CompSci 101
Introduction to Computer Science

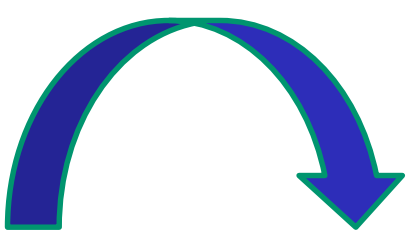
www.cs.duke.edu/courses/fall16/compsci101

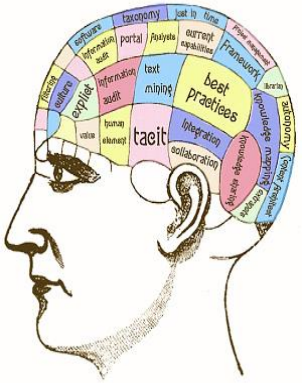
August 30, 2016

Prof. Rodger

CompSci 101
Data into Information and Knowledge

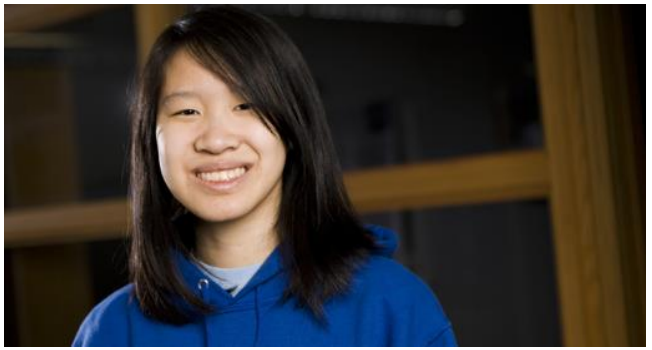
Computer Science





Prerequisites for Compsci 101

Who has taken CompSci 101?

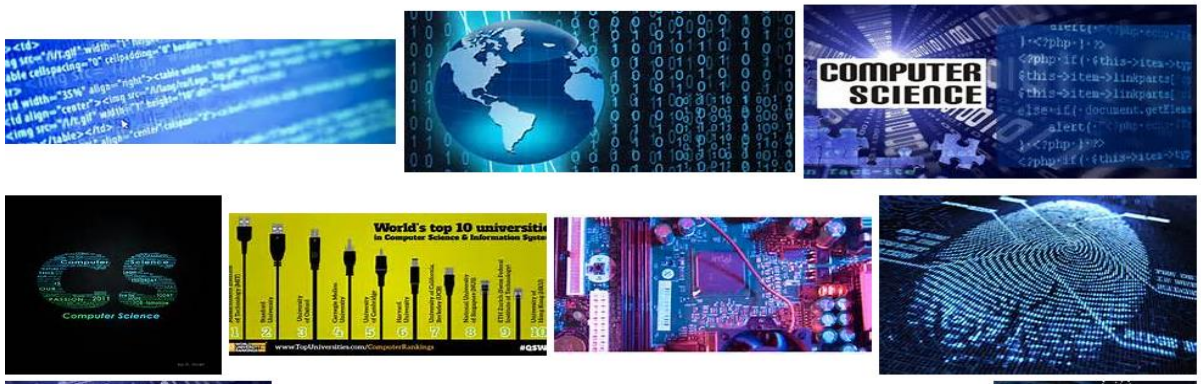


What is Computer Science?

http://bit.ly/101f16-0830-1

Just ask Siri (or Bing?)

http://www.bing.com/images/search?q=computer+science&go=Submit&qs=n&form=QBIR&pq=computer+science&sc=8-16&sp=-1&sk=



