Introduction to Programming

Spring 2022

Objects and Graphics

- The String Data Type
- Simple String Processing
- List as Sequences
- String Representation and Message Encoding
- String Methods
- Lists Have Methods too
- From Encoding to Encryption
- Input/Output as String Manipulation
- **File Processing**

File Processing

- File processing is an important part of computer programming
- Files can be used to persist data from one invocation of your program to another
- Example
  - You have an app that keeps track of all your contacts.
  - When you use the app for the first time you add all your contacts.
  - Now you expect that when you will use the app next time it will remember all the data.

File Processing

- A file is a sequence of data that is stored in secondary memory (disk drive).
- Files can contain any data type, but the easiest to work with are text.
- A file usually contains more than one line of text.
- Python uses the standard newline character (`\n`) to mark line breaks.

Multi-Line Strings

```
Hello
World

Goodbye 32
```

- When stored in a file:

```
Hello\nWorld\n\nGoodbye 32\n
```

Multi-Line Strings

- This is exactly the same thing as embedding `\n` in print statements.
- Remember, these special characters only affect things when printed. They don't do anything during evaluation.

File Processing

- The process of opening a file involves associating a file on disk with an object in memory.
- We can manipulate the file by manipulating this object.
  - Read from the file
  - Write to the file

File Processing

- When done with the file, it needs to be closed. Closing the file causes any outstanding operations and other bookkeeping for the file to be completed.
- In some cases, not properly closing a file could result in data loss.

File Processing

- Working with text files in Python

- Associate a disk file with a file object using the open function
  - `<filevar> = open(<name>, <mode>)`
- Always close the file
  - <filevar>.close()

- name is a string with the actual file name on the disk. The mode is either ‘r’ or ‘w’ depending on whether we are reading or writing the file.

- Example

```
infile = open("numbers.txt", "r")
```

File Processing

- `<file>.read()` – returns the entire remaining contents of the file as a single (possibly large, multi-line) string
- `<file>.readline()` – returns the next line of the file. This is all text up to and including the next newline character
- `<file>.readlines()` – returns a list of the remaining lines in the file. Each list item is a single line including the newline characters.
- Must convert numbers to int or float

File Processing

- Example

File Processing

- Opening a file for writing prepares the file to receive data
- If you open an existing file for writing, you wipe out the file's contents. If the named file does not exist, a new one is created.
  - `outfile = open("mydata.out", "w")`
  - `print(<expressions>, file=outfile)`
- Example

File Dialogs

- Python looks for files in the current directory
- Files can be located anywhere on the hard disk
- Allow users to browse the file system for locating files (just like other apps)

File Dialogs

- To ask the user for the name of a file to open, you can use `askopenfilename` from `tkinter.filedialog`.

```
from tkinter.filedialog import askopenfilename
…
infileName = askopenfilename()
infile = open(infileName, "r")
```

File Dialogs

- To ask the user for the name of a file to save, you can use `asksaveasfilename` from `tkinter.filedialog`.

```
from tkinter.filedialog import asksaveasfilename
…
outfileName = asksaveasfilename()
outfile = open(outfileName, "w")
```

Class Work

- Write a program that:

1) opens a file for reading

2) read one line at a time

1) counts the number of words in the line

2) counts the total number of characters (not including spaces) in the line

3) Display total number of words and characters in the file

4) Display average word size

Class Work

- Download the file futval.py from Canvas. This program prompts the user for the amount of the investment, the annualized interest rate, and the number of years of investment.
- Modify the program so that it will read the data from an input file and write the result to an output file