CompSci 101
Introduction to Computer Science

March 10, 2016
Prof. Rodger
Announcements

• Next Reading and RQ due Thurs March 24
• Assignment 5 due today
  – Next Assignment out after Spring Break
• APT 6 due Tues March 22 (only one from lab)
• APT 7 due Thurs March 24

• Today:
  – Review nested loops, tuple generators
  – Focus on problem solving with sets
Alice programming language
alice.org, Alice version 2.4
Nested Loop
Fair Ride – Octopus
Wac-A-Mole
Review from last time: generator

```
im.getdata(), accessing pixels
```

- Returns something *like* a list
  - Use: `for pix in im.getdata():`
  - Generates pixels on-the-fly, can't slice or index unless you use `list(im.getdata())`
  - Structure is called a Python generator!
  - Saves on storing all pixels in memory if only accessed one-at-a-time
Review from last time
Making Tuples and Generators

• Overuse and abuse of parentheses
  – To create a tuple, use parentheses

```
for pix in im.getdata():
    (r,g,b) = pix
    npx = (255-r,255-g,255-b)
```

  – To create a generator use parentheses as though creating a list comprehension!

```
[2*n for n in range(10000)]
(2*n for n in range(10000))
```

• See this in PyDev console
Question: Which operation does the red represent?
Problems — snarf setExample.py

• Given a list of strings that have the **name of a course (one word)**, followed by **last names** of people in the course:
  1. Find total number of people taking any course
  2. Find number of people taking just one course

["econ101 Abroms Curtson Williams Smith”, “history230 Black Wrigley Smith”, … ]

Process data – create lists of strings of names for each course
Data for example

[“compsci101 Smith Ye Li Lin Abroms Black“, 
“math101 Green Wei Lin Williams DeLong Noell Ye Smith“, 
“econ101 Abroms Curtson Williams Smith“], 
“french1 Wills Wrigley Olson Lee”], 
"history230 Black Wrigley Smith” ]
ECON101
Curtson
Williams

COMPSCI101
Abroms
Li

MATH101
Ye
Lin
Green
Noell
Wei
Yavatkar
Delong

HISTORY230
Black

FRENCH1
Wrigley
Wills
Lee
Olson

Set Picture of Data
People Taking both Math And CompSci

Intersection

ECON101

CURTSON

WILLIAMS

HISTORY230

COMPSCI101

ABROMS

SMITH

BLACK

WRIGLEY

FRENCH1

GREEN

NOELL

WEI

YAVATKAR

MATH101

YE

LIN

LI

WILLIAMS

CURTSON

OLSON

LEE
Part 1 — processList
bit.ly/101sp16-0310-2

• Given a list of strings that have the name of a course (one word), followed by last names of people in the course:
  – Convert list into lists of strings of names for each course

["econ101 Abroms Curtson Williams Smith",
"history230 Black Wrigley Smith", ...
]
[[‘Abroms’, ‘Curtson’, ‘Williams’, ‘Smith’],
[‘Black’, ‘Wrigley’, ‘Smith’, ...]]
Part 2 — peopleTakingCourses
bit.ly/101sp16-0310-3

• Given a list of lists of names, each list represents the people in one course:
  – Find total number of people taking any course
  – peopleTakingCourses should return unique list of names

• Small Example

```
[‘Abroms’, ‘Curtson’, ‘Williams’, ‘Smith’],
[‘Black’, ‘Wrigley’, ‘Smith’]
```

Answer is 6 unique names
People taking Courses - Union

Total Number Is 17 unique names

ECON101: Curtson, Williams
COMPSCI101: Abroms, Smith, Black, Wrigley
MATH101: Li, Ye, Lin, Green, Noell, Wei, Yavatkar, Delong
FRENCH1: Wills, Lee, Olson
HISTORY230: Smith, Abroms, Black, Wrigley

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Next, find the number of people taking just one course
To solve this problem

- First let’s write a helper function
Part 3 — unionAllSetsButMe
bit.ly/101sp16-0310-4

• Given example, a list of sets of strings, and the index of one of the sets, return the union of all the sets but that one

example = [set(["a", "b", "c"]), set(["b", "c", "d", "g"]), set(["e", "d", "a"])]
unionAllSetsButMe(example,1) is
set(["a", "b", "c", "e", "d" ])

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Part 4 — peopleTakingOnlyOneCourse

bit.ly/101sp16-0310-5

- Given a list of lists of strings of names representing people from courses
  - Find number of people taking just one course

```
[ ['Abroms', 'Curtson', 'Williams', 'Smith'],
  ['Black', 'Wrigley', 'Smith', 'Abroms'] ]
```

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APT - UniqueZoo

• How do you solve this problem?
• How is it similar to the problem we just solved
Example Data for UniqueZoo

["zebra bear fox elephant", "bear crocodile fox", "rhino elephant crocodile kangaroo", "elephant bear"]
UniqueZoo – two zoos have unique animals

zebra

fox

bear

elephant

crocodile

rhino

kangaroo