Python Training Workshop 2019

An introduction course to Python

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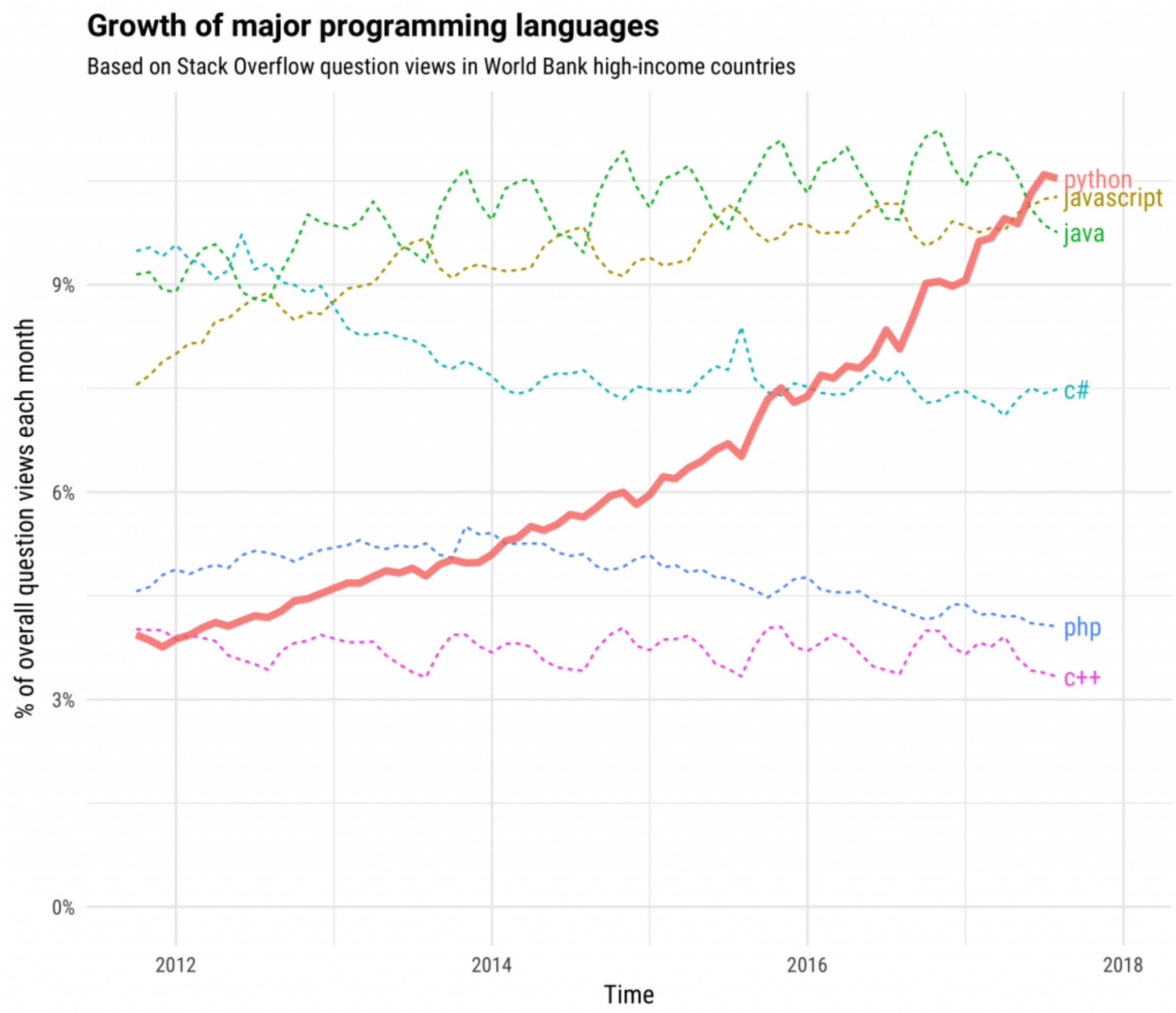
Please go to

`https://tinyurl.com/y6wzrkl5 (introduction)`
`https://tinyurl.com/ybz69nux (hands-on materials)`
`https://tinyurl.com/ycwj6kcs (Download all notebooks)`

Python: a very fast-growing language



A new era of computing

- Varieties of programming languages
- Multi-core CPU and GPU support
- Easily-accessible cloud computing
- Cloud microservices

Python: a versatile language

- high-level
- object-oriented, and
- Interpreted

programming language.

Python: a "High-level language"

- "Low level language": C, Fortran, Basic
- **Level** means the accessiblity to system resources.
- **High Level** :
  - care less about memory management or proper declaration of variables
  - less abstract than low-level language
  - less time to write and compile
  - relatively slower running time than some low-level language (not always true).