Anatomy of a search query

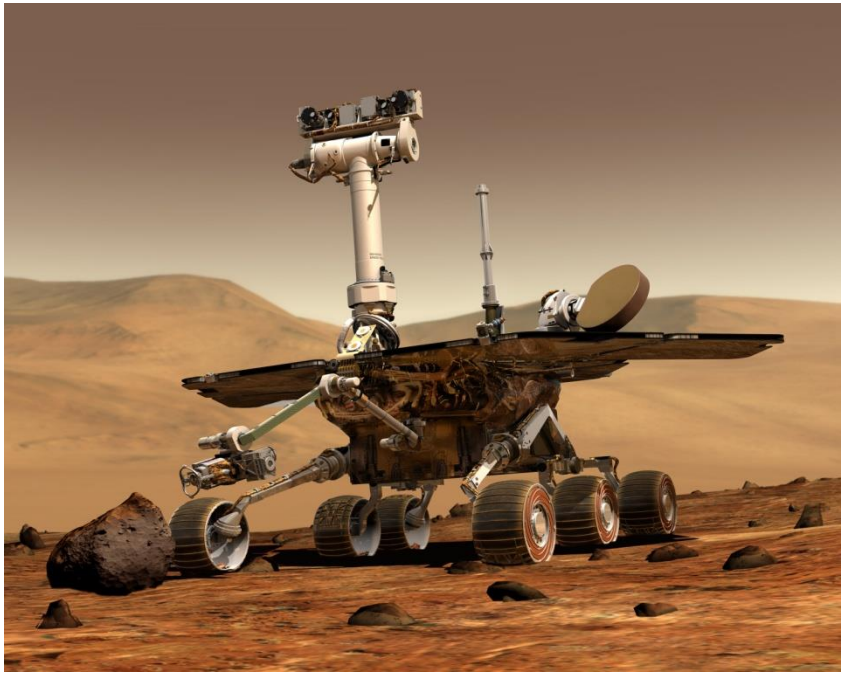
https://www.google.com/search?q=what+is+computer+science&espv=2&source=lnms&tbm=isch&sa=X&ei=Ib77U_O9CtDhsAT07YDABA&sqi=2&ved=0CAcQ_AUoAg&biw=1293&bih=861

- What are the parameters to the query?
  - What changes, what stays the same?

What is Computer Science?

- Artificial Intelligence

Roomba

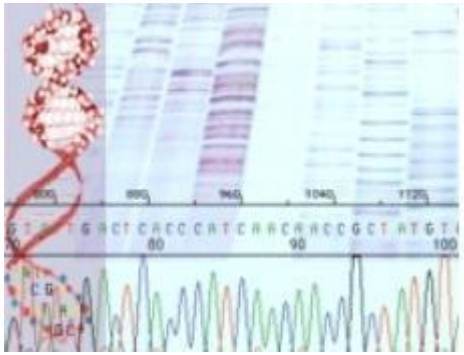


Spirit, Mars Rover

CMU's Sandstorm

What is Computer Science?

- Medicine, Genomics

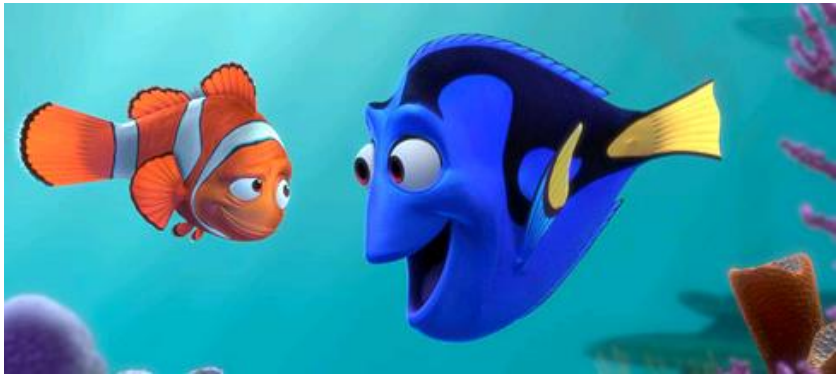


What is Computer Science?

- Devices

What is Computer Science?

