File IO

Python for Ecologists

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Overview of files

- What is a file?
- Where is a file stored?
- Reading files
- Writing files
- Opening files on the Internet
- Hairy Issues
- Problems!

What is a file?

- Technically - long strings of 0s and 1s
- Informally - a name for the place your program reads from and writes to

Where is a file stored?

- Files can be stored on your computer, or on a remote computer.
  - When files are on your computer, life is easy, ex:
    - 'myFileName.txt'
  - When files are on a remote computer, you need a specific protocol to retrieve them, ex:
    - 'http://mywebsite.com/myFileName.txt'

How do I get data out of a file?

1 Open the file.

```python
file = open("myFileName.txt")
```

2 Loop through the File (here we loop through)

```python
for line in file:
    print(line)   # line is a string, lets print
```

3 Close the File

```python
file.close()
```

I want to do more than print!

- Code:

```
file = open('myFileName.txt')
for line in file:
    print(line)   # line is a string, lets print it!
file.close()
```

- line is a string, so we can do whatever we want to it. If the line is a sentence, and we wanted to break it up by words, we could do this instead :

```
file = open('myFileName.txt')
for line in file:
    for word in line.split():
        print(word)    # lets print each word!
file.close()
```

I want to save a file

- We can open a file for writing, as well as reading.

```
file = open('anotherFile.txt', 'w')
file.write('This is output!\n')
file.close()
```

- Be careful not to overwrite an important file!

How can we open a file from the Internet?

- Short answer: do different things
- Long answer: make one function so that both operations look the same:
  - The 'openAnything' function tries to open both URLs and local drives

    ```
    import fileUtils
    file = fileUtils.openAnything('YourFilePathHere')
    ```

Why you'll hate files

- Files can be open in different modes
  - w - write
  - a - appends
  - r - read (default)
  - and more!
- Files involve string parsing and manipulation
  - This can be a real pain!
  - Corruption prone!

Exercise

1. Read a file
   1. Read StateoftheUnion.txt
   2. Output each word on its own line
2. Sum a file
   1. Read IntegerFile.txt, which has many numbers on one line.
   2. Calculate the sum, and the mean. Hint, the int() function turns a string into a number.
3. File copier
   1. Copy http://www.ubertool.org/index.html to a file on your local disk.