CompSci 101
Introduction to Computer Science

Jan 17, 2017

Prof. Rodger
Announcements

• Reading for next time on calendar page
  – RQ 2 due Thursday

• Assignment 1 due Thursday
  – Have fun with Blockly

• Install your environment! Get Help!

• Lab 1 this week!

• Plan for Today:
  – Problem Solving and Python
Software Failure
Error

An unexpected error has occurred.

Send a bug report

To send a bug report, describe what you were doing when the problem occurred, in the space below, and press the submit button.

Recovery

To recover from this error without sending in a bug report, please do the following:

- Press the Logout button above to logout.
- Close your browser to assure a clean start.
- Re-open your browser and start again.
Error

An unexpected error has occurred.

Recovery
To recover from this error without sending in a bug report, please do the following:
- Press the Logot button above to logout.
- Close your browser to assure a clean start.
- Re-open your browser and start again.
Your User ID and/or Password are invalid.

Sign in to ACESSTORM.
Last Time Scratch program

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

```
...Hello

Created on Jan 11, 2017

@author: Susan

...Hello CompSci 101 students
```

![Console output]

```
<terminated> hello.py [C:\Users\Susan\AppData\Local\Enthought\C

hello CompSci 101 students
```
Python data reading code

```python
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)
```
Woa!!!
Am I suppose to understand all that code right now!!!!
No!!!
We will learn all that over The next month!
Explaining Python code?

bit.ly/101s17-0117-1
Computers learn to diagnose breast cancer? And more? *The Data Scientist on a Quest to turn Computers into Doctors*

• [http://wrd.cm/1E9zFqy](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
Lab 1 This Week

• Install Before attending if can
• Modify Python program
• Scratch program
Our Programming Environment

• Install 5 items

• Why Java? – not using

• Eclipse – platform for development

• Python – programming language
  – Pydev – Python IDE for Eclipse

• Canopy – python libraries

• Ambient – turnin/snarf files to/from Duke
How does one get help in CompSci 101?

- Consulting hours
  - Sunday-Thursday 7:30-11:30pm
- Office hours (prof, TAs)
- Collaborate with other students
- Piazza
  - Ask questions
  - Do not post your code and ask what is wrong!
  - Post error message and line of code for error message
  - If added class late, may need to add yourself
How to succeed in Compsci 101

• Start assignments early, they'll take longer than you think

• Read the book, we'll build on it in class

• Collaborate well, but be sure you can do work on your own!

• Be curious, work hard at beginning, think carefully
Your goal is to …

• Get all assignments completed and turned in on time.

AND…
Your goal is to …

• Get all assignments completed and turned in on time.

AND…

• Understand the code you turn in.
• Be able to explain the code you turn in.
Algorithm
bit.ly/101s17-0117-1a

• Recipe
• Sequence of steps that constitute instructions
• Step-by-step procedure for calculations

Cookie Sandwich
Algorithm

• Recipe
• Sequence of steps that constitute instructions
• Step-by-step procedure for calculations

How do Netflix and Amazon know me?
• Compsci101 project: capable of implementation as a program, but much more basic

What does Nate Silver do?

http://53eig.ht/1tZy909

More on algorithms:
http://moreintelligentlife.com/content/features/anonymous/slaves-algorithm
How to Tell Someone’s Age When All You Know Is Her Name

By Nate Silver and Allison McCann

Filed under ICYMI
Who will win the presidency?

Chance of winning

Hillary Clinton 73.8%
Donald Trump 26.1%
Google Algorithm – with News

An Algorithm to Identify Every Tree
Science Friday - Jan 10, 2017
Rather, you'd take a photo of the object—take the tree, for example—and an algorithm used in an app or a website would be able to recognize ...

Algorithm does real-time, city-wide ridesharing
Ars Technica - Jan 4, 2017
Algorithm does real-time, city-wide ridesharing. Could cut NYC's taxi count by 75 percent while still providing the same number of rides.

What Happens When Algorithms Design a Concert Hall? The ...
WIRED - Jan 12, 2017
The most interesting thing about Herzog and De Meuron's newly opened concert hall, the Philharmonie, isn't its wave-like facade, which
Algorithms that scale: An example

• Human Genome Project
  – Multiple approaches, relying heavily on computational power and algorithms
  – Combine reads of DNA sequences, we'll look at an illustrative example

• These combine bio/chemistry techniques with computational techniques to recreate the sequencing, e.g., CGATTCCG… from "live data", actual DNA.
Eugene (Gene) Myers

• Lead computer scientist/software engineer at Celera Genomics, then at Berkeley, now at Janelia Farms Research Institute (HHMI)

"What really astounds me is the architecture of life. The system is extremely complex. It's like it was designed." ... "There's a huge intelligence there."

• BLAST and WG-Shotgun
Whole Genome Shotgun with words

The creation algorithm:
- Take a phrase
- Replicate it four times
- Chop into "chunks"
- 15-22 characters

How to recreate original phrase?

From Algorithms to Code

• An algorithm that scales needs to run on a computer --- programming to the rescue!
• Extensive libraries help with programming
  – Brain or Neuroscience
  – Engineering and Mathematics
  – Genomics
  – Graphic User Interfaces, …
• We are using Python, extensible and simple
Understanding terminology: code

- Move from "Hello World" to "Hello Around the World"
  - Look at Python, code, libraries
  - Learning (reviewing) terminology about Python

```python
print "hello world"
f = open("hello.txt")
for line in f:
    print line
```
Hello around world code