Introduction to Python

With NASA API

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Why learn Python?

- Python is one of the easiest to learn programming languages.
- It has implementations in a wide variety of fields, from data science to video games to web development and desktop GUIs.
- It is NOT used for mobile app development.
- https://wiki.python.org/moin/WebFrameworks

Installing Python

Download

https://www.python.org/downloads/

Documentation

https://docs.python.org/3/using/windows.html

https://docs.python.org/3/index.html

Need to add Python to your path? Try
https://stackoverflow.com/questions/3701646/how-to-add-to-the-pythonpath-in-windows

Installing Python

Editors

https://www.sublimetext.com/

https://wiki.python.org/moin/PythonEditors

Integrated Development Environments

https://www.anaconda.com/what-is-anaconda/

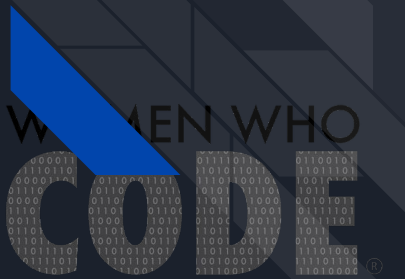
https://www.jetbrains.com/pycharm/

Online Interactive Shell

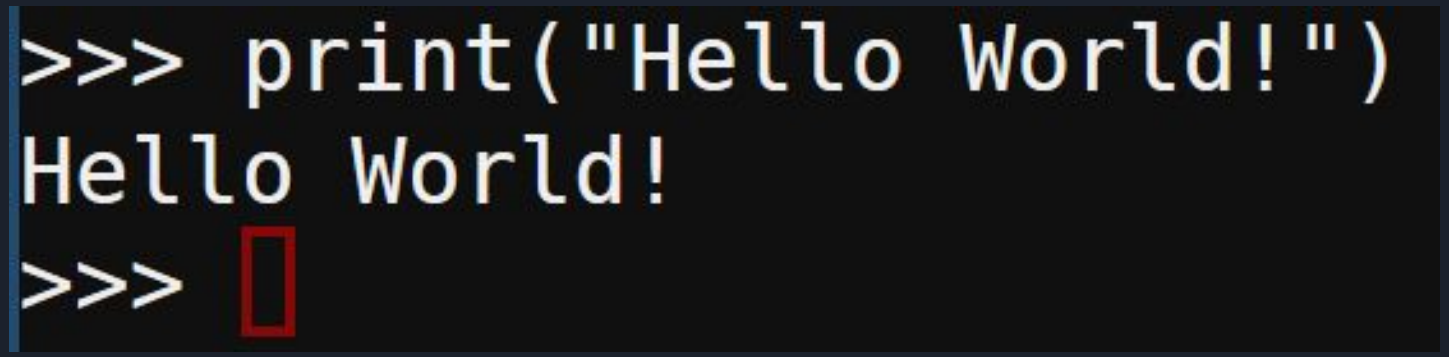
https://www.python.org/shell/

Basics

- Hello, World!
- Indentation
- Arrays
- Loops
- Adding Packages



Hello, World!



Hello, World!

```
>>> h = 'hello'
>>> w = 'world'
>>> x = "!"
>>> num = 0
>>> print(h, w, x, num)
hello world ! 0
```

Hello, World!

```
>>> print(h+w)
helloworld
```

```
>>> print(h+num)
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: must be str, not int
```

Hello, World!: A note about “ vs ‘

```
>>> print("'Hello' world!")
'Hello' world!
>>> print('Hello "world"!')
Hello "world"!
>>> print('Hello 'world'!')
  File "<stdin>", line 1
    print('Hello 'world'!')
                       ^
SyntaxError: invalid syntax
```

Arrays

```
>>> h_world_array = (h, w, x, num)
>>> print(h_world_array)
('hello', 'world', '!', 0)
```

Lists: Using Operators

```
>>> even_numbers = [2,4,6,8]
>>> odd_numbers = [1,3,5,7]
>>> all_numbers = odd_numbers + even_numbers
>>> print(all_numbers)
[1, 3, 5, 7, 2, 4, 6, 8]
```

Lists: Searching using “`if ... in`”

```
>>> needed_number = 4
>>> if needed_number in all_numbers:
...     print("Found the number you needed!")
...
Found the number you needed!
```