- Animation



Who are all these people?
bit.ly/101f16-0830-2

1

2

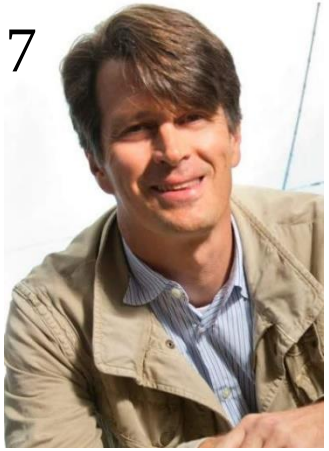
3

4

5

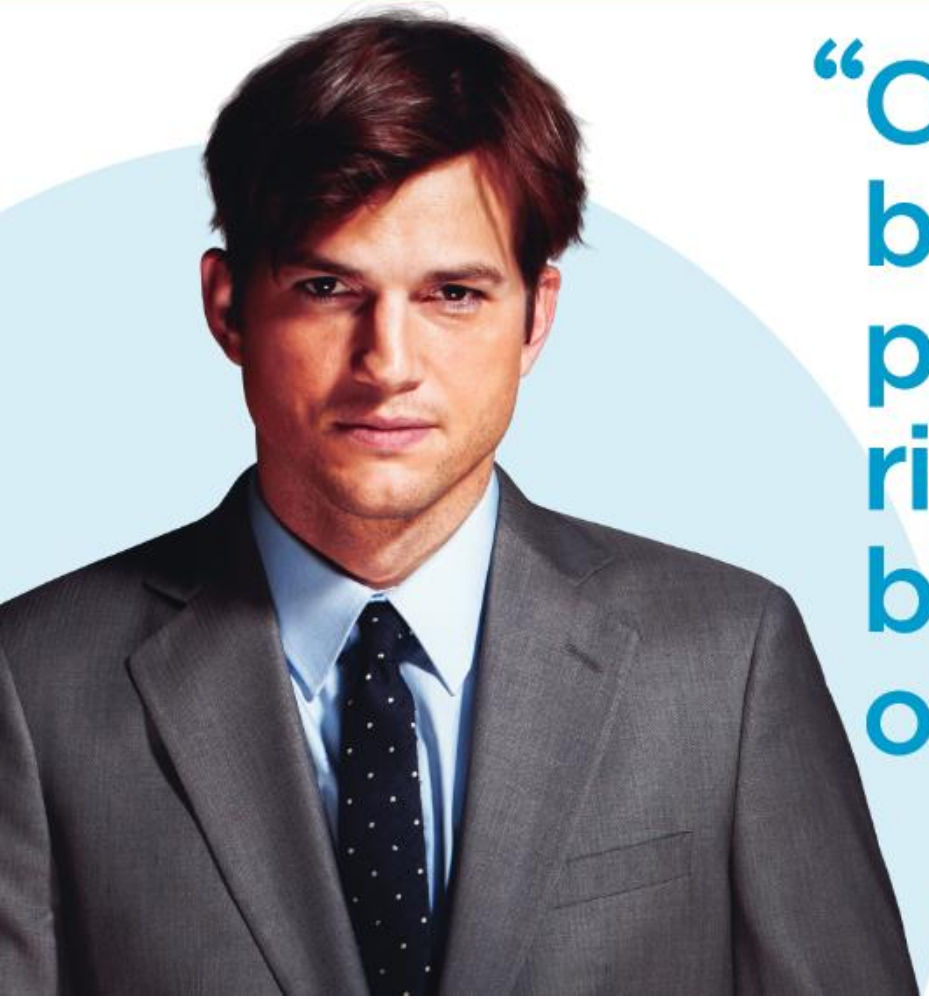
6

7



"Don't just play on your phone, program it."

— President Barack Obama



"Computer science belongs in every public school, right next to biology, chemistry, or algebra."

