File IO
String formatting

Files

- Files give us PERSISTENCE
  - Data in programs is cleared with every run, not the case with files
- Text files provide convenient input/output storage
  - e.g. programs can read configuration data or input files to process, and can write output to files

Files – important terms

- File: A document
- Directory: A folder containing files and other folders
- File System: Collection of all the files and folders on the computer, organized in a hierarchy

File Input/Output

- We read data from a file into our program.
- We write data from our program into a file.
- Steps for File I/O

  1. Open the file (creates a "connection" between your program and the file).

```
f = open('animals.txt')
```

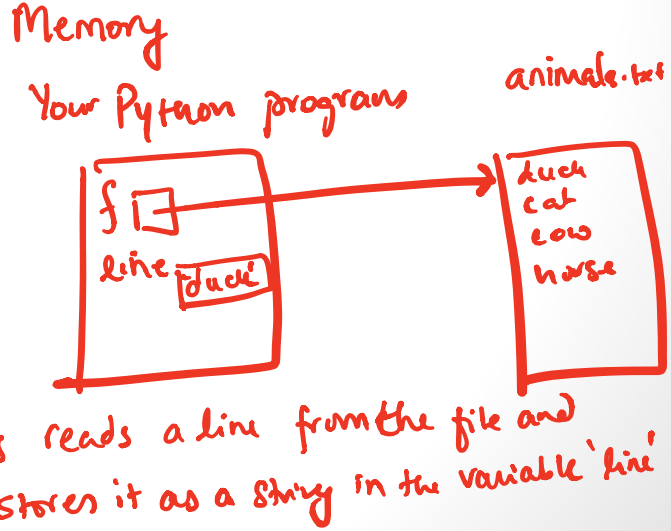
  2. Read the data / write the data

  3. Close the file (close the "connection"). This should to be done once per file.

Reading Files with Methods

- Several methods for reading text from files:
  - `readline()`: reads and returns next line; returns empty string at end-of-file
  - `read()`: reads the entire file into one string
  - `readlines()`: reads the entire file into a list of strings
- All of these leave a trailing '\n' character at the end of each line.

```
f = open('animals.txt')
line = f.readline()
print(line)
line = f.readline()
f.close()
```



Reading Files in a loop

```
f = open('animals.txt')
for line in f:
    print(line.strip())
f.close()
```

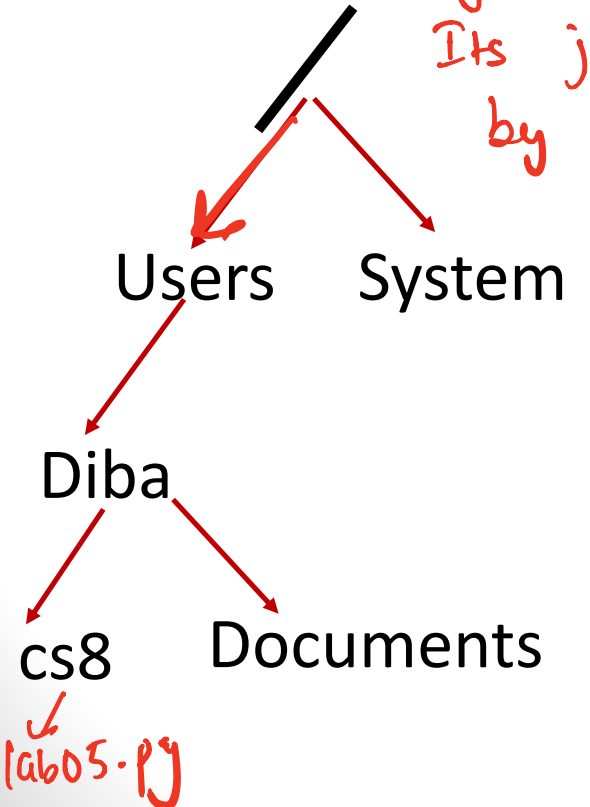
See detailed lecture notes for usage with read and readlines

Writing to file

```
outfile = open('example_2.txt', 'w')
outfile.write("Duck\nCow\nCat")
outfile.close()
```

Unix File System

- Root (/): Files (and directories) are organized in a hierarchical fashion (like a pyramid). The 'root' is starting point of the hierarchy (top of the pyramid)
- Path : A way of specifying the location of a file in the pyramid



Its just a sequence of directories separated by '/'

e.g. the path to lab05.py from the root is

/Users/Diba/cs8/lab05.py

(Any path that starts at the root is called an ABSOLUTE path)
This is just one way of specifying the PATH (or location) of files

Concept Question

Every file on a file system can be referred to be an "absolute pathname", which consists of a sequence of … what?

A. Files
B. Directories
C. Paths

Concept Question

In contrast to an “absolute pathname”, we have the concept of a “relative pathname”. What is the technical term used for the “starting point” of a “relative pathname”?

A. Root
B. Home directory
C. Current directory
D. None of the above

In a relative path the "starting point" doesn't have to be the root

Navigating the unix file system

- Some common unix commands
  - `ls`
  - `pwd`
  - `mkdir`
  - `cd`