CompSci 101
Introduction to Computer Science

Sept 12, 2017
Prof. Rodger
Announcements

- Reading and RQ5 due next time
- Assignment 2 due Thursday
- APT 1 is due today, APT 2 out today
- Catch up Schedule on main web page

- Today – TWOTS
  - Solving problems – 7 Step process
  - Decisions - if, Boolean
Assignment 2

• Questions?
Submitting Assignment 2

• Use Ambient/eclipse to submit!
  – Check if submitted with Submit History – files submitted should be listed!
  – Alternative submit – use websubmit – on assign tab
  – What time is it due? Thursday 11:59pm
Why is this person so important to this course?
Finish from last time.....

Function Detective


```python
if __name__ == '__main__':
    f = open("words.txt")
    for w in f:
        w = w.strip()
        print w, pluralize(w)
```

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Another way for the main
Iterate over words, not lines

```python
if __name__ == "__main__":
    f = open("words.txt")
    all = f.read()
    wordlist = all.split()
    for w in wordlist:
        print w, pluralize(w)
```

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Python – Names and Types

• Names vs abstractions
  – What is http://152.3.140.1
  – What is http://www.amazon.com

• Types are important
  – What is foo.pdf, foo.mp4, foo.jpg, foo.wav
  – Do the file extensions guarantee file type?

• Python – what types are these?
  first = "Susan"
  x = 6
  y = 3.4
Strings

- Sequence of characters in quotes
  
  "I" + 'Love' + '''Python'''

  "I" 'Love' '''Python'''

- String operators: concatenation (+), repeat(*)

- Precedence?

  "a" + "b" + "c" * 3

- Precedence?

  "a" + "b" "c" * 3
Names, Types and Values

• bit.ly/101f17-0912-1
import urllib2
if __name__ == "__main__":
    source = urllib2.urlopen("http://.../poe.txt")
    s = source.read()
    words = s.split()
    total = len(s)
    all = len(words)
    print total > all
Grace Murray Hopper (1906-1992)

• “third programmer on world's first large-scale digital computer”
  – US Navy: Admiral
  “It's better to show that something can be done and apologize for not asking permission, than to try to persuade the powers that be at the beginning”

https://www.youtube.com/watch?v=1-vcErOPofQ

- ACM Hopper award given for contributions before 35
  2010: Craig Gentry: http://www.youtube.com/watch?v=qe-zmHoPW30
  2011: Luis von Ahn
  2013: Pedro Felzenszwab
  2014: Sylvia Ratnasamy
  2015: Brent Waters
APT: Pancakes

Problem Statement

You're a short-order cook in a pancake restaurant, so you need to cook pancakes as fast as possible. You have one pan that can fit capacity pancakes at a time. Using this pan you must cook numCakes pancakes. Each pancake must be cooked for five minutes on each side, and once a pancake starts cooking on one side it has to cook for five minutes on that side. However, you can take a pancake out of the pan when you're ready to flip it after five minutes and put it back in the pan later to cook it on the other side.

Write the method, minutesNeeded, that returns the shortest time needed to cook numCakes pancakes in a pan that holds capacity pancakes at once. See the examples.

```
filename: Pancakes.py

def minutesNeeded (numCakes, capacity):
    ""
    return integer representing time to cook pancakes based on integer parameters as described below
    ""
```
Examples

1. numCakes = 0
   capacity = 4

   Returns: 0

   It takes no time to cook 0 pancakes.

2. numCakes = 2
   capacity = 2

   Returns: 10

   You cook both pancakes on one side for five minutes, then flip them over and cook each on the other side for another five minutes.
APT Pancake:

• How do you solve this problem?
  – First steps: are there simple cases that can be solved immediately?
    • What are these for the pancake problem?
  – Sometimes it helps to know if you are on track, should you use Python to check your paper and pencil work?
• Get specific, solve for 5, not N
  – Fix one parameter, vary the other
  – Identify the cases and continue
Solve an APT - Pancakes
bit.ly/101f17-0912-2
Problem Solving to Code

7 Step Process

1. Work small examples by hand
2. Write down what you did in words (algorithm)
3. Find Patterns (generalize algorithm)
4. Work another example by hand (does your algorithm work? If not, go back to 2)
5. Translate to code
6. Test several cases
7. Debug failed test cases
Pancake Problem

• Work through the 7 step process….
How to solve problems with different cases?

• Keep score in a video game?
  – Different points for different tasks?

• Translate a book from English to Spanish?
  – Different words, different rules

• Identify proteins in strands of DNA?
  – Start codon: atg       Stop Codon: tag

• Different cases with Pancake APT?

• In Python use: if, else ,elif
How to teach pancake Flipping

• http://www.youtube.com/watch?v=W_gxLKSsSIE
  – For longer, more complex robotic tasks
    • http://www.youtube.com/watch?v=4usoE98e7I
Review Functions

```python
def duplicate(word, num):
    answer = word * num
    return answer

def duplicate2(word, num):
    answer = word * num
    print answer

def duplicate3(word, num):
    answer = word * num
```

1. print duplicate ("Go", 3)
2. print duplicate2("Go", 5)
3. print duplicate3("Go", 2)
4. duplicate("Go", 5)
5. duplicate2("Go", 4)
6. duplicate3("Go", 2)