Community of Python users

- Web backend developers
- Data science
- Machine learning

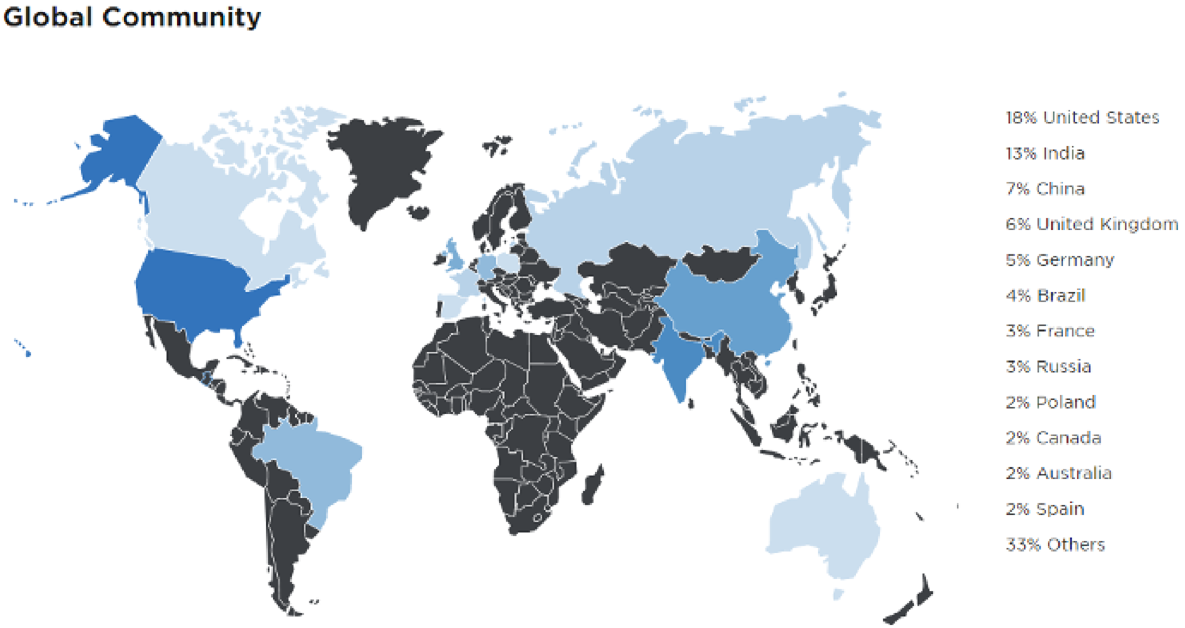
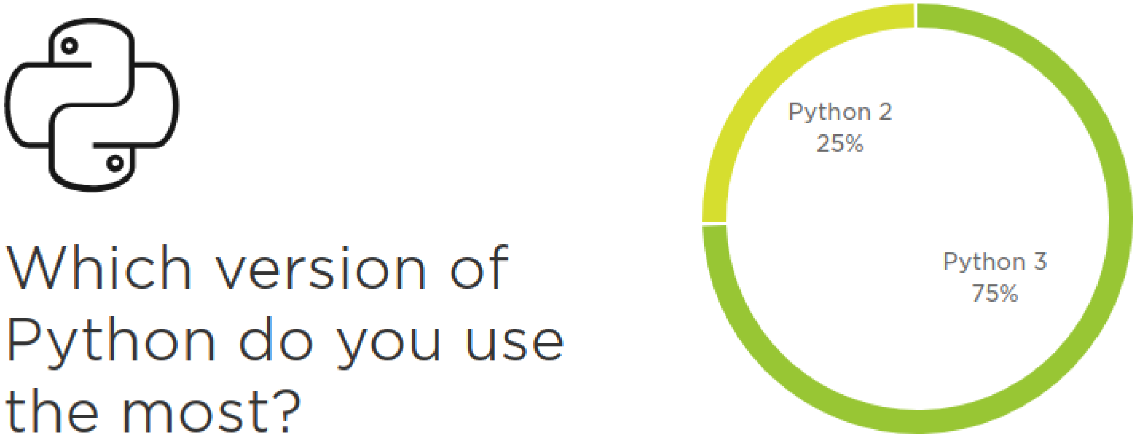


