File IO

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()
```

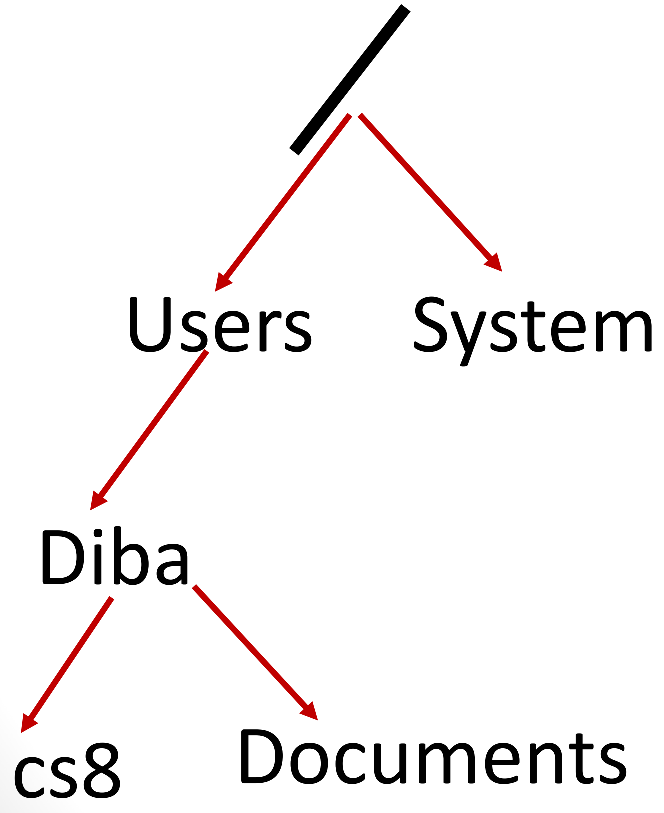
See detailed lecture notes for usage with read and readlines

Writing to file

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

Unix File System

- Root (/)
- Path



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

Navigating the unix file system

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

String Methods

```
s = "CS 8: Intro to Programming”
s.find(“8”)
s.find(“Math”)
s.startswith(“CS”)
s.startswith(“Computer”)
s.endswith(“ing”)
s.endswith(“Prog”)
s.count(‘m’)
'Mississippi'.count('i’)
s.replace(":", "#")
s.upper()
‘Mississippi’.lower()
```

Concept Question

```
MS = “Mississippi”
MS.replace(“i”, “!”)
print(MS)
```

What is printed?

A. Mississippi
B. M!ss!ss!pp!
C. Error
D. None of the above

String formatting

Let’s say you have an integer price:

```
price = 18.00
```

Write a statement to print:

```
The price is <price>. Wow that’s cheap!
```

''' Format specification:
{ : }. Left side of colon say which argument to place into {}

To the right we specify a FIELD WIDTH (i.e., how many spaces/
columns on the screen to devote to this

```
print("-->{}<--".format(price))
print("-->{:20}<--".format(price))
# We can use '>' or '<' to justify left or right
print("-->{:<20}<--".format("18"))
print("-->{:>20}<--".format("18"))
# we can use '^' to center.
print("-->{:^20}<--".format("18"))
print("-->{:20.2f}<--".format(price))
# without 'f' , price appears in scientific notation
# width of 20, with 2 places after the decimal
```