Compsci 101
Dictionaries
Part 1 of 2

Susan Rodger
October 8, 2020

d = {'a': 10, 'b': 100}
is for …

- **Open Source**
  - Copyright meets the Creative Commons
- **Object Oriented**
  - Using classes and more in programming
- **Occam's Razor**
  - Not just compsci. Simple is good
PFTD

• Dictionaries
How the Dictionary is made

• Using a dictionary is reasonably straight-forward
  • We will be clients, not implementers
  • Efficiency not a large concern in 101
  • Our goal is to just get stuff done 😊
What is a Dictionary?

• A collection of (key, value) pairs (abstract view)
  • Look up key, find the value

• Very, very fast: essentially index by key
  • For list `a[3]` takes same time as `a[3000]`

• For Dictionary: `d["cake"]`
  • Finding the value associated with "cake"
Dictionaries/Maps

- Dictionaries/maps are another way of organizing data
- Keys and Values
  - Each key maps to a value
  - Some keys can map to the same value
  - Can change the value a key maps to
Example

- Each student could be mapped to their favorite ice cream flavor

![Diagram showing the relationship between students and their favorite ice cream flavors. Students: Astrachan, Sun, Rodger, Forbes. Ice Cream Flavors: Chocolate, Chocolate Chip, Strawberry.]
How is dictionary different than a list?

- List – have to search for name first
- Dictionary – each key maps to a value
- getting name (or key) is automatic! Fast!
Implementing a Dictionary/Map

Keys map to values

• Create Empty dictionary
  somemap = {}

• Put in a key and its value
  somemap[“Forbes”] = “Strawberry”

• Get a value for a dictionary
  value = somemap[“Forbes”]

• Change a value for a dictionary
  somemap[“Forbes’”] = “Chocolate”
Change Astrachan’s value
somemap[“Astrachan”] = Coffee Mocha
Change Astrachan’s value
somemap[“Astrachan”] = Coffee Mocha

Students

- Astrachan
- Sun
- Rodger
- Forbes

Ice Cream Flavors

- Coffee Mocha
- Chocolate Chip
- Strawberry
Value could be a set or list

- Students
  - Astrachan
  - Sun
  - Rodger
  - Forbes

- Ice Cream Flavors
  - Coffee Mocha
  - Chocolate
  - Vanilla
  - Blueberry
  - Chocolate Chip
  - Blueberry
  - Banana
  - Strawberry
The Tech Twins

• Troy and Travis Nunnally
• Between them: 2 master’s and 1 doctorate from Georgia Tech
• Cofounders of Brain Rain Solutions
  • Augmented-reality
  • Internet-of-things
• Applied machine learning

https://www.wired.com/story/what-atlanta-can-teach-tech-about-cultivating-black-talent/
d = {'a': 10, 'b': 100}
How to use a Dictionary

• Create: `d = {}`
  • `d = {'a': 10, 'b': 100}`
  • `d = dict([(a', 10), (b', 100)])`

• Insert: `d[KEY] = VALUE`

• Update/Reassign: `d[KEY] = VALUE`

• Get a value (like list indexing): `d[KEY]`

• Key membership (not values): `KEY in d`
  • No membership check for values
How to use a Dictionary

• Let’s see some examples in the Python Console
How to use a Dictionary

• Like lists, but with keys
• KEY – immutable type, unique within dictionary
• VALUE – any type, not unique within dictionary
• Unordered collection of (KEY, VALUE) pairs