Image courtesy of the Python Developers Survey 2017 Results website

Python 2 vs Python 3

Results are quoted from

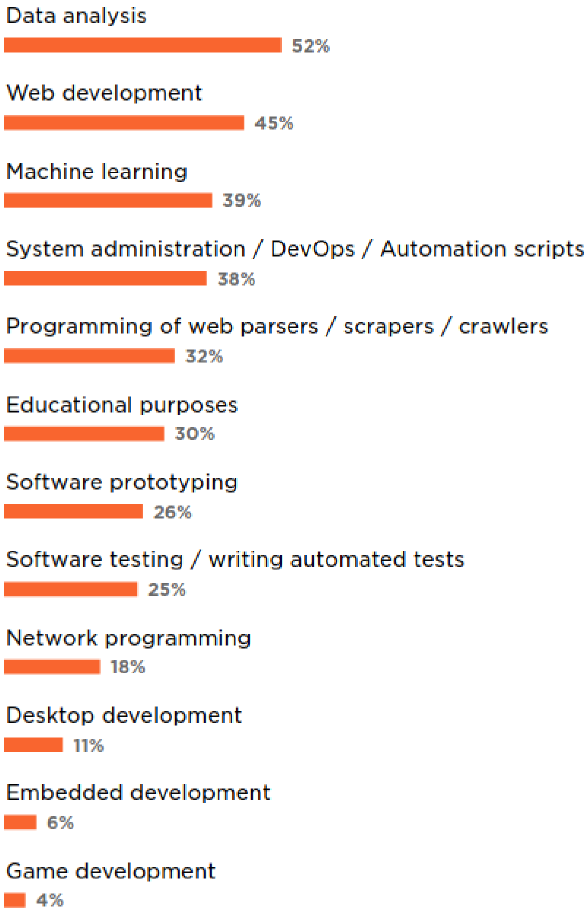
https://www.jetbrains.com/research/devecosystem-2018/python/



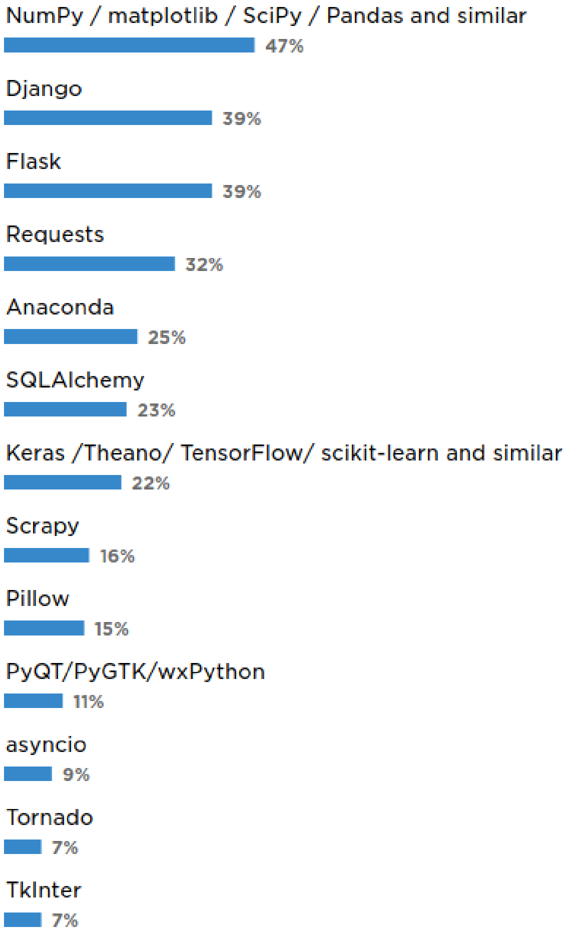
Which version of Python do you use the most?

Python Usages

What do you use Python for?



What libraries and/or frameworks do you use in addition to Python, if any?



Installation

- Refer to another guide
- Recommendation:
  - Anaconda
  - Google colab

Install packages (with anaconda)

- `conda search xxxxxx`
- `conda install xxxxxx`

Install packages (with `pip`)

`pip` is a package management system in Python

To search/install packages:

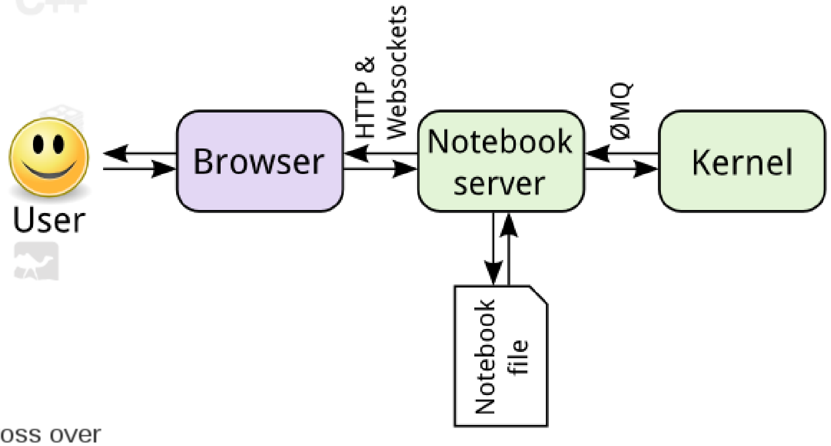
- Search package : `pip search xxxxxx`
- Install package : `pip install xxxxxx`
- Upgrade package : `pip install --upgrade xxxxxx`
- Uninstall package : `pip uninstall xxxxxx`
- Install wheel package :`pip install xxxxxx.whl`

Jupyter Notebook

You may want to run a Jupyter notebook when:

- You want to try out a new experiment or analysis with an existing Jupyter notebook from someone.
- You want to develop an algorithm that run on a large software.
- You have only ten minutes to download a data, plot a graph and send the email to your supervisor in a neat format.