— Ashton Kutcher

"I always did something I was a little not ready to do. I think that's how you grow."

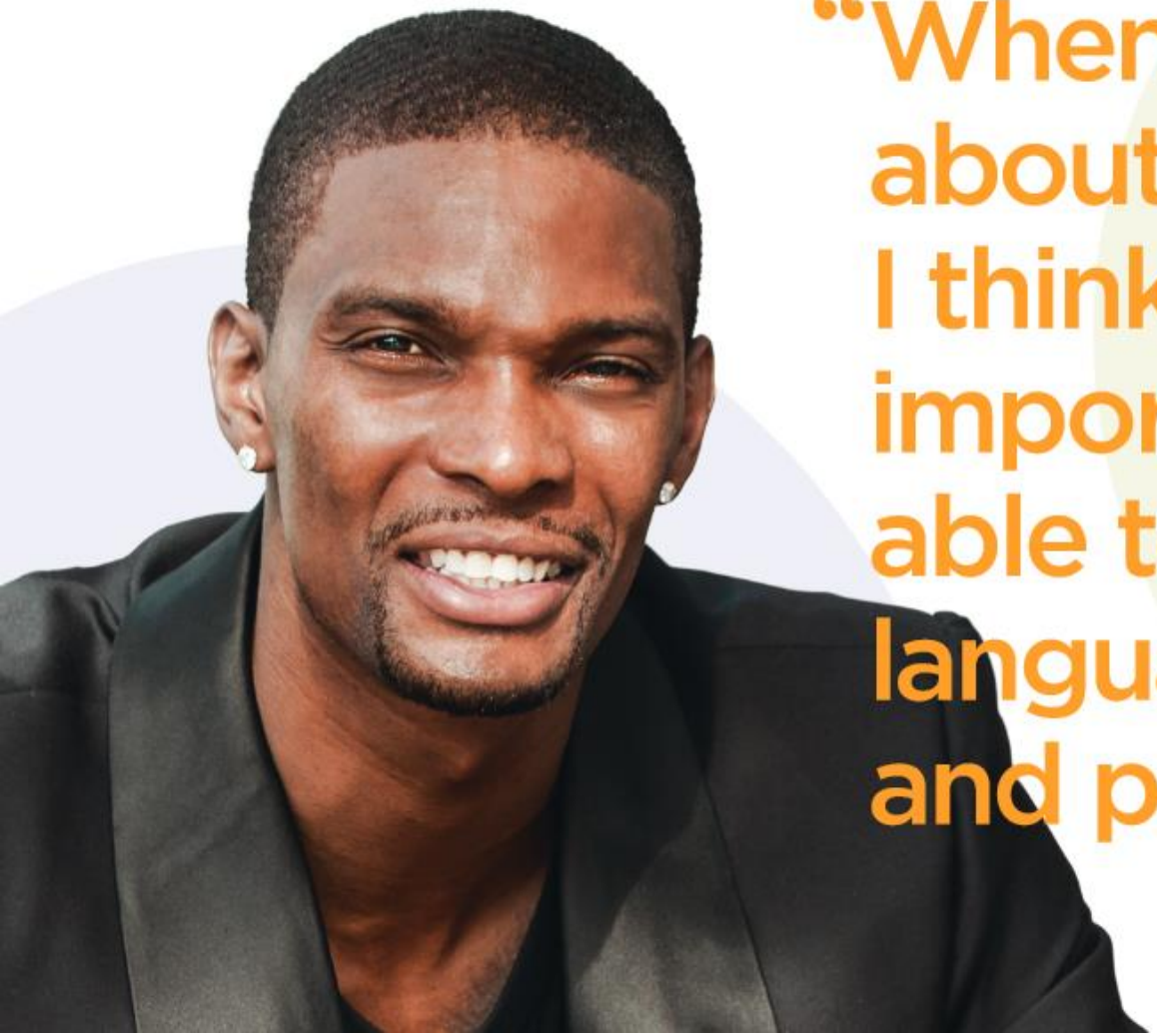
— Marissa Mayer, CEO, Yahoo!

