Compsci 101
Pancakes, While loops, Parallel Lists
Live Lecture

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PhD. Computer Science, MIT – first black woman

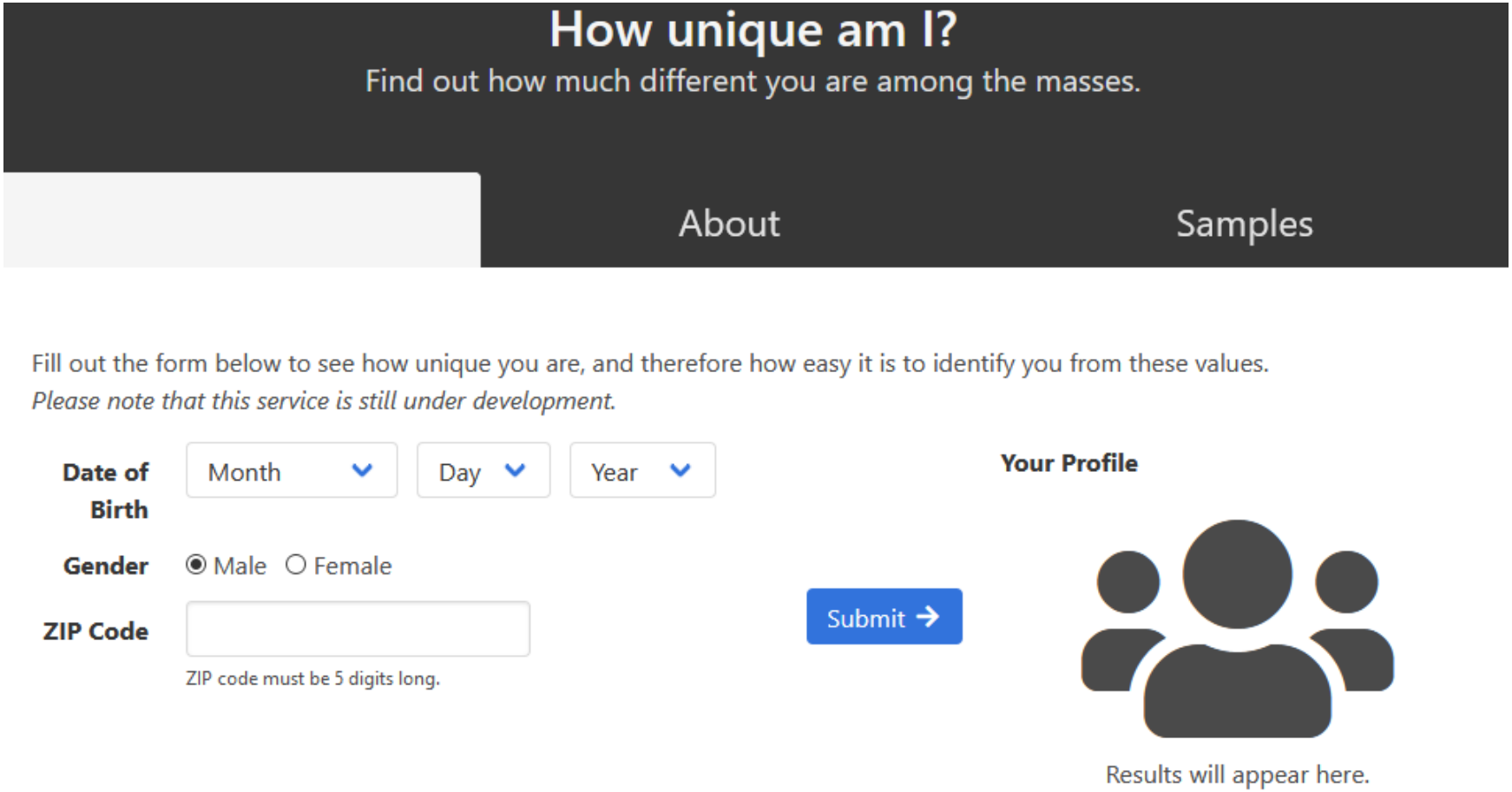
Over 100 publications, Fellow ACMI

"I am a computer scientist with a long history of weaving technology and policy together to remove stakeholder barriers to technology adoption. My focus is on "computational policy" and I term myself a "computer (cross) policy" scientist. I have enjoyed success at creating technology that weaves with policy to resolve real-world technology-privacy clashes.