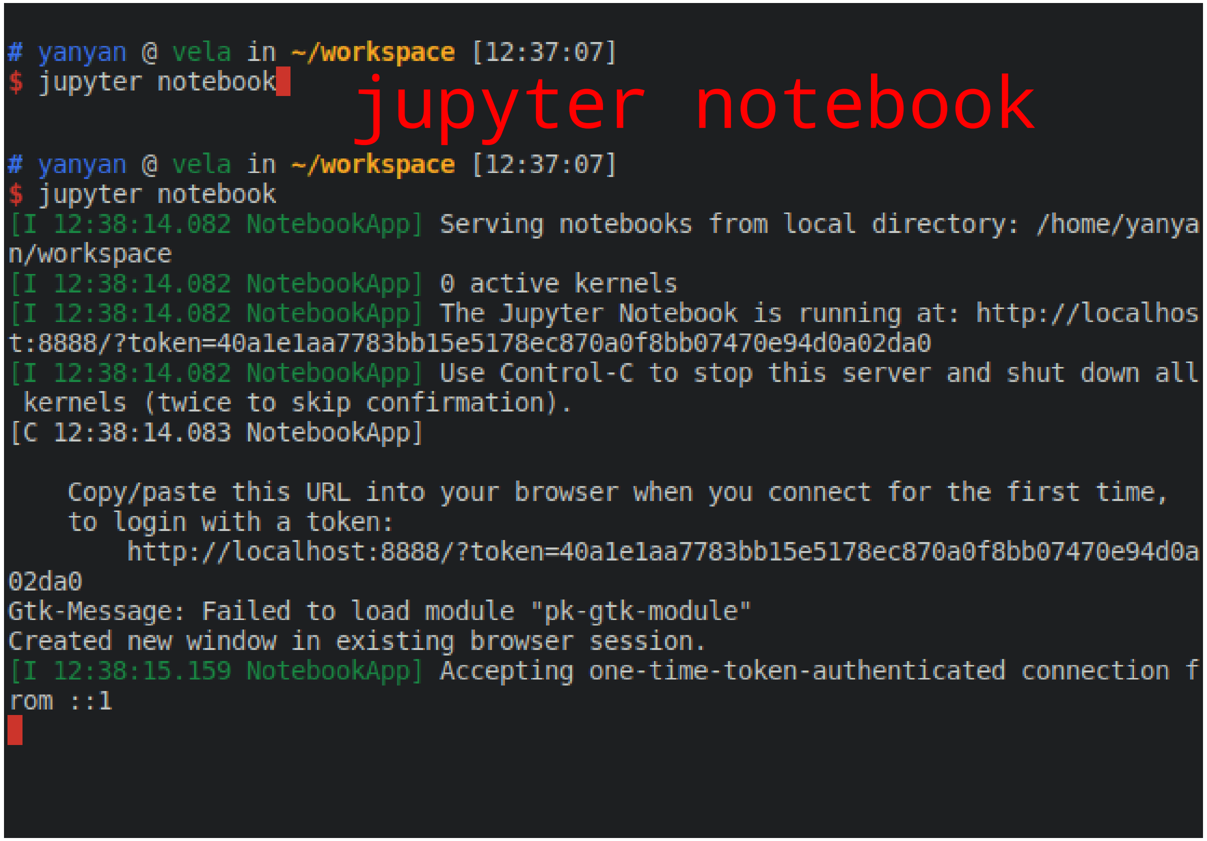
Open source, interactive data science and scientific computing across over 40 programming languages.



