

Objectives

- Wrap up dictionaries

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Lab Review

- What are our goals for a test function?
 - What are the benefits?
 - What are the alternatives?

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Test Functions

- Designing test function
 - Pick good test cases
 - Automatically (i.e., program) check results so its easy to spot problems
 - Report input/test cases that cause the problems
- Benefits:
 - Quickly and automatically test functions
 - Quickly add new test cases
 - Can rerun test cases quickly if function implementation changes
 - If tested well, you can use the function in other programs with confidence

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Review: Dictionaries

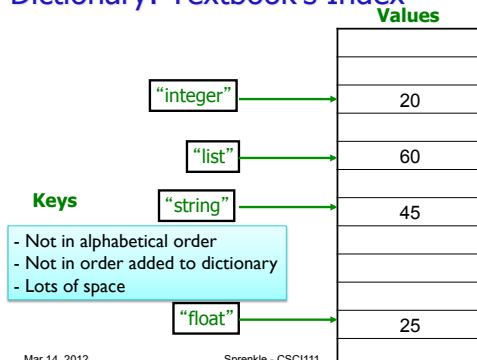
- What is a dictionary in Python?
- What is the syntax for creating a new dictionary?
- How do we access a key's value from a dictionary?
 - What happens if there is no mapping for that key?
- How do we create a key → value mapping in a dictionary?
- How can we iterate through a dictionary?

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Dictionary: Textbook's Index



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Review: Creating Dictionaries

Syntax:

{<key>:<value>, ..., <key>:<value>}

```
empty = {}  
ascii = { 'a':97, 'b':98, 'c':99, ..., 'z':122 }
```

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Adding/Modifying Key-Value Pairs

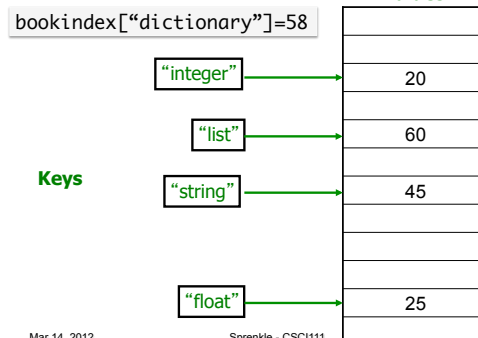
- Syntax:
`<dictionary>[<key>] = <value>`
- `directory['registrar'] = 8455`
 - Adds mapping for 'registrar' to 8455
- OR
- Modifies old entry if it existed to 8455

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Textbook's Index

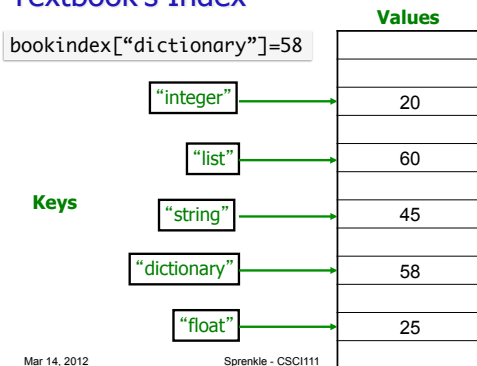


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Using Dictionaries

`using_dictionary.py`

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Methods `keys()` and `values()`

- Don't actually return a list object
- But can be used similarly to a list
- If you want to make them into a list:

```
keys = list(mydict.keys())
```

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Problem

- Given a file of the form
 - `<lastname> <year>`
- Create a mapping between the last name and year, i.e., I want to be able to quickly find out what a student's class year is
 - How do we want to model the data?
 - What is the key? What is the value?
 - How to display the mapping in a pretty way?
 - What order is the data printed in?

`years_dictionary.py`

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Problem

- Modify the previous program to keep track of the *number* of students of each year
 - How do we want to model the data?
 - What is the key? What is the value?
- Could we solve this using a list?

years_dictionary2.py

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Analyzing years_dictionary2.py

- Anything useful/general that we could put in a function?

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Equivalent Solutions

```
if key not in dictionary :  
    dictionary[key] = 1  
else:  
    value = dictionary[key] + 1  
    dictionary[key] = value
```

```
if key not in dictionary :  
    dictionary[key] = 1  
else:  
    dictionary[key] += 1
```

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Discussion

- Compare lists and dictionaries
 - What are their properties?
 - How are they similar?
 - How are they different?
 - When do you use one or the other?

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Lists vs. Dictionaries

Lists	Dictionaries
integer <i>positions</i> (0, ...) to any type of value	Map <i>immutable keys</i> (int, float, string) to any type of value
Ordered	Unordered
Slower to find a value (<i>in</i>)	Fast to find a value (use key)
Fast to print in order	Slower to print in order (by key)
Only as big as you make it	Takes up a lot of space (so can add elements in the middle)

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This Week

- Lab 8 due Friday
- Broader Issue: environmental monitoring using sensor networks

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