Nested 2
Chris Piech + Mehran Sahami
CS106A, Stanford University
Contest

- Celebration of what you have learned + joy of coding.
- Optional
- Due June 10th
- Have fun
Learned about Collections
List
index -> value
Dictionary
key -> value
my_list = ['a', 'b', 'c']

print(my_list[1])

for i in range(len(my_list)):
    value = my_list[i]
    print(i, value)

my_dict = {
    'x': 'a',
    'y': 'b',
    'c': 'c'
}

print(my_dict['y'])

for key in my_dict:
    value = my_dict[key]
    print(key, value)
```
my_list = ['a', 'b', 'c']

print(my_list[1])
for i in range(len(my_list)):
    value = my_list[i]
    print(i, value)
```

```
my_dict = {'x': 'a', 'y': 'b', 'c': 'c'}

print(my_dict['y'])
for key in my_dict:
    value = my_dict[key]
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```
List

my_list = ['a', 'b', 'c']

print(my_list[1])
for i in range(len(my_list)):
    value = my_list[i]
    print(i, value)

Dictionary

my_dict = {
    'x':'a',
    'y':'b',
    'c':'c'
}

print(my_dict['y'])
for key in my_dict:
    value = my_dict[key]
    print(key, value)
List

```python
my_list = ['a', 'b', 'c']

print(my_list[1])

for i in range(len(my_list)):
    value = my_list[i]
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Dictionary

```python
my_dict = {
    'x': 'a',
    'y': 'b',
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print(my_dict['y'])

for key in my_dict:
    value = my_dict[key]
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List

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my_list = ['a', 'b', 'c']

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Dictionary

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my_dict = {'x': 'a',
           'y': 'b',
           'c': 'c'}

print(my_dict['y'])
for key in my_dict:
    value = my_dict[key]
    print(key, value)
```
Ultimate CS106A: Reverse a Dict

Normal Dict:
Key -> Value

Reversed Dict:
Value -> Keys

Claim: understanding this single example is most indicative of mastery in CS106A
Ultimate CS106A: Reverse a Dict

ages = {
    'Mehran': 50,
    'Gary': 70,
    'Chris': 32,
    'Brahm': 23,
    'Adele': 32,
    'Lionel': 32,
    'Rihanna': 32,
    'Stephen': 32
}

reversed = {
    50: ['Mehran'],
    70: ['Gary'],
    32: ['Chris', 'Adele', 'Lionel', 'Rihanna', 'Stephen'],
    23: ['Brahm']
}
End Review
Learning Goals

1. Mix and match lists and dictionaries
Once upon a time there was a rabbit named George. George was a wonderful animal whose goal in life was to learn to code. So George signed up for CS106A. Everything was great until one day...

```python
import json
def main():
    file = open('ages.json')
    data = json.load(file)
    for name in data:
        age = data[name]
        print(name, age)
```

<table>
<thead>
<tr>
<th>Color</th>
<th>RGB Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>pastel blue</td>
<td>72,100,175</td>
</tr>
<tr>
<td>baby blue</td>
<td>182,226,245</td>
</tr>
<tr>
<td>purple</td>
<td>130,64,234</td>
</tr>
<tr>
<td>blue</td>
<td>75,49,234</td>
</tr>
<tr>
<td>light blue</td>
<td>76,215,249</td>
</tr>
<tr>
<td>olive green</td>
<td>111,145,122</td>
</tr>
<tr>
<td>brown</td>
<td>88,70,1</td>
</tr>
</tbody>
</table>
How would you store this dictionary in a file?

```
ages
{
    "Chris":32,
    "Gary":70,
    "Mehran":50,
    "Brahm":23,
    "Rihanna":32,
    "Adele":32
}
```
JSON: A way to teach Nested Structures