Open Jupyter in Linux/MacOS

Type

```
jupyter notebook
```



jupyter notebook

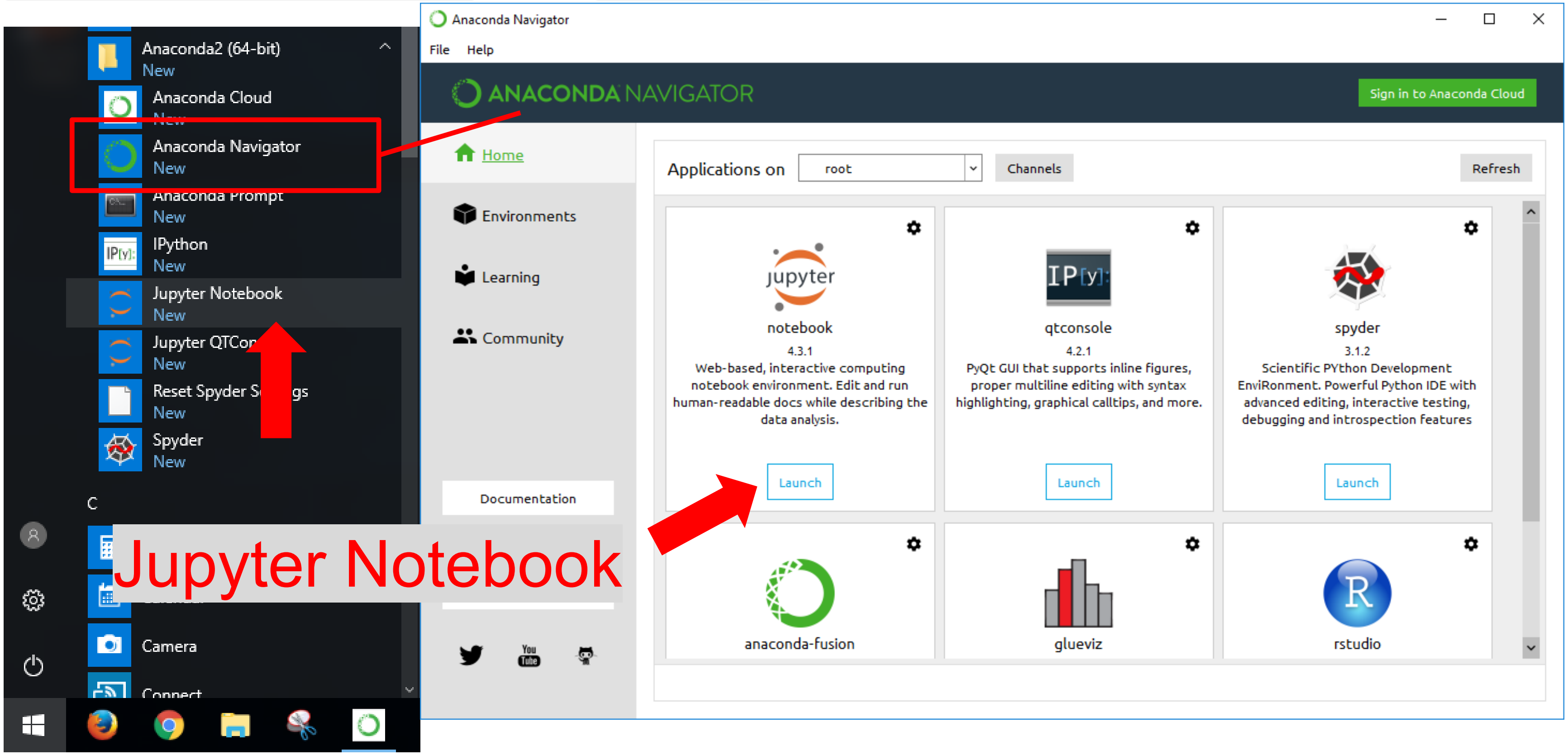
```
# yanyan @ vela in ~/workspace [12:37:07]
$ jupyter notebook

# yanyan @ vela in ~/workspace [12:37:07]
$ jupyter notebook
[I 12:38:14.082 NotebookApp] Serving notebooks from local directory: /home/yanya
n/workspace
[I 12:38:14.082 NotebookApp] 0 active kernels
[I 12:38:14.082 NotebookApp] The Jupyter Notebook is running at: http://localhos
t:8888/?token=40a1e1aa7783bb15e5178ec870a0f8bb07470e94d0a02da0
[I 12:38:14.082 NotebookApp] Use Control-C to stop this server and shut down all
 kernels (twice to skip confirmation).
[C 12:38:14.083 NotebookApp]

    Copy/paste this URL into your browser when you connect for the first time,
    to login with a token:
        http://localhost:8888/?token=40a1e1aa7783bb15e5178ec870a0f8bb07470e94d0a
02da0
Gtk-Message: Failed to load module "pk-gtk-module"
Created new window in existing browser session.
[I 12:38:15.159 NotebookApp] Accepting one-time-token-authenticated connection f
rom ::1
```

Open Jupyter in Windows

Open your Start menu, goes to `Anaconda` Folder,
Click the `Jupyter Notebook` shortcut (Recommended). Or start the `Anaconda Navigator` and `Launch`



Jupyter Notebook

Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis.

PyQt GUI that supports inline figures, proper multiline editing with syntax highlighting, graphical calltips, and more.

Scientific PYthon Development EnviRonment. Powerful Python IDE with advanced editing, interactive testing, debugging and introspection features

Hand's on Session

The hand's on session requires a working python installations with Jupyter installed. The following links are read-only, they do not run calculations in your computer.

