

# Getting Started with Python

A beginner course to Python

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# Links

Tutorial Material on GitHub:

<http://goo.gl/grrXQJ>

# Learning Outcomes

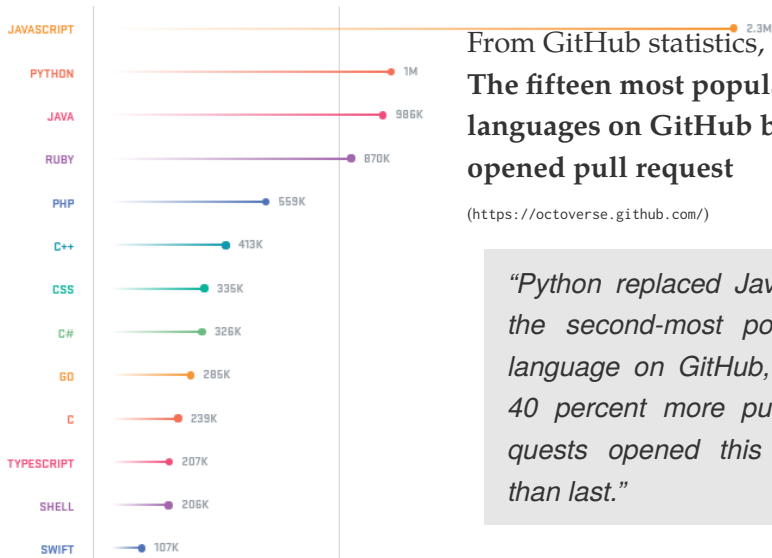
- ⊙ Python as a programme language
- ⊙ Python for different OS.
- ⊙ Use Python in **Jupyter notebook**.
- ⊙ **Familiar with different data structures.**
- ⊙ **Make a loop with for and while.**
- ⊙ **Defining functions.**
- ⊙ **Reading files and plotting graphs.**
- ⊙ **Object-oriented and Classes.**
- ⊙ **Examples.**

# What is Python?

Introduction to programming language and  
python

# Why Python?

programming languages—but especially JavaScript.



From GitHub statistics,  
**The fifteen most popular  
languages on GitHub by  
opened pull request**

(<https://octoverse.github.com/>)

*“Python replaced Java as the second-most popular language on GitHub, with 40 percent more pull requests opened this year than last.”*

# What is Python?

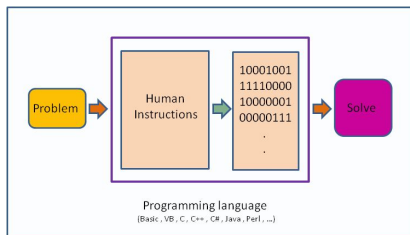


- ⦿ High-level programming language.
- ⦿ Object-oriented, interpreted, interactive.
- ⦿ Easy write, easy read.
- ⦿ Dynamic variables & memory management.

# What does a program do?

Sequences of instructions that tell the computer to solve your problem.

- ⦿ Like cooking.
- ⦿ A program is a receipt.
- ⦿ You prepare raw food, seasoning, etc. (Input)
- ⦿ If you follow the receipt, you will get a good food (hopefully).



# Why Python? Lots of packages!

- ⦿ Coding and debugging is a tough task.
- ⦿ Spend less time debugging, Code more!
- ⦿ Lots of packages written in Python for speed deployment!





# How can I get python?

Install python on your system.

# Python distributions

- ⦿ Anaconda (Recommended! For Windows, MacOS and Linux)
  - <https://www.anaconda.com/download/>
- ⦿ Official Site (Windows, MacOS, Linux)
  - <https://www.python.org/downloads/>

# Python version, 2 vs 3

## Python 2 vs Python 3:

- ⊙ Python 2 still has a huge number of users.
- ⊙ Officially, they suggest people to use python 3
- ⊙ Python 3 is the future, it reduces nasty way to
- ⊙ code.
- ⊙ But there stills a lot of well-written package for
- ⊙ python 2.
- ⊙ So, learn both is the best option, you can use any
- ⊙ of it, but keep it consistent.
- ⊙ Learn to use `__future__` package in python2.

# Installing Python with Anaconda

## ⦿ Windows

- [http://ryan-leung.github.io/PHYS4650\\_Python\\_Tutorial/installing-on-windows.html](http://ryan-leung.github.io/PHYS4650_Python_Tutorial/installing-on-windows.html)

## ⦿ MacOS

- [http://ryan-leung.github.io/PHYS4650\\_Python\\_Tutorial/installing-on-macos.html](http://ryan-leung.github.io/PHYS4650_Python_Tutorial/installing-on-macos.html)

## ⦿ Linux:

- [http://ryan-leung.github.io/PHYS4650\\_Python\\_Tutorial/installing-on-linux.html](http://ryan-leung.github.io/PHYS4650_Python_Tutorial/installing-on-linux.html)

# Install Python in Linux (Not from Anaconda)

Linux: Usually pre-installed, or get it from repository:

- ⦿ Fedora: `sudo dnf install python`
- ⦿ Ubuntu: `sudo apt-get install python`

MacOS: Usually pre-installed in new version.