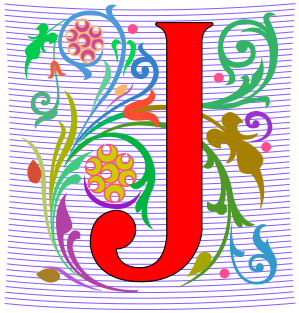
http://latanyasweeney.org/

Identify 87% of US population using (dob,zip,gender). Prof. Government and Technology @ Harvard, instrumental in HIPAA because if *de-identification* work. Former CTO of the Federal Trade Comm.

One of her websites you can try: https://aboutmyinfo.org/identity



J is for …



- **JSON**
  - Format for data transmitted across the web
- **JPEG**
  - Image format based on lossy compression
- **Jacquard Loom**
  - 1804 "automated" loom

Announcements

- Nothing due today!
- APT-3 due Tuesday, March 2
- Assignment 2 due Thursday, March 4
- Lab 4 Friday – No Prelab
- APT Quiz 1 3/5-3/8

PFTD

- Files and Data
- Pancake APT
- While loops and Collatz sequence
- Parallel lists
- Exam 1

Exam 1 – Still grading, back soon

- Once graded, you will get an email from GradeScope
  - You will be able to see the full exam
  - We will post solutions
    - If you missed something, you should try to figure out what you did, then look at solutions
  - Regrades will be in Gradescope

  - Here is feedback from the Exam 1 Survey

APT Quiz 1 coming…

- APT Quiz 1 is 3/5 8AM -3/8 11PM – finish by 11pm
- There are two parts – each part is 1.5 hours
- Pick a start time for each part,
  - Once you start a part, You have 1.5 hours
  - If you get accommodations, you get those
- 4 APTs to solve (2 in each part)
  - Take parts 1 and 2 on same day or different days
- Start APT Quiz on Sakai!
- See old APT Quiz problems so you can practice
  - On APT page – NOT FOR CREDIT

APT Quiz 1

- Is your own work!
  - No collaboration with others!
  - Use your notes, lecture notes, your code, textbook
  - DO NOT search for answers!
  - Do not talk to others about the quiz until grades are posted
- Post private questions on Piazza
  - We are not on between 10pm and 8am EDT!
  - We are not on all the time
  - Will try to answer questions between 8am – 10pm

Lists of Data

- String lists: **`["ant","fox","cat","dog"]`**
- Lists of int/float numbers: **`[5, 3.14159, -15]`**
- What about lists of lists? Variable **`plist =`**

`[["Washington",1789,57],["Clinton",1993,46]]`

- What is **`plist[0]?`**
- What is **`plist[0][2]?`**
  - Can always use a variable:

- **`First char. of “Washington”?`**

WOTO-1 Files
http://bit.ly/101s21-0225-1

Pancakes!

APT Pancake

- How do you solve this (or any) problem?
  - 7 Steps!

- Some APTs are hard problems to solve (step 1-4)
  - Translating to code easy
- Some APTs have easy-to-see algorithms (step 5)
  - Translating to code is hard

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.

