Why Does My Computer Do That? Intro to Coding with Python– Dictionaries

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Slides based off slides courtesy of Jordan Crouser (https://jcrouser.github.io/)

Plan for Today

- Dictionaries
  - motivation
  - defining a dictionary
  - converting multiple lists ←→ dictionaries

Recap: 15-minute exercise

Write a program that:

- asks the user to **`input()`** names one at a time
- adds each new name to a list called **`friends`**
- and after each new name is added prints the list in alphabetical order

The program should loop until the user types "**`DONE`**"

Motivation

- Imagine we want to use the previous exercise to create a contact list. Could do it with **multiple lists**:

Untitled

```
def main():

    instruction = "ADD"
    friends = []
    numbers = []

    while (instruction != "DONE"):
        # Get information about new contact
        friends.append(input("Name? "))
        numbers.append(input("Number? "))

        # Ask for next instruction
        instruction = input("ADD or DONE?")

if __name__ == "__main()__":
    main()
```

Ln: 9 Col: 15

Motivation

- If we want to access the data later:

```
print(friends[0]) # Joe
print(numbers[0]) # 413-286-3712

print(friends[1]) # Ali
print(numbers[1]) # 972-272-2782

print(friends[2]) # Clio
print(numbers[2]) # 291-288-2897
```

Ln: 8 Col: 32

- Or worse, modify it…

```
print(friends.pop(1)) # Bye,
print(numbers.pop(1)) # Ali!
```

Ln: 2 Col: 28

Motivation

- If we want to access the data later:

```
print(friends[0]) # Joe
print(numbers[0]) # 413-286-3712

print(friends
print(numbers
```

```
Ali
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Clio
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```

Untitled

Ln: 8 Col: 32

- Or worse, modify it.

Untitled

```
print(friends.pop(1)) # Bye,
print(numbers.pop(1)) # Ali!
```

Ln: 2 Col: 28

What we really want

- Each name should “map” to the corresponding number:

```
“Joe” → “413-286-3712”
“Ali” → “972-272-2782”
“Clio” → “291-288-2897”
```

- That way, we could access the **`number`** using the **`name`**:

```
contacts[“Joe”] # “413-286-3712”
```

Introducing: `dictionaries`

- **`lists`** were **ordered** sets of objects, and we accessed their contents via position (index)
- **`dictionaries`** are **unordered** sets, and we can access their contents via **`keys`**
- We declare them using `{…}` ← "curly braces" like this:

```
contacts = {}
```

Contacts: take 2

Untitled

```
def main():

    instruction = "ADD"
    contacts = {}

    while (instruction != "DONE"):
        # Get information about new contact
        new_friend = input("Name? ")
        new_number = input("Number? ")

        # Add contact to dictionary
        contacts[new_friend] = new_number

        # Ask for next instruction
        instruction = input("ADD or DONE?")

if __name__ == "__main()__":
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Ln: 18 Col: 10

Contacts: take 2

Untitled

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Ln: 18 Col: 10

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Ln: 18 Col: 10

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Ln: 18 Col: 10

Interesting dilemma

What happens when we **iterate** over a **dictionary**?

*demo10.py - /Users/jcrouser/G...

```
for c in contacts:
    print(c)
```

Ln: 1 Col: 6

dictionary methods: .keys()

- If you want to get a list of the **keys** in a **dictionary**

*demo10.py - /Users/jcrouser/Google Drive/Teaching/Course M...

```
print(contacts.keys())
# ["Joe", "Ali", "Clio"]
```

Ln: 1 Col: 1

dictionary methods: .values()

- If you want a **list** of the **values** in a **dictionary**

*demo10.py - /Users/jcrouser/Google Drive/Teaching/Course M...

```
print(contacts.values())
# ["413-286-3712",
#  "972-379-2782",
#  "297-288-2897"]
```

Ln: 4 Col: 19

dictionary methods: .items()

- If you want a **list** of the **key,value** pairs in a **dictionary**

*demo10.py - /Users/jcrouser/Google Drive/Teaching/Course Materi...

```
for key, value in contacts.items():
    print(key, value)
```

Ln: 2 Col: 21

dictionary methods: .copy()

- If you want to **copy** the **dictionary** :

*demo10.py - /Users/jcrouser/Google Drive/Teaching/Course Ma...

```
contacts = {"Joe" :"413-286-3712",
            "Ali" :"972-379-2782",
            "Clio":"297-288-2897"

contacts2 = contacts.copy()
```

Ln: 5 Col: 25

just like with a **list**

The `zip(...)` function

- If you want to combine two **`lists`** into one **`dictionary`**, use a comprehension and the **`zip(...)`** function:

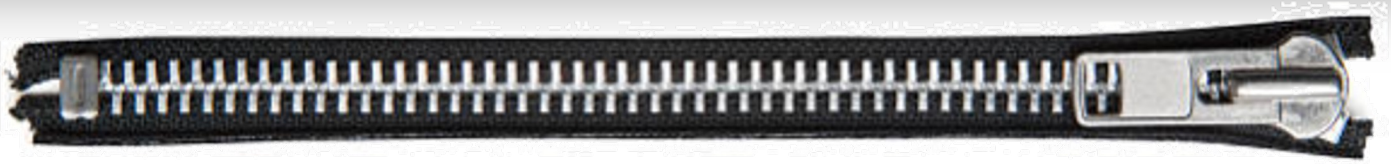
Untitled

```
names = ["Joe", "Ali", "Clio"]

numbers = ["413-286-3712",
           "972-272-2782",
           "291-288-2897"]

contacts = {name:number for name, number in zip(names, numbers)}
```

Ln: 7 Col: 35



Recap

- **`strings`**: immutable ordered collections of characters
- **`lists`**: mutable ordered collections of objects
- **`dictionaries`**: mutable unordered collections of objects

15 minute exercise

- Write a program that …
  - Asks the user "ADD or DONE? "
  - If the user says ADD
    - Take user input to creates a contact book entry that includes (1) name, (2) number, and (3) address
    - Ask "ADD or DONE? " again
  - If the user says DONE
    - Quit and print "X's number is Y and they live at Z" for each entry in the contact book