"In fifteen years we'll be teaching programming just like reading and writing…and wondering why we didn't do it sooner."

— Mark Zuckerberg

"From phones to cars to medicine, technology touches every part of our lives. If you can create technology, you can change the world."

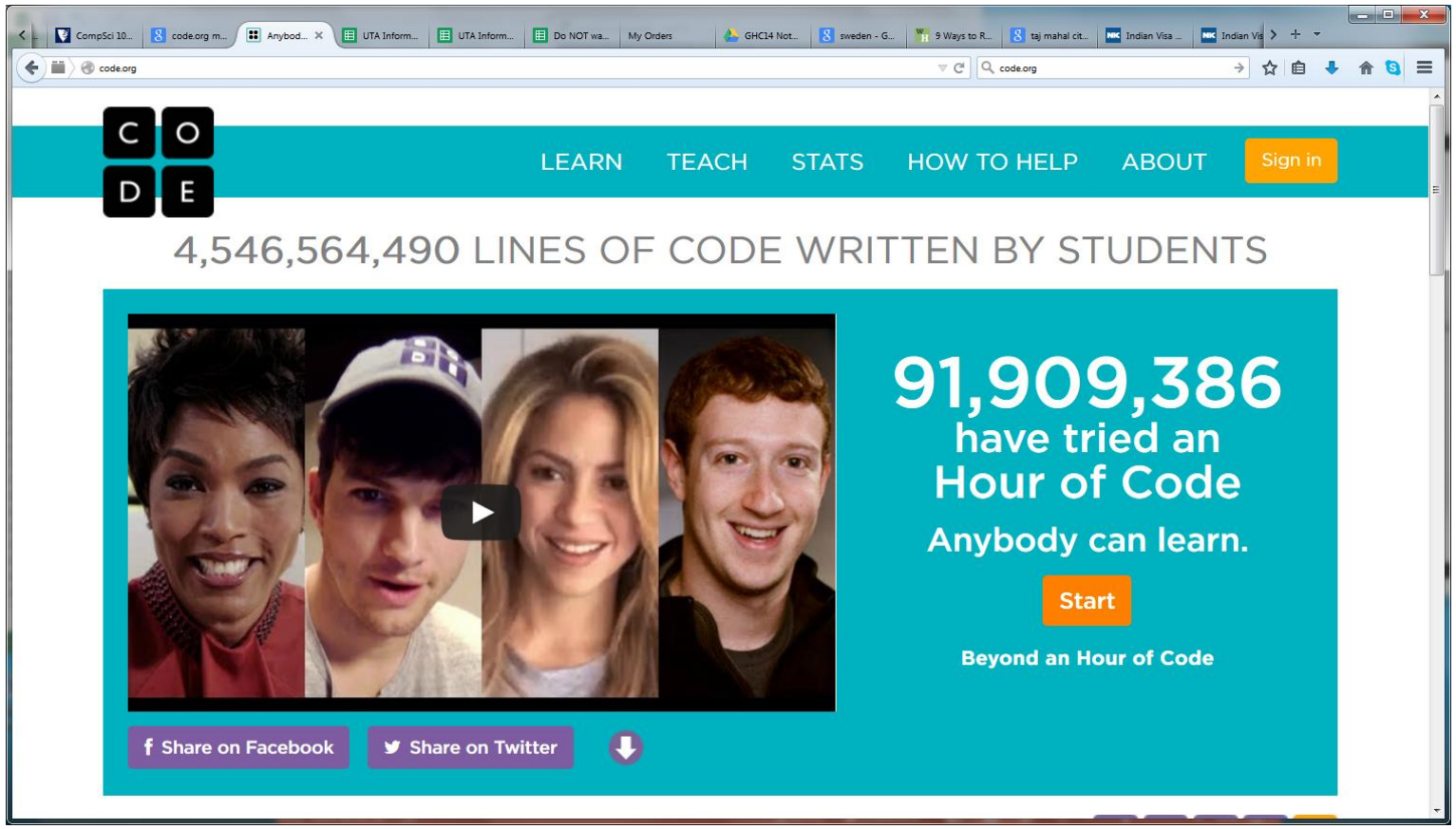
— Susan Wojcicki, CEO, YouTube



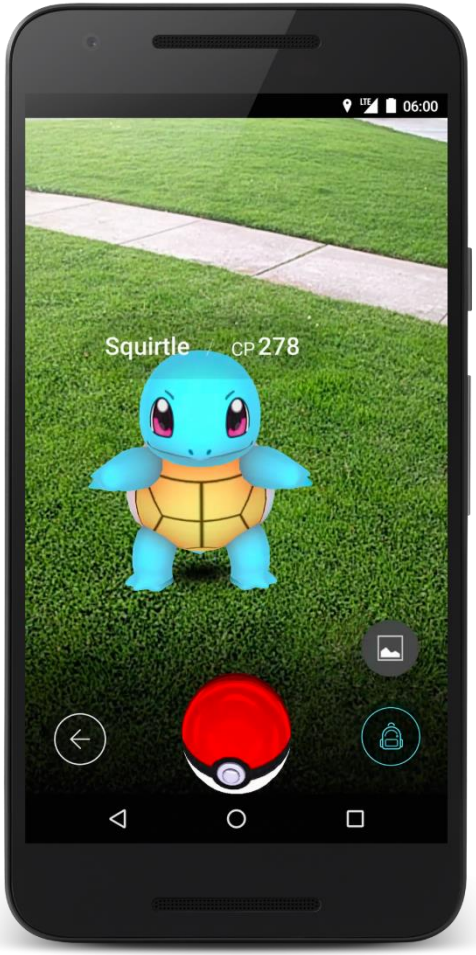
"When you think about the future… I think it's very important to be able to learn the language of coding and programming."

— Chris Bosh

Those quotes are all from Code.org



John Hanke, ‘Pokemon Go’



About Prof. Rodger

How do you keep your sanity?

Sea turtles hatching