JSON: file which stores a nested datastructure in human readable text

```json
ages.json
{
    "Chris":32,
    "Gary":70,
    "Mehran":50,
    "Brahm":23,
    "Rihanna":32,
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}
```

```python
print_ages.py
import json

def main():
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Piech, CS106A, Stanford University
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**Let's give it a whirl!**

`type` is a function which tells you a variable's type!
import json

# load data
data = json.load(open('ages.json'))

# save data
json.dump(data, open('ages.json', 'w'))
### Weekly Weather

<table>
<thead>
<tr>
<th>Day</th>
<th>Condition</th>
<th>Temperature</th>
<th>Feels Like</th>
<th>Night</th>
<th>POP (%)</th>
<th>Wind (km/h)</th>
<th>Wind Gust (km/h)</th>
<th>Hrs Of Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tue</td>
<td>Chance of a shower</td>
<td>20°C</td>
<td>20</td>
<td>12°C</td>
<td>40%</td>
<td>26 W</td>
<td>39</td>
<td>11h</td>
</tr>
<tr>
<td>Wed</td>
<td>Mainly sunny</td>
<td>22°C</td>
<td>21</td>
<td>11°C</td>
<td>30%</td>
<td>23 W</td>
<td>35</td>
<td>9h</td>
</tr>
<tr>
<td>Thu</td>
<td>Mainly sunny</td>
<td>23°C</td>
<td>22</td>
<td>11°C</td>
<td>10%</td>
<td>25 W</td>
<td>38</td>
<td>12h</td>
</tr>
<tr>
<td>Fri</td>
<td>Mainly sunny</td>
<td>22°C</td>
<td>21</td>
<td>11°C</td>
<td>10%</td>
<td>26 W</td>
<td>39</td>
<td>11h</td>
</tr>
<tr>
<td>Sat</td>
<td>Mainly sunny</td>
<td>24°C</td>
<td>23</td>
<td>11°C</td>
<td>10%</td>
<td>24 W</td>
<td>36</td>
<td>12h</td>
</tr>
<tr>
<td>Sun</td>
<td>Mainly sunny</td>
<td>24°C</td>
<td>23</td>
<td>12°C</td>
<td>0%</td>
<td>23 N</td>
<td>34</td>
<td>11h</td>
</tr>
<tr>
<td>Mon</td>
<td>Mainly sunny</td>
<td>25°C</td>
<td>25</td>
<td>13°C</td>
<td>10%</td>
<td>22 NW</td>
<td>33</td>
<td>9h</td>
</tr>
</tbody>
</table>
Stanford Adventure Game
https://www.youtube.com/watch?v=jbkSRLYSoojo
# Mindset Raw Data

## Population

<table>
<thead>
<tr>
<th>Country</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>3280000</td>
</tr>
<tr>
<td>Algeria</td>
<td>349322</td>
</tr>
<tr>
<td>Angola</td>
<td>365720</td>
</tr>
<tr>
<td>Antigua &amp; Barbuda</td>
<td>107438</td>
</tr>
<tr>
<td>Argentina</td>
<td>4524000</td>
</tr>
<tr>
<td>Armenia</td>
<td>3017750</td>
</tr>
<tr>
<td>Andorra</td>
<td>85660</td>
</tr>
<tr>
<td>Australia</td>
<td>25197000</td>
</tr>
<tr>
<td>Austria</td>
<td>879690</td>
</tr>
<tr>
<td>Bahamas</td>
<td>330900</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>15590000</td>
</tr>
<tr>
<td>Barbados</td>
<td>1245000</td>
</tr>
<tr>
<td>Belarus</td>
<td>9550000</td>
</tr>
<tr>
<td>Belgium</td>
<td>11311737</td>
</tr>
<tr>
<td>Belize</td>
<td>255300</td>
</tr>
<tr>
<td>Benin</td>
<td>636595</td>
</tr>
<tr>
<td>Bhutan</td>
<td>100000</td>
</tr>
<tr>
<td>Bolivia</td>
