes by keyword in books
- What are you currently doing that a computer could do?
- List of some project ideas

What language?

- Expanding your Java knowledge with a project is valuable

- Pick a project, see what language is most appropriate
  - iOS: Swift
  - Android: Java
  - Client-side web: Javascript (many frameworks to choose from)
  - Beautiful visuals: Processing
  - Data Processing: Python
  - Data Management: SQL
  - Embedded systems: C / C++

- Learn a new paradigm
  - Functional languages: Racket, SML, Scala, (now, Java 8!)

Leveraging existing code

- Processing language
  - http://nlp.stanford.edu/software/
- Building games
  - http://lwjgl.org/
  - http://jbox2d.org/ (with physics!)
- Processing biological data
  - http://biojava.org/wiki/Main_Page
- Accessing Facebook data
  - http://restfb.com/
- Making music
  - http://www.jfugue.org/

Courses?

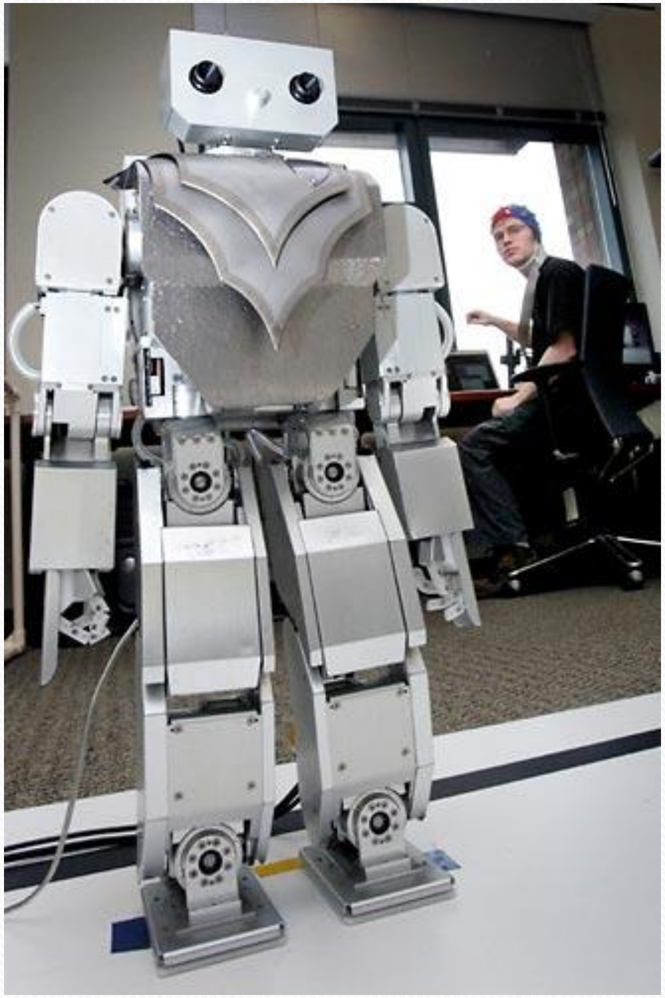
- CSE non-majors
  - CSE 154: Web Programming
  - CSE 373: Data Structures and Algorithms
  - CSE 374: Programming Concepts and Tools (C/C++, Linux, ...)
  - CSE 131: Digital Photography
  - CSE 460: Animation Capstone (open to all majors)

- CSE majors
  - CSE 311: (Mathematical) Foundations of Computing
  - CSE 332: Data Abstractions (Data Structures and Algorithms)
  - CSE 331: Software Design and Implementation
  - CSE 341: Programming Languages
  - CSE 344: Intro to Data Management (and databases)
  - CSE 351: Hardware/Software Interface
  - CSE 427: Computational Biology

- INFO, AMATH, HCDE, DXARTS, ...

Beyond programming

- Mind-controlled robots
  - http://www.youtube.com/watch?v=TQ7EOpPNQyw
- Muscle-controlled interfaces
  - http://www.youtube.com/watch?v=pktVSTwC8qo
- 3D models from pictures
  - http://www.youtube.com/watch?v=25Yifg70eIY
- Face aging
  - http://www.youtube.com/watch?v=fLOtssJDMMc
- Animation
  - http://www.youtube.com/watch?v=b4kkPlLdMyI
- Security
  - http://www.pbs.org/wgbh/nova/tech/tadayoshi-kohno.html
- Lip syncing Obama