Lists: .append

```
>>> mylist = []
>>> mylist.append(1)
>>> mylist.append('mixed list')
>>> mylist.append(3.004)
```

```
[]
```

```
[1]
```

```
[1, 'mixed list']
```

```
[1, 'mixed list', 3.004]
```

Lists: Printing Using “for ... in”

```
>>> print(mylist[0])
1
```

```
>>> for x in mylist:
...     print(x)
...
1
mixed list
3.004
```

Loops: “while”

```
>>> count = 0
>>> while count < 5:
...     print(count)
...     count += 1
...
0
1
2
3
4
```

Modules

- A module is a file consisting of Python code.
- A module can define functions, classes and variables.
- A module can also include runnable code.

Modules: Example with `random`

- `random` contains a function to randomly select a number in range
- Once imported, you can access those functions.

```
import random

print(random.randint(0,5))
```

Packages

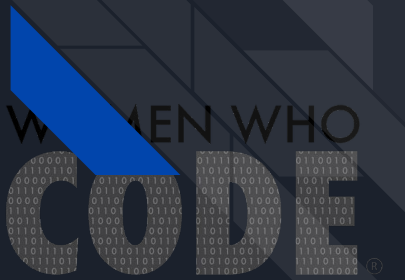
- Packages are namespaces which contain multiple packages and modules themselves.
- They are basically directories with a special file called __init___.py, so the package can imported just like a module!
- Python libraries are modules that are in common use and often come pre-loaded in IDEs.

API (Application Programming Interface)

- An API is a part of a server (which itself is a computer that connects with other computers) .
- The API receives requests and sends responses when you connect to it.
- For example when you want Meetup.com or your school's online learning system to create an event on your Google calendar.

NASA API

- Installing the `nasa` package
- Other resources



NASA API

- https://github.com/brendanv/nasa-api
- This package must be installed with pip
  - Pip should install with Python
  - `pip install nasa-api-wrapper`
- You must connect an API key https://api.nasa.gov/

NASA API

MAAS

Browse reports from the Mars Atmospheric Aggregation System

Easily get the latest report:

```
>>> from nasa import maas
>>> report = maas.latest()
>>> report.min_temp_fahrenheit
-110.2
```

NASA API

Earth Assets and Imagery

Fetch Landsat 8 images of any location on Earth! This consists of two distinct APIs: Assets that detail when a picture was taken of a given location, and the actual Imagery for that location and time.

You can use the Assets API to fetch images:

```
>>> from nasa import earth
>>> assets = earth.assets(lat=1.5, lon=100.75, begin='2014-02-01', end='2014-06-01')
>>> [(a.date, a.id) for a in assets]
[('2014-02-04T03:30:01', 'LC8_L1T_TOA/LC81270592014035LGN00'),
 ('2014-02-20T03:29:47', 'LC8_L1T_TOA/LC81270592014051LGN00'),
 ...
 ('2014-05-27T03:28:32', 'LC8_L1T_TOA/LC81270592014147LGN00')]

>>> image = assets[0].get_asset_image()
>>> image.id
'LC8_L1T_TOA/LC81270592014035LGN00"'
>>> image.image.__str__()
'<PIL.PngImagePlugin.PngImageFile image mode=RGB size=512x512>'
```

Backup and Reference Slides

Upcoming Space Apps & Python Workshops at Coworking Night

- Check out https://www.spaceappshsv.com/workshops/ for a complete listing.
- Join us Friday before Space Apps for **Code-Along Python 101**
- Wednesday September 19th - **Scientific and Geographic Python**
- Wednesday September 26th - **Explore the NASA Catalogs** - Go to https://data.nasa.gov for more.

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Even more resources

- Continue learning basic Python
  - https://docs.python.org/3/tutorial/index.html
  - https://www.w3schools.com/python/
  - https://hackr.io/tutorials/learn-python
- Learn Python for web development
  - https://pythonspot.com/web-dev/

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Even more resources

- Learn Python for game development
  - https://www.gamedesigning.org/learn/python/
- Learn Python for data science
  - https://realpython.com/tutorials/data-science/

MOOCs (like EdX and Coursera) have multiple Python-based courses.

Questions?

Marcia DeFiore Ensley and Kim Hill

Women Who Code Huntsville:
https://www.womenwhocode.com/huntsville

WeRockIT Conf:
https://werockitconf.com/