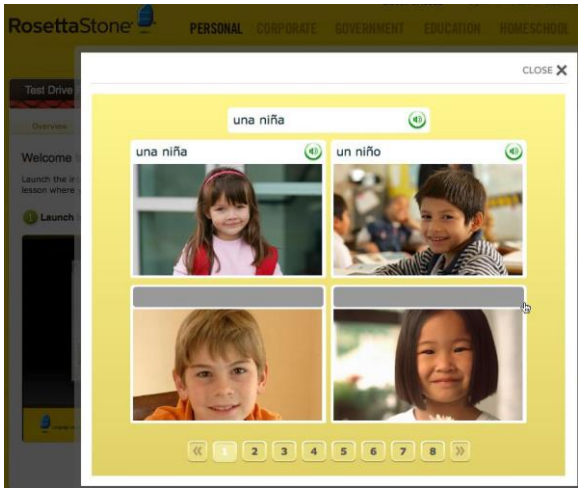
- https://www.youtube.com/watch?v=sZYd0-egqbc

Questions about Computer Science

What is it that distinguishes it from the separate subjects with which it is related? What is *the linking thread* which gathers these disparate branches into a single discipline? My answer to these questions is simple --- it *is the art of programming a computer*. It is the art of designing efficient and elegant methods of getting a computer to solve problems, theoretical or practical, small or large, simple or complex.

How will you learn to 'speak'?

- http://www.rosettastone.com/personal/demo
- http://duolingo.com



How will you learn to program?