First Session:

- Python Syntax
- Python Data Structures
- Python Numpy Array

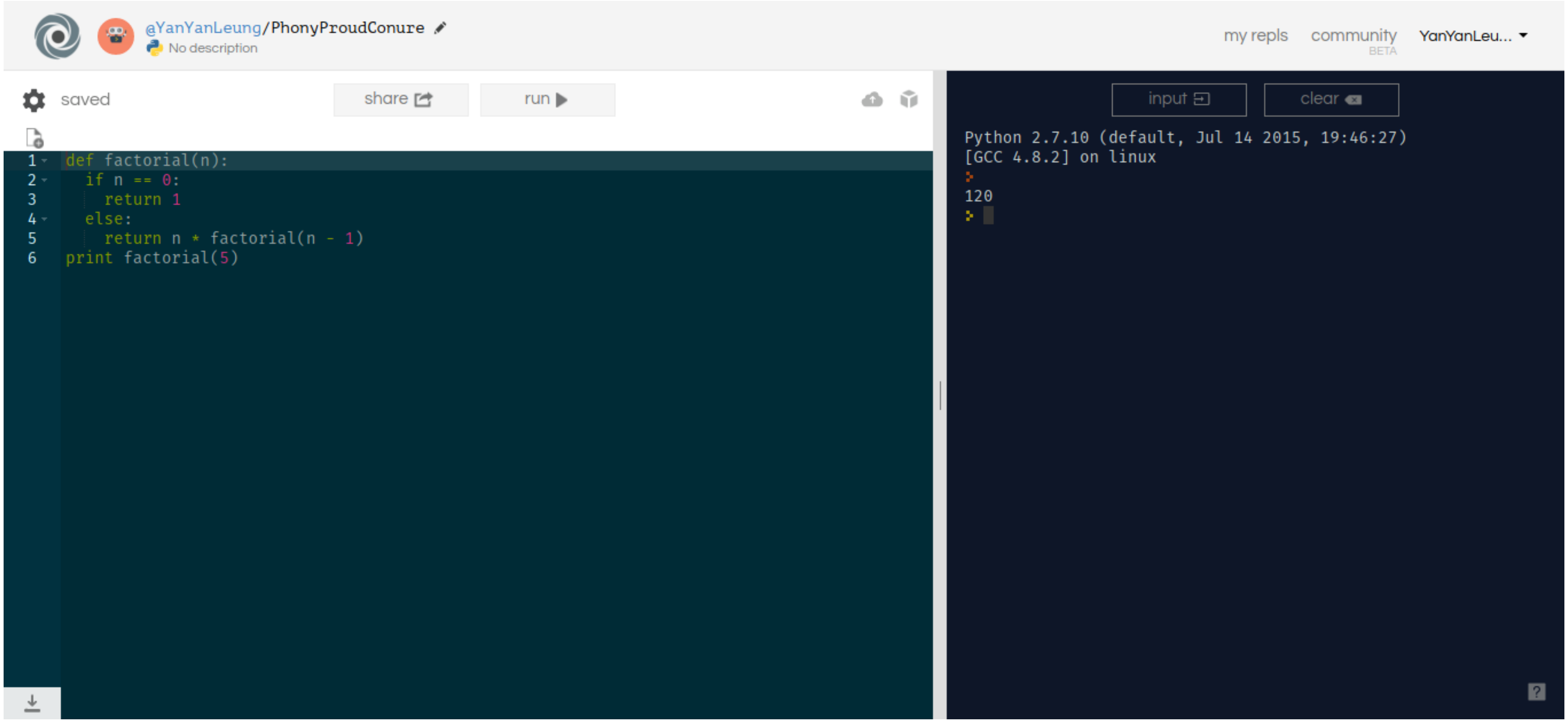
Second Session:

- Introduction to Pandas
- Python Functions and Class
- Python Matplotlib
- Python plotting with Astropy and AplPy

Online Platforms

Here are some online Python platform that are quite good indeed.