<td>11000000</td>
</tr>
</tbody>
</table>

## GDP

<table>
<thead>
<tr>
<th>Country</th>
<th>GDP (in billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>328000000</td>
</tr>
<tr>
<td>Algeria</td>
<td>413739000</td>
</tr>
<tr>
<td>Angola</td>
<td>1576208</td>
</tr>
<tr>
<td>Antigua &amp; Barbuda</td>
<td>3400900</td>
</tr>
<tr>
<td>Argentina</td>
<td>3530000000</td>
</tr>
<tr>
<td>Armenia</td>
<td>3138260000</td>
</tr>
<tr>
<td>Andorra</td>
<td>3182600000</td>
</tr>
<tr>
<td>Australia</td>
<td>3510150000</td>
</tr>
<tr>
<td>Austria</td>
<td>8796900000</td>
</tr>
<tr>
<td>Bahamas</td>
<td>2750000000</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>1922775000</td>
</tr>
<tr>
<td>Barbados</td>
<td>8172900000</td>
</tr>
<tr>
<td>Belarus</td>
<td>2355000000</td>
</tr>
<tr>
<td>Belgium</td>
<td>3318323000</td>
</tr>
<tr>
<td>Belize</td>
<td>2536000000</td>
</tr>
<tr>
<td>Benin</td>
<td>6365950000</td>
</tr>
<tr>
<td>Bhutan</td>
<td>10000000000</td>
</tr>
<tr>
<td>Bolivia</td>
<td>110000000000</td>
</tr>
</tbody>
</table>

## Life Expectancy

<table>
<thead>
<tr>
<th>Country</th>
<th>Life Expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>28.21</td>
</tr>
<tr>
<td>Algeria</td>
<td>28.82</td>
</tr>
<tr>
<td>Angola</td>
<td>34.62</td>
</tr>
<tr>
<td>Antigua &amp; Barbuda</td>
<td>35.34</td>
</tr>
<tr>
<td>Argentina</td>
<td>35.14</td>
</tr>
<tr>
<td>Armenia</td>
<td>34.42</td>
</tr>
<tr>
<td>Andorra</td>
<td>35.22</td>
</tr>
<tr>
<td>Australia</td>
<td>34.05</td>
</tr>
<tr>
<td>Austria</td>
<td>30.33</td>
</tr>
<tr>
<td>Bahamas</td>
<td>35.34</td>
</tr>
<tr>
<td>Barbados</td>
<td>35.22</td>
</tr>
<tr>
<td>Belgium</td>
<td>30.33</td>
</tr>
<tr>
<td>Belize</td>
<td>28.21</td>
</tr>
<tr>
<td>Benin</td>
<td>30.33</td>
</tr>
<tr>
<td>Bhutan</td>
<td>28.21</td>
</tr>
<tr>
<td>Bolivia</td>
<td>30.33</td>
</tr>
</tbody>
</table>
Mindset Data Visualization

Python Variable

Piech, CS106A, Stanford University
Mindset Data Visualization

Step 1: load the data into a python variable
Mindset Data Visualization

Step 2: visualize the python variable

Python Variable

Piech, CS106A, Stanford University
Mindset Data

```json
{
    "Afghanistan": {
        "life": [28.21, 28.2, 28.19, ..., 53.8],
        "pop": [3280000, 3284351, ..., 32526562],
        "gdp": [603.0, 604.0, ..., 1925.0]
    },
    "Albania": {
        "life": [...],
        "pop": [...],
        "gdp": [...]
    }
}
```

```json
{
    "1800": {
        "Afghanistan": {"life": 28.21, "pop": 3280000, "gdp": 603.0},
        "Albania": {"life": 28.2, "pop": 3284351, "gdp": 604.0},
        ...
        "Zimbabwe": {"life": 20.8, "pop": 12226542, "gdp": 98.0}
    },
    "1801": {
        "Afghanistan": {"life": ...},
        "Albania": {"life": ...}
        ...
        "Zimbabwe": {"life": ...}
    }
}
```
Let's do it!