- You learn more than programming
- Coding, Algorithms
  - UX/UI: User Experience, User Interface
  - Data Analytics, Software Engineering

- A course, a way of thinking, a set of skills and practice that can lead to more or …

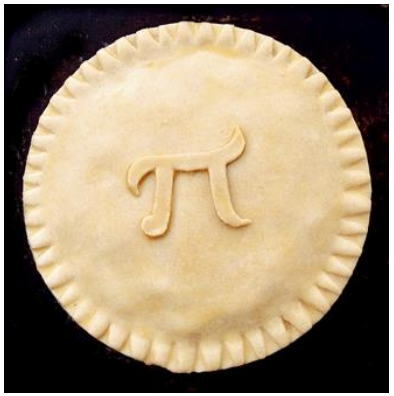
What language will we learn?

- http://www.python.org/
- Python is a *multi-paradigm* language
  - Procedural
  - Functional
  - Object-Oriented
- Simple, libraries, widely used
- Guido is BDFL

Why is it called Python?

A

B



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C

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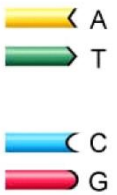
$9.8\ m/sec^2$

answer

ReCAPTCHA™

http://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WWW

Who are you?

- Let's look at survey to see who is taking Compsci 101 in Fall 2016
  - Do you recognize yourself?
  - Is there a stereotypical Compsci 101 student?
  - Is there a stereotypical computer scientist?

- Everyone can succeed! Ideally you won't have lots of experience programming

Daphne Koller, AI Pioneer, Educator

Computers learn to diagnose breast cancer? And more? *The Data Scientist on a Quest to turn Computers into Doctors*

- http://bit.ly/koller-cancer
- http://wrd.cm/1E9zFqy

On Coursera: "But to practice problem-solving, a student must first master certain concepts. By providing a cost-effective solution for this first step, we can focus precious classroom time on more interactive problem-solving activities that achieve deeper understanding — and foster creativity."

Coursera Founder, NY Times, December 5, 2011

Course overview, logistics

www.cs.duke.edu/courses/fall16/compsci101

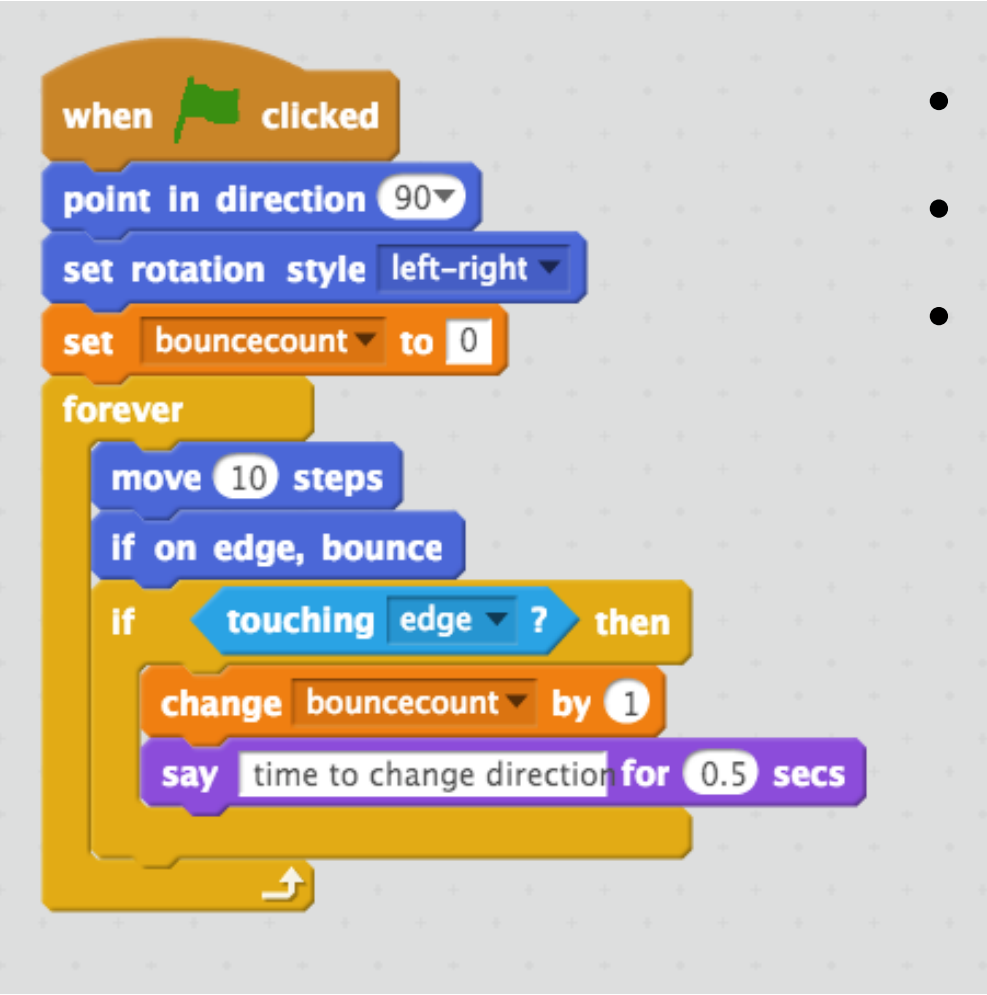
- Programming assignments: APTs and Assignments
  - Acknowledge assistance, to learn to program …
  - Be aware of late policy
- Exams: midterms and final: paper-based, different
  - All old midterms available
- Class work/attendance
  - Examples today, benefits hopefully clear