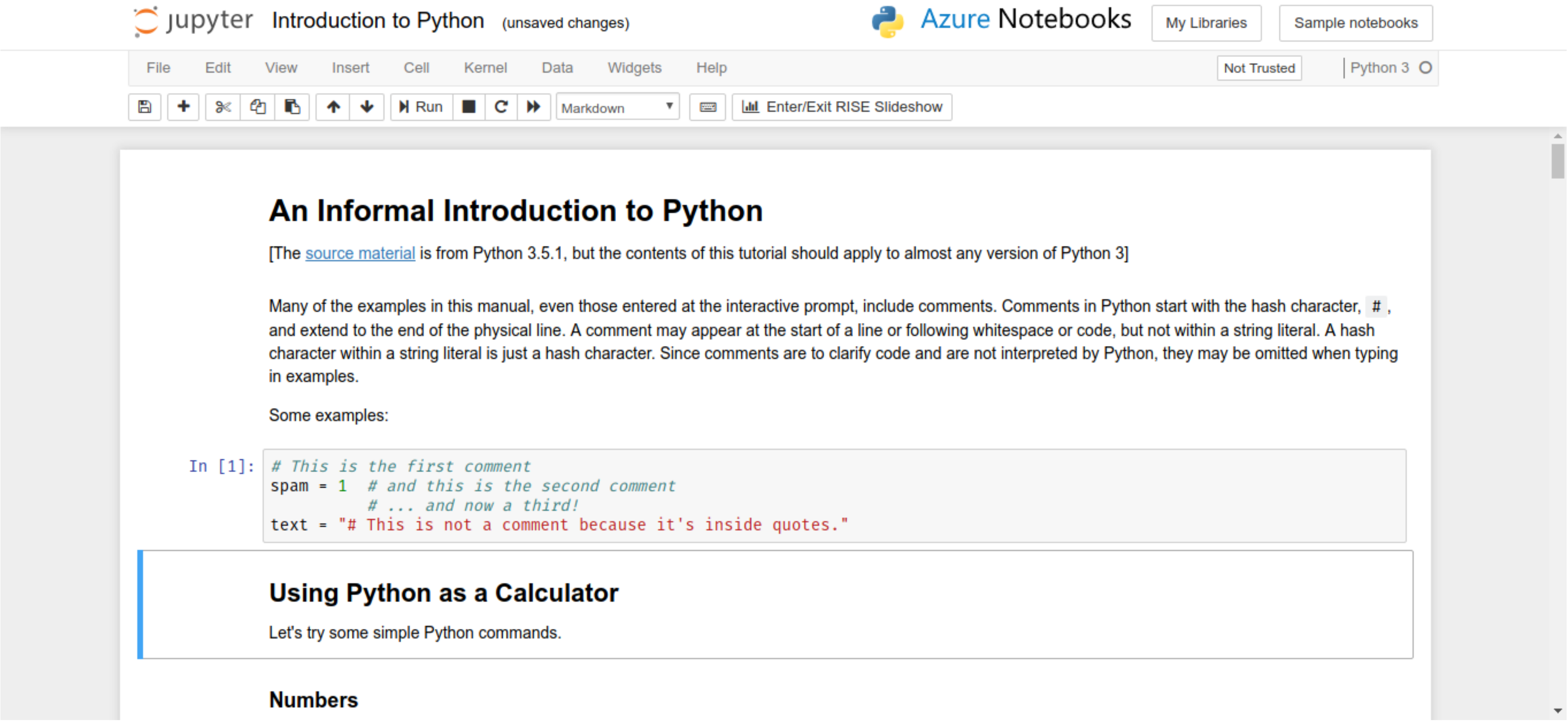
- c9.io
- repl.it
- Microsoft Azure Notebooks
- Google Colab



```python
def factorial(n):
  if n == 0:
    return 1
  else:
    return n * factorial(n - 1)
print factorial(5)
```

```
Python 2.7.10 (default, Jul 14 2015, 19:46:27)
[GCC 4.8.2] on linux
>
120
>
```

repl.it



An Informal Introduction to Python

[The source material is from Python 3.5.1, but the contents of this tutorial should apply to almost any version of Python 3]

Many of the examples in this manual, even those entered at the interactive prompt, include comments. Comments in Python start with the hash character, `#`, and extend to the end of the physical line. A comment may appear at the start of a line or following whitespace or code, but not within a string literal. A hash character within a string literal is just a hash character. Since comments are to clarify code and are not interpreted by Python, they may be omitted when typing in examples.

Some examples:

