Lecture 2: Python Basics

April 1, 2021

Python Files

 You can write and edit code in files. This is the preferred method when you're working on a large codebase or repeatedly editing code.

 Code that should only be executed when the file is being called directly is placed in:

```
if __name__ == '__main__':
    # only executes if this file is being called directly
    ...
```

Execute the file by calling python file.py

Python Style



(a stylish python)

Comments

A single-line comment in Python is denoted with the hash symbol.

77 77 77

Multi-line comments
Lie between quotation marks
This is a haiku

PEP8

Spacing

Use four spaces to indent code (don't use tabs).

Use blank lines to separate functions from each other and logical sections within a function.

Use spaces around operators and after commas, but not directly inside delimiters.

$$a = f(1, 2) + g(3, 4) \# good$$

 $a = f(1, 2) + g(3, 4) \# bad$

PEP8

Commenting

Comment all nontrivial functions.

A function's docstring is the first string literal inside the function body.

Describe parameters (value / expected type) and return (value / expected type).

As usual: list pre/post conditions if any.

Add header comments at the top of files before any imports.

If possible, put comments on a line of their own.

```
def my function():
    ** ** **
    Summary line: do nothing, but document it.
    Longer description: No, really, it doesn't do anything.
    Returns: Gosh, for the last time... nothing (None)!
    ** ** **
    pass
print(my function. doc )
     Summary line: do nothing, but document it.
     Longer description: No, really, it doesn't do anything.
     Returns: Gosh, for the last time... nothing (None)!
```

PEP8

Naming

Use snake_case for variables/functions; CamelCase for classes; CAPS CASE for constants.

Decomposition and Logic

Same as 106A/B/X. Simple is better than complex!

Automated Code Style Checking

Use <u>PEP8 Online</u> for mechanical violations (naming, spacing) and more advanced suggestions.

Use pycodestyle as a command line tool. Install with pip install pycodestyle (you'll do this in the installation instructions).

File I/O

Read

Function	Action
next(f)	Returns the next line in the file
f.read()	Returns the entire file as a string
for line in f:	Loops over the file, line by line
f.readlines()	Returns the lines of the file as a list of strings

Write

Function	Action
f.write(new_line)	Writes new_line to the file

^{*} Writing appends or overwrites, depending on the method

What happens without f.close()?

- When the program ends (naturally or from an error), Python will try to clean up any objects that remain in memory.
- This isn't guaranteed*, but it happens most of the time. You should be concerned if you're writing code that will be run on many operating systems or Python versions.
- If it isn't closed, the file could remain locked so other programs can't open it or become corrupted.
- The safe option: use a context manager!

* Depends on the operating system, Python version, Python implementation (which language the interpreter was written in), ...

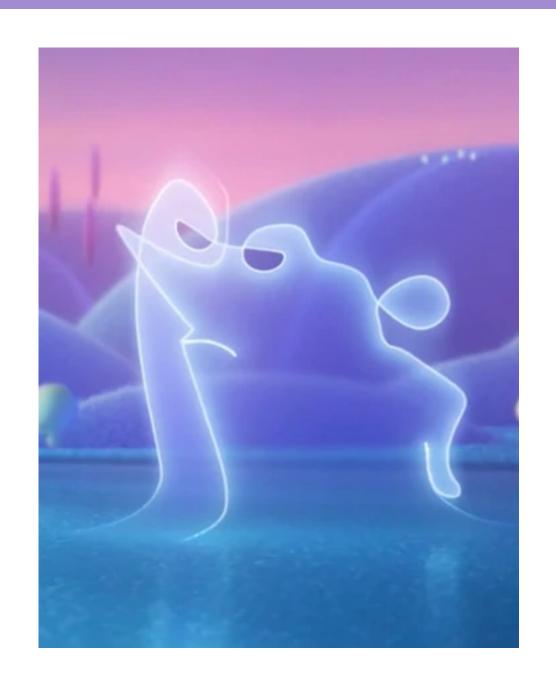
with open ("words.txt", "r") as f:

open ("words.txt", "r") is a file object - it has instructions about how to open and close the file.

The context manager makes sure those instructions are followed, no matter what.

Roughly equivalent to:

```
f = open("words.txt", "r")
try:
     ...
finally:
     f.close()
```



Strings, Revisited

Useful String Methods

Method	Action
.lower()	Converts the string to lowercase
.upper()	Converts the string to uppercase
.title()	Converts the string to title case (every word capitalized)
.strip([chars])	Removes the characters from the ends of the string (or whitespace if chars is omitted)

Method	Action
.find(substr)	Finds the first occurrence of substr and returns the index (or -1 if not found)
.replace(old, new)	Replaces every instance of old with new and returns the new string
.startswith(substr).endswith(substr)	Returns whether the string starts/ends with substr

Splitting and Joining

```
"3-14-2015".split('-') # => ['3', '14', '2015']

"Michael Jamiroquai Cooper".split()
# => ['Michael', 'Jamiroquai', 'Cooper']

", ".join(["Minerva", "Albus", "Severus"])
# => 'Minerva, Albus, Severus'
```