## Compsci 101
List Comprehensions, Transform, Global - Live Lecture

<table>
<thead>
<tr>
<th>What is it?</th>
<th>Where first created?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular variable in main</td>
<td>In main</td>
</tr>
<tr>
<td>Regular local function variable</td>
<td>In function</td>
</tr>
<tr>
<td>Global variable</td>
<td>Top of file</td>
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</table>
Announcements

• Assign 2 – Turtles due Thursday!
• APT-4 out today due Thursday, March 11
• Assign3-Transform out today, due Thursday, March 18
  • There is a Sakai quiz on Assign3 – also by March 18
• Exam 1 – do not discuss with anyone until handed back
  • It is not autograded! Be patient!
• No class-Tues/Wed, March 9-10
  • Consulting hours may vary (if available)**
K is for …

• Kernel
  • Core of the OS, Core for Machine Learning

• Keyboard - QWERTY or DVORAK
  • DVORAK:

• Key and (Key, Value) pair
  • Heart of a dictionary
Computer Scientists to Know
Frieda McAlear

• Senior Research Associate
  • Kapor Center
• Lead
  • Women of Color and Computing Collaborative
• Co-Lead (Partnership)
  • American Indian Science and Engineering Society
PFTD

- List Comprehensions
- Global Variables
- Transform Assignment
Review: List Comprehension Syntax

- **V** is any variable: all list elements in order
- **V_EXP** is any expression, often use **V**

```
ret = []
for V in LIST:
    ret.append(V_EXP)
```

```
ret = [V_EXP for V in LIST]
```

```
ret = []
for V in LIST:
    if BOOL_EXP:
        ret.append(V_EXP)
```

```
ret = [V_EXP for V in LIST if BOOL_EXP]
```
WOTO-1 List Comprehension Examples

• In your groups
  • Come to a consensus
WOTO-1 List Comprehension Examples

[w for w in words if w.count('e') == 0]
• What does this represent? When is the if true/false?

[v*2 for v in range(6) if v % 2 == 1]
• What does this represent? What is the length?

sum([1 for x in words if len(x) > 4])
• What does this represent?
WOTO-2 List Comprehension Examples

• In your groups
  • Come to a consensus
WOTO-2 List Comprehension Examples

words = ['giraffe', 'zebra', 'ant', 'lion', 'elephant']
x = [2*x for x in [len(w) for w in words if len(w)>3] if x%2==0]

x is [8, 16]

Don’t do this!!!

Break it up to two list comprehensions

y is [7, 5, 4, 8]

Difficult to debug!!!
Assignment 3: Transform

• Reading and writing files
  • We've seen how to read, writing is similar
  • Open, read, and close
  • Open, write, and close - `.write(...)`

• Apply a function to every word in a file
  • Encrypt and decrypt
  • Respect lines, so resulting file has same structure
Encrypting and Decrypting

• We give you:
  • Transform.py
  • Vowelizer.py - Removes vowels

• You implement
  • Pig Latin
  • Caesar cipher

• Challenge: Shuffleizer
Concepts in Starter Code

• Global variables
  • Generally avoided, but very useful
  • Accessible in all module functions

• FileDialog and tkinter
  • API and libraries for building UI and UX

• Docstrings for understanding!

Look at code
Reminder: Global Variables (Best Practice)

• Best practice = help other humans read the code

• All variables that will be global are created with an initial assignment at the top of the file

• When used in a function, variable is declared global at the beginning of the function
## Reminder:
What, where, read, write? (in 101)

<table>
<thead>
<tr>
<th>What is it?</th>
<th>Where first created?</th>
<th>Where accessible? (read)</th>
<th>Where reassign-able? (write)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular variable in main</td>
<td>In main</td>
<td>In main only (technically anywhere, but don’t do that)</td>
<td>In main only</td>
</tr>
<tr>
<td>Regular local function variable</td>
<td>In function</td>
<td>In function only</td>
<td>In function only</td>
</tr>
<tr>
<td>Global variable</td>
<td>Top of file</td>
<td>If not reassigning the value, in main and all functions</td>
<td>In main or in any function that first declares it global</td>
</tr>
</tbody>
</table>
WOTO-3 – Globals

• If you are done early, revise and collaborate on your notes!

• In your groups:
  • Come to a consensus
Tkinter and FileDialog

- This library and API is useful for creating GUIs
  - Difficult and not always about the big picture
  - Debugging can be frustrating
  - Tedium of making things right versus exultation in creating wonderful programs!

- If you don't see the rocket-ship? Go to Consulting hours
  - What happens when you run Transform?