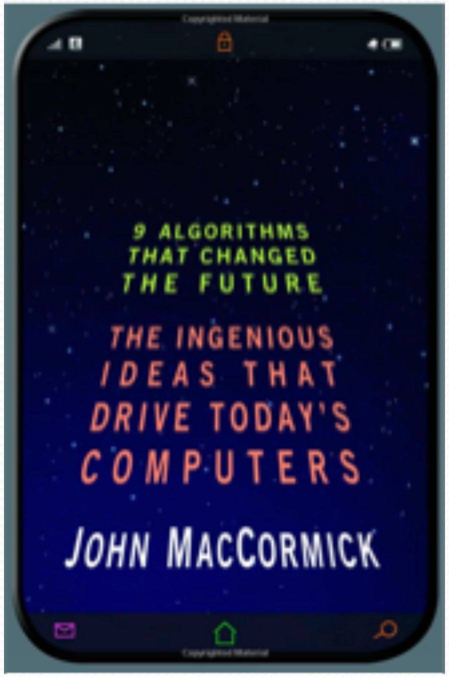


Weekly meetings

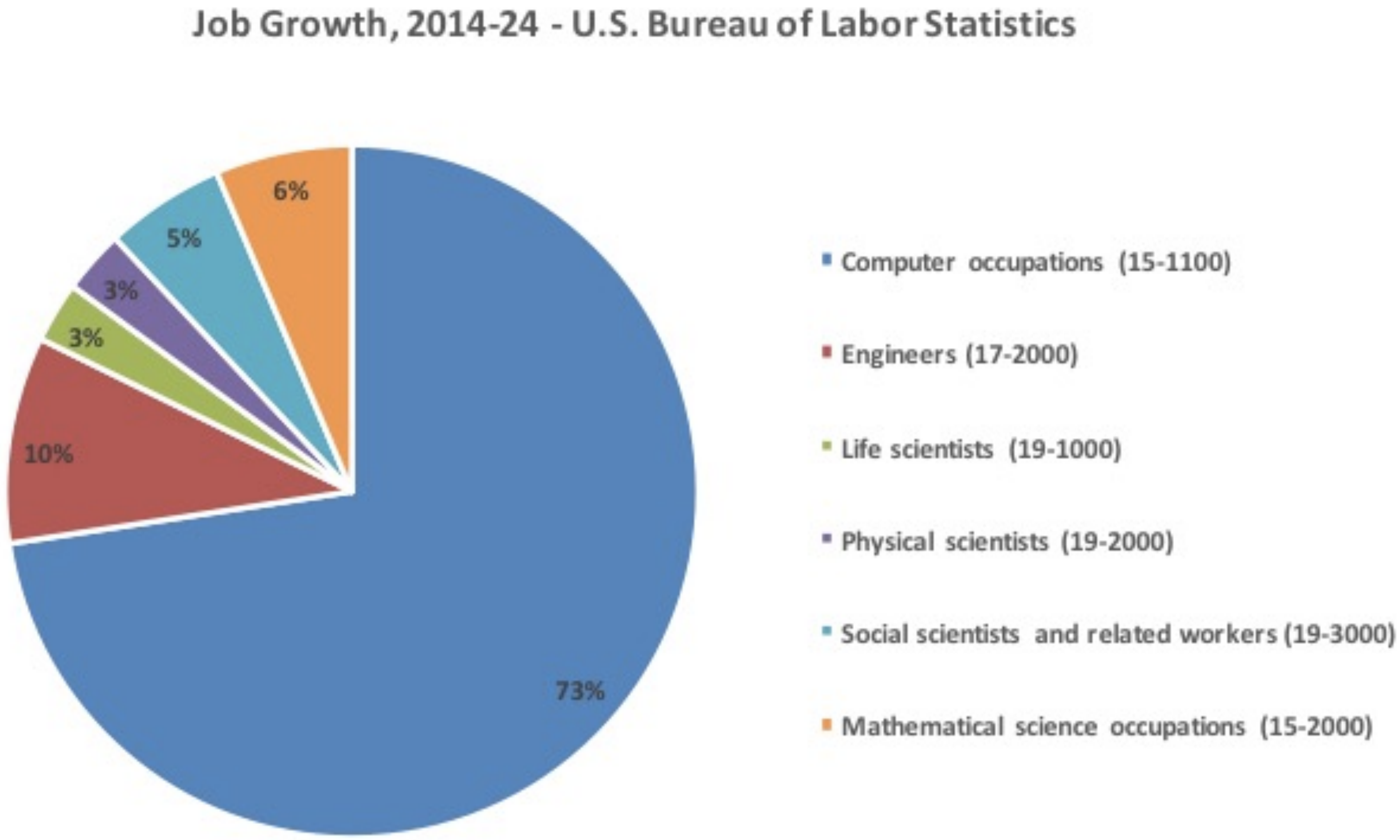
- Change – technologies for low-income regions
  - http://change.washington.edu/

- Dub – human-computer interaction and design
  - http://dub.washington.edu/

Computer Science Books


9 ALGORITHMS THAT CHANGED THE FUTURE
THE INGENIOUS IDEAS THAT DRIVE TODAY'S COMPUTERS
JOHN MACCORMICK

Computing & Jobs


Job Growth, 2014-24 - U.S. Bureau of Labor Statistics

Data from the spreadsheet at http://www.bls.gov/emp/ind-occ-matrix/occupation.xlsx

Internships

- Various career fairs around campus.
- Start looking early!
- Cast a broad net and interview lots of places
- For those just starting out
  - Microsoft Explorer Program –
  - Google Engineering Practicum -

Roles in Industry

- Software Developer/Software Engineer
  - Builds and designs software
  - Includes designing and engineering architecture of a software system as well as programming
- Product Manager (PM)
  - Designs and makes decisions regarding the overall product
  - Works with people across disciplines at the company
  - Role can be different at different companies
- Test/QA
  - Write and design tests of the product
- Site Reliability Engineer (SRE)
  - Responsible for ensuring that systems and services are available and responsive

Small vs Big Company?

- Small Company
  - Lots of autonomy and impact within the company
  - Often move quickly
  - Breadth – get to work on many projects and with many types of people

- Large company
  - Large data sets, impact many users
  - Lots of support and infrastructure to do your job well
  - Depth – get to focus on specific areas of a project

What Do I Do?

- I’m a graduate student at the Paul G Allen School for Computer Science. Topics in CS that interest me:
  - Programming languages & Compilers
  - Data Visualization
- Where I have interned
  - Microsoft
    - Job: Explore program – PM and software developer
    - Android application
  - Square
    - Job: Developer on the Billing team
    - Improved internal APIs for other teams to use
    - Language: mostly Ruby
  - Facebook
    - Job: Web developer on the Messenger team
    - Languages: React (Facebook’s version of JavaScript), PHP

Questions?