Specification

```
filename: Pancakes.py

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

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.

Examples

1.
```
numCakes = 0
capacity = 4

Returns: 0
```

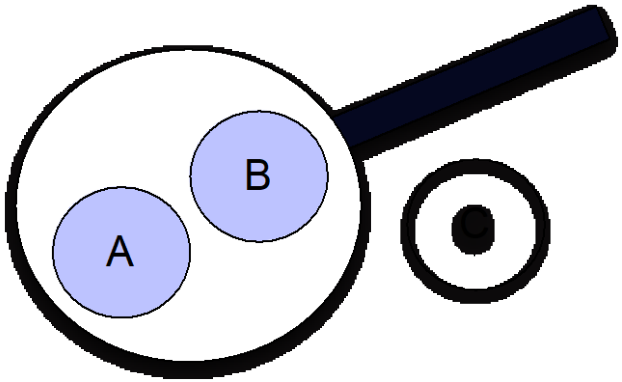
It takes no time to cook 0 pancakes.

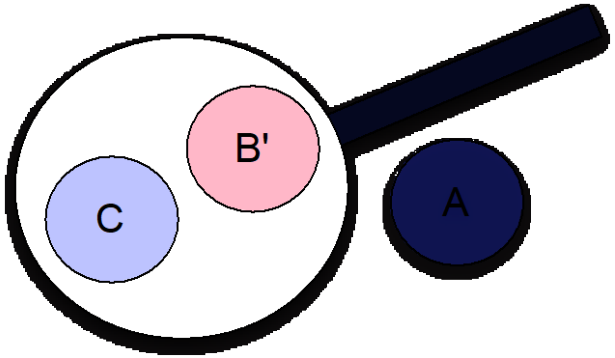
2.
```
numCakes = 2
capacity = 2

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.

Step 1: Solve an instance
Three pancakes in a two-cake pan

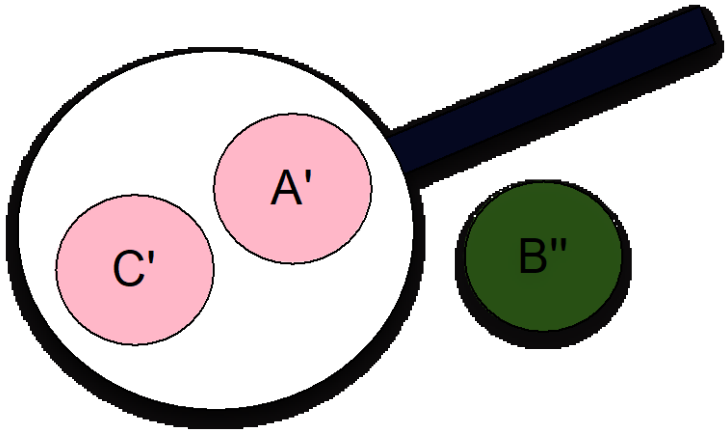
- First 5 minutes
  - 2 half cooking
  - 1 uncooked
- Second 5 minutes
  - 2 half cooking
  - 1 almost cooked





Step 1: Solve an instance
Three pancakes in a two-cake pan

- Third 5 minutes
  - 1 done
  - 2 almost cooked
- How many minutes to cook all three pancakes?



Step 1: Solve an instance

- **What kind of instances? Simple cases that are quickly solved**
  - What are these in Pancake problem?

- **Don't solve for N, solve for 5 (generalize is step 3)**
  - What do when there are two parameters?
    - Fix one, vary the other one
  - Helps identify cases

WOTO-2 Pancakes
http://bit.ly/101s21-0225-2

Let’s code it up!

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=4usoE981e7I

Review: While Loops

- Don't know: *how many times* loop executes
  - *a priori* knowledge, we'll know afterword

- Do know: condition that should be true after loop
  - Its negation is the expression for `BOOL_CONDITION` (loop guard)

```
while BOOL_CONDITION:
    LOOP_BODY
    # modify variables, affect expression
```

WOTO-3 Collatz and While
http://bit.ly/101s21-0225-3

Parallel Lists Review

- We will use parallel lists to track data
  - Each word is stored in a list named **`words`**
  - Word's count is stored in a list named **`counts`**
  - # occurrences of **`words[k]`** is in **`counts[k]`**

```
["apple", "fox", "vacuum", "lime"]
[5,2,25,15]
```

- What happens when we read a word?

WOTO-4 File Frequency
http://bit.ly/101s21-0225-4