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

- http://bit.ly/101f17-0907-5

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


Another way for the main Iterate over words, not lines

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


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

Names, Types and Values

```
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 a 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.

Specification

```
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
  - Is this computer science? http://bit.ly/zykOrh
  - For longer, more complex robotic tasks
    - http://www.youtube.com/watch?v=4usoE981e7I

Review Functions

www.bit.ly/101f17-0912-3

```
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)
```