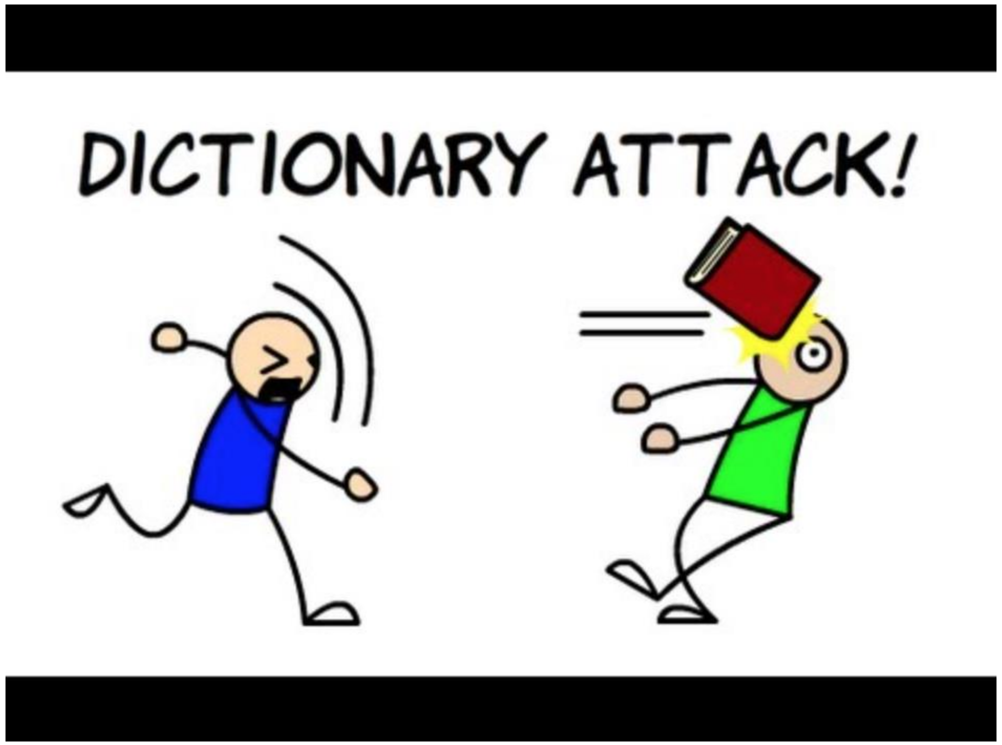
CSc 110, Autumn 2016

Lecture 27: Sets and Dictionaries

Adapted from slides by Marty Stepp and Stuart Reges



Exercise

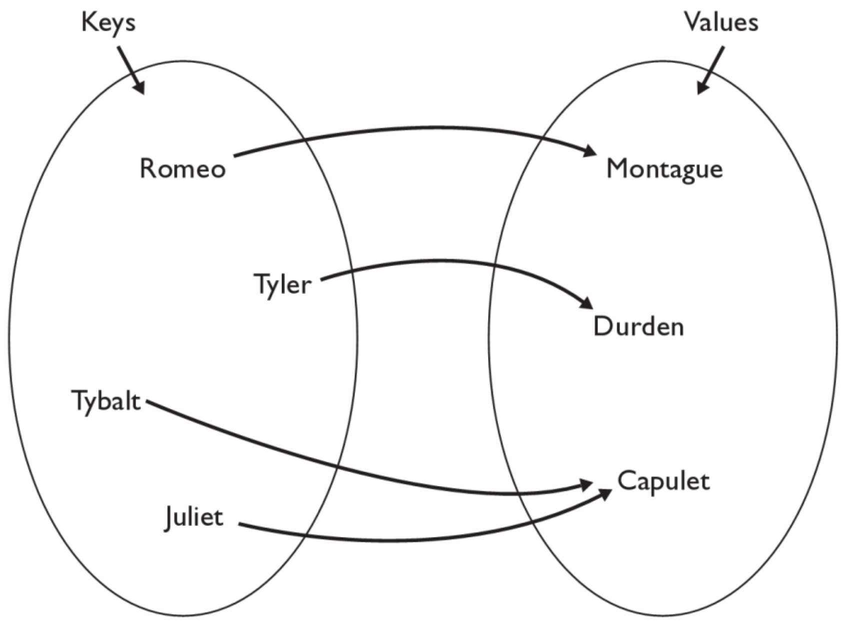
- Write a program to <u>count the number of occurrences</u> of each unique word in a large text file (e.g. *Moby Dick*).
  - Allow the user to type a word and report how many times that word appeared in the book.
  - Report all words that appeared in the book at least 500 times.

- What structure is appropriate for this problem?

Dictionaries

- **dictionary**: Holds a set of unique *keys* and a collection of *values*, where each key is associated with one value.
  - a.k.a. "map", "associative array", "hash"

- basic dictionary operations:
  - **put**(*key*, *value*): Adds a mapping from a key to a value.
  - **get**(*key*): Retrieves the value mapped to the key.
  - **remove**(*key*): Removes the given key and its mapped value.



`my_dict["Juliet"]` returns `"Capulet"`

Dictionary functions

`my_dict[`**key**`] =` **value**	adds a mapping from the given key to the given value; if the key already exists, replaces its value with the given one
`my_dict[`**key**`]`	returns the value mapped to the given key (error if key not found)
`items()`	return a new view of the dictionary’s items ((key, value) pairs)
`pop(`**key**`)`	removes any existing mapping for the given key and returns it (error if key not found)
`popitem()`	removes and returns an arbitrary (key, value) pair (error if empty)
`keys()`	returns the dictionary's keys
`values()`	returns the dictionary's values

You can also use `in`, `len()`, etc.

Maps and tallying

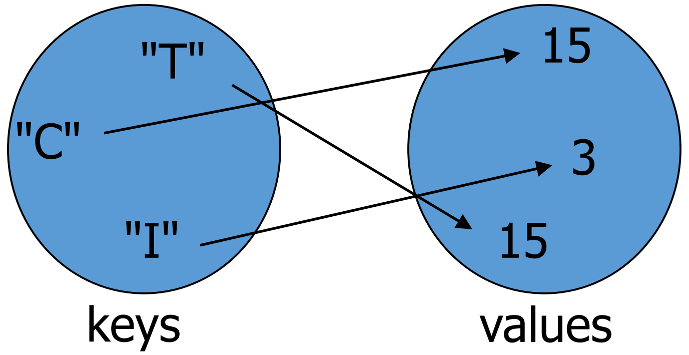
- a map can be thought of as generalization of a tallying list
  - the "index" (key) doesn't have to be an `int`
  - count digits: `22092310907` →

index	0	1	2	3	4	5	6	7	8	9
value	3	1	3	0	0	0	0	1	0	2

```
# (T)rump, (C)linton, (I)ndependent
```

  - count votes: `"TCCCCCCTTTTTCCCCCCTCTTITCTTITCCTIC"`

key	"T"	"C"	"I"
value	15	15	3



items, keys and values

- `items` function returns tuples of each key-value pair
  - can loop over the keys in a for loop

```
ages = {}
ages["Merlin"] = 4
ages("Chester"] = 2
ages["Percival"] = 12
for cat, age in ages.items()):
    print(name + " -> " + str(age))
```

- `values` function returns all values in the dictionary
  - no easy way to get from a value to its associated key(s)
- `keys` function returns all keys in the dictionary