Lecture 2: Python Basics

April 1, 2021

Python Files

- You can write and edit code in files, which allows you to

Python Style

(a stylish python)

Comments

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


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

PEP 8

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
```

PEP 8

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)!
```

PEP 8

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 PEP8 Online 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).

Reading Files

```
f = open(filename, method)
```

- `r` - Read
- `w` - Write
- `a` - Append
- `b` - Bytes Mode

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
`f.writelines([collection, of, new, lines])`	Writes the collection of lines to the file

** Writing appends or overwrites, depending on the method*

```
f.close()
```

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'
```

Virtual Environments

Math

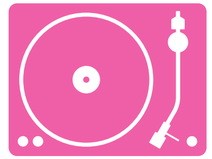
TI-84

Law

Econ

TI-Nspire

CSRE



(Parth, on the way to lecture)

Law

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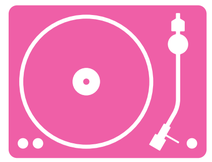

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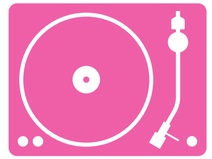


(Parth, on the way to lecture)

Project 1

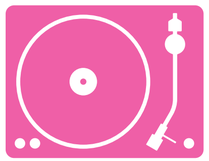
TI-84

Project 2

Project 3

TI-Nspire

Project 4



(Parth, on the way to lecture)

Project 1	Project 2	Project 3	Project 4
Python Imaging Library	SciPy	Python Imaging Library	SciPy
requests v2.3	pdfreader	requests v2.25	pyglet

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Things to Know*

- You can use the `workon` command or the `source` command to activate a virtual environment (depending on how you created it).
- `deactivate` deactivates the virtual environment.
- When you're working in a virtual environment, use `pip` to install packages. They'll only be installed into the active environment.
- All of this is explained in the Installing Python handout!

* if you frequently work on multiple Python projects

Console Input

`input(prompt)`

Shows the user `prompt` and allows the user to type at the cursor.

Returns the user's input (as a string) when they press Enter.

`print(msg)`

Sends `msg` (as a string) to the terminal, where it is displayed to the user.

```
name = input("What's your name? ")
print(f"Hi {name}!")
```

```
name = "Michael Jingleheimer Cooper"
```

```
What's your name? Michael Jingleheimer Cooper
Hi Michael Jingleheimer Cooper!
```