Course Overview: Is this the right one?

- Work by yourself and collaboratively on solving problems that programming
  - Analyze the problems, think about solving them
  - Create, Collaborate, Persist, Problem-Solve
- Why should you come to class?
  - Learn things, participate in a community
  - Provide help, get help, wonder, dance, think
- Why is this course so great?
  - Because you're in it

What's in Compsci 101?

- Learning about computing, computer science, and programming
  - Vocabulary of Python and programming
  - *Power of automation, repetition, scale*
  - Understanding and changing the world
- Programming using Python
  - Tools: Eclipse, EPD, Libraries, …
  - Using mathematical and scientific techniques
  - Art *and* science of programming



- "Hello World"
- Scratch Program
- Colors
  - Duke blue: motion
  - Mustard: control
  - Light blue: sensing
  - Orange: data
  - Purple: looks

Analyze this Scratch Program?

http://bit.ly/101f16-0830-3

Python code
hello.py

```
'''
Created on Jan 14, 2016

@author: Susan
'''
print "hello CompSci 101 students"
```

Python data reading code

```
f = open("kjv10.txt")
st = f.read()
total = len(st)
zc = st.count('z')
print "total # chars = ",total
print "number of z's",zc
for ch in 'aeiou':
    print ch, st.count(ch)
```

Announcements

- See assigned reading on course web page
  - Reading Quiz 1 (RQ1) online on Sakai (out today)
  - due by 10am Thurs, Sept 1.
- Labs start this week! (Wed/Thur)
- Assignment 1 out – Due Sept 6
- Install course software
  - Try to install before going to lab
  - If you get frustrated, get help!

- Today: Introduce Computer Science

Duke Connection: Fred Brooks '53

- What Would FB Say?

"The most important single decision I ever made was to change the IBM 360 series from a 6-bit byte to an 8-bit byte, thereby enabling the use of lowercase letters. That change propagated everywhere."

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Why is programming fun?

Fred Brooks

- First is the sheer joy of making things
- Second is the pleasure of making things that are useful
- Third is the fascination of fashioning complex puzzle-like objects of interlocking moving parts
- Fourth is the joy of always learning
- Finally, there is the delight of working in such a tractable medium. The programmer, like the poet, works only slightly removed from pure thought-stuff.