## **Objectives**

- Reading from files
- Writing to files

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# Midway Check: Parts of an Algorithm

- Primitive operations
  - What data you have, what you can do to the data
- Naming
  - Identify things we're using
- Sequence of operations
- Conditionals
  - ➤ Handle special cases
- Repetition/Loops
- Subroutines
  - > Call, reuse similar techniques

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Which of these have we covered?

How do we implement them in Python?

## Midway Check: Parts of an Algorithm

Primitive operations

where most of the rest of the semester focuses

Working toward

- > What data you have, what you can do to the data
- Naming
  - > Identify things we're using
- Sequence of operations
- Conditionals
  - > Handle special cases
- Repetition/Loops
- Subroutines
  - > Call, reuse similar techniques

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#### Review

- What is the major difference between strings and lists?
  - What are the implications of that difference?

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## Review: Lists vs. Strings

- Strings are **immutable** 
  - Can't be mutated?
  - Err, can't be modified/ changed
- Lists are mutable
  - Can be changed
  - Changes how we call/use methods

#### Implications:

- Think of list variables as pointing to the list
- Assigning a list to another variable does not make a copy of the list
- list methods **modify** the list on which the method was called
   Don't return a copy of the object, modified
- When you pass a list into a function, you can modify the list

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#### Review

• Why should we care about files?

#### **Files**

- Conceptually, a file is a sequence of data stored in memory
- To use a file in a Python script, create an object of type file
  - > **file** is a data type

**Built-in function**"constructs" a file object

- > <varname> = open(<filename>,<mode>)
  - <filename>: string
  - <mode>: string, "r" for read, "w" for write, "a" for append (and others)
- Ex: dataFile = open( "years.dat", "r" )

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#### Common File Methods

Method Name	Functionality
read()	Read all the content from the file, returned as a string object
readline()	Read next line from file, returned as a string object (which includes the "\n"). If it returns "", then you've reached the end of the file
write(string)	Write a string to the file
close()	Close the file. Must close the file after done reading from/writing to a file

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# Reading from a File

- Examples of reading from a file using file methods
  - Show file: data/famous\_pairs.txt

Typically use .dat or .txt file extension to name files containing data or text

- file\_read.py (using read())
  - How is what Python printed different than the file's content?
  - ➤ How to fix?
- Using readline()

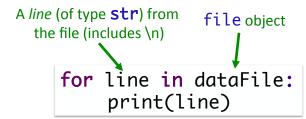
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# Reading from a File

- Recall that a file is a sequence of data
- Can use a **for** loop to iterate through a file



> Read as: for each line in the file, do something

for\_file\_read.py

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### **Data Types of Loop Variables**

#### What are the data types of the loop variable **x**?

```
myString = "some string"
dataFile = open("datafile.dat", "r")

for x in range(len(myString)):
    # loop body ...

for x in myString:
    # loop body ...

for x in dataFile:
    # loop body ...
```

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### **Data Types of Loop Variables**

```
What are the data types of the loop variable x?
```

```
myString = "some string"
dataFile = open("datafile.dat", "r")

for x in range(len(myString)):
    # loop body ...

for x in myString:
    # loop body ...

for x in dataFile:
    # loop body ...

string → single
    characters

string → line
    (include \n)
```

## Problem: Searching a File

• We want to search a file for some term. We want to know which lines of the file contain that term and a *count* of the number of lines that contained that term

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file\_search.py <sub>13</sub>

## Writing to a File

• Create a file object in write mode:

```
> myFile = open("myfile.txt", "w")
```

• Example: create a file from user input

What happens if you execute the program again with different user input?

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### **Handling Numeric Data**

- We have been dealing with reading and writing strings so far
  - > Read from a file: get a string
  - > Write to file: use a string
- What do we need to do to read numbers from a file?
- How can we write numbers to a file?

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## Handling Numeric Data

- We have been dealing with reading and writing strings so far
  - > Read from a file: get a string
  - > Write to file: use a string
- What do we need to do to read numbers from a file?
  - > Cast as a numeric type, e.g., int or float
- How can we write numbers to a file?
  - > Cast number as a str

### Broader Issue: Cryptography

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#### **Broader Issues Discussion**

- What is cryptography?
  - ➤ Why is cryptography useful?
- Debate is often summarized as "privacy vs security"
  - ➤ What does this mean? How does it relate to the recent case (Apple vs FBI) referred to in the article?
- Why are computer scientists involved in politics?
  - > Has this class informed your politics?
- Who is Alan Turing?

# **Duffie and Hellman**

Technique still used in protocols (like SSL today)