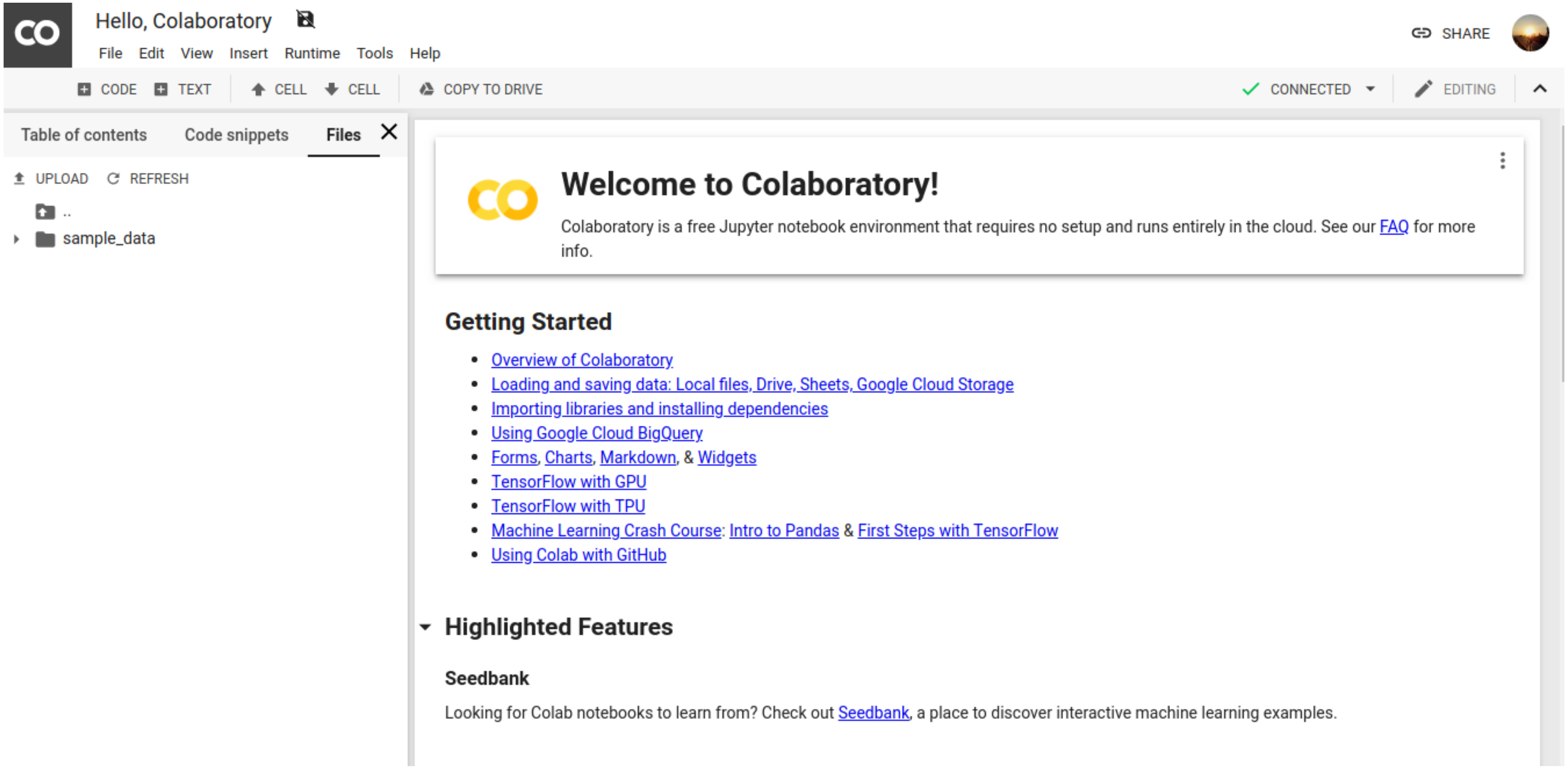
In [1]:
```
# This is the first comment
spam = 1  # and this is the second comment
          # ... and now a third!
text = "# This is not a comment because it's inside quotes."
```

Using Python as a Calculator

Let's try some simple Python commands.

Numbers

Azure Notebook



Welcome to Colaboratory!

Colaboratory is a free Jupyter notebook environment that requires no setup and runs entirely in the cloud. See our FAQ for more info.

Getting Started

- Overview of Colaboratory
- Loading and saving data: Local files, Drive, Sheets, Google Cloud Storage
- Importing libraries and installing dependencies
- Using Google Cloud BigQuery
- Forms, Charts, Markdown, & Widgets
- TensorFlow with GPU
- TensorFlow with TPU
- Machine Learning Crash Course: Intro to Pandas & First Steps with TensorFlow
- Using Colab with GitHub

Highlighted Features

Seedbank

Looking for Colab notebooks to learn from? Check out Seedbank, a place to discover interactive machine learning examples.

Google Colab

Online Judge

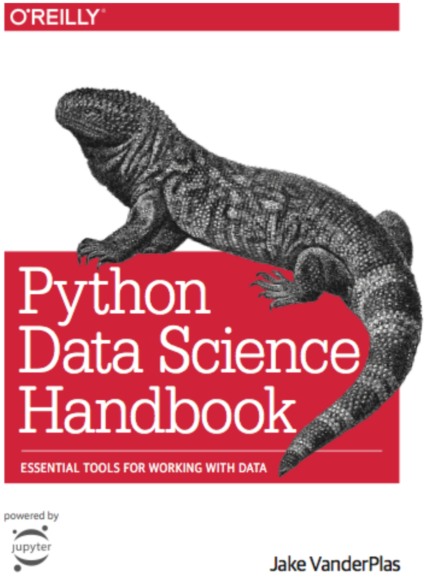
- Sphere Online Judge (SPOJ)
- HackerRank
- CodeAcademy
- Aizu Online Judge (AOJ)

Good Reference Material

- stackoverflow.com

stackoverflow

- https://github.com/jakevdp/PythonDataScienceHandbook



O'REILLY

Python Data Science Handbook

ESSENTIAL TOOLS FOR WORKING WITH DATA

powered by jupyter

Jake VanderPlas

- Book: Python for Astronomers

Credits

This tutorial have referenced the following materials:

- Unidata's online-python-training
- Anaconda Installation Guide
- And thanks Sandy Chan and Stephen Ng