# Installing package in Python

How can we install package we need.

# What are python packages (or library)



# Packages for numerical calculations

## 1. For symbolic maths

1.1 sympy

## 2. For numerical

2.1 numpy

2.2 scipy

## 3. For data science

3.1 pandas



machine learning in Python

$y_{it} = \beta x_{it} + \mu_i + \epsilon_{it}$





# Packages for data visualing/plotting

**matplotlib** All-round, major plotting in Python.

**aplpy** High quality FITS image plotting program.

**yt** Large data / volumetric data visualising.

**bokeh** interactive plots in html & javascript.

**matplotlib**



## conda, package management system for Anaconda

- ⊙ Anaconda distribution have their own package management system.
- ⊙ To use `conda`, one should have open a proper Anaconda Python setup as the instruction.
- ⊙ And the `conda` command in terminal is working (any terminal in MacOS/Linux; “Anaconda prompt” in MS Windows Start menu.)

To search/install packages:

- ⊙ `conda search xxxxxx`
- ⊙ `conda install xxxxxx`
- ⊙ Other commands:
- ⊙ [http://conda.pydata.org/docs/\\_downloads/conda-cheatsheet.pdf](http://conda.pydata.org/docs/_downloads/conda-cheatsheet.pdf)

# `pip`, a package management system for 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`

# Virtual Environment

`virtualenv` is a tool to create isolated Python environments.  
Simply open your terminal and type:

- ⊙ `virtualenv ENV`, where `ENV` is a directory to place the new virtual environment.
- ⊙ To use : `source ENV/bin/activate`
- ⊙ To end and deactivate the session : `source deactivate`
- ⊙ Example:
  - `virtualenv ~/newpython/`, which create a “newpython” directory under your home directory.
  - `source ~/newpython/bin/activate`.

# Create virtual Python environment in `conda`

`conda` has its own version to create a separated Python environment.

- ◎ To create : `conda create -n yourenvname python=x.x anaconda`
- ◎ Example :
  - `conda create -n py3 python=3.6 anaconda` to create a Python 3 environment even you are using Python 2.
  - `conda create -n py2 python=2.7 anaconda` , vice versa.
- ◎ To use : `source activate yourenvname`
- ◎ To end and deactivate the session : `source deactivate`

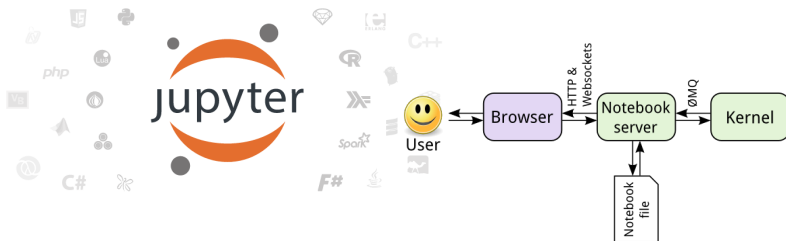
# Running Python in computer

How can we launch python.

# Jupyter Notebook

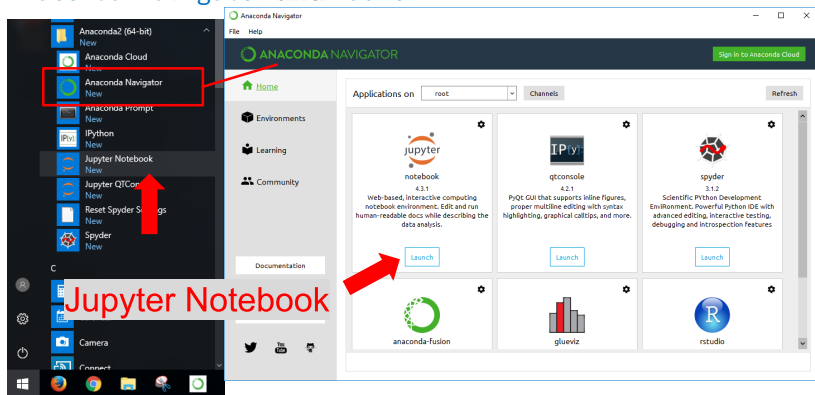
You may want to run a Jupyter notebook when:

- ⦿ 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 Jupyter in Windows

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





# Open Jupyter in Linux/MacOS

Type: `jupyter notebook`

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

**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
```

# Hands-on Session 1

- ⦿ Python Syntax
- ⦿ Python Intrinsic Data Type
- ⦿ Python Data Structures
- ⦿ Python Conditionals And Loops
- ⦿ Python Functions And Class

# Hands-on Session 2

- ◎ Python plotting with `matplotlib`
- ◎ Python plotting with `Astropy`
- ◎ Python data analysis with `Pandas`
- ◎ Problem solving

# Running Python without Jupyter

For large software, a python script is much better.

# Python interpreter

For Linux / OSX, type `python` in terminal. For windows, open `Anaconda` folder in Start menu.

# Running a python script (In Linux and Mac)

Simply type `python xxxx.py` in the terminal.

You can also type `PATH_TO_SCRIPT.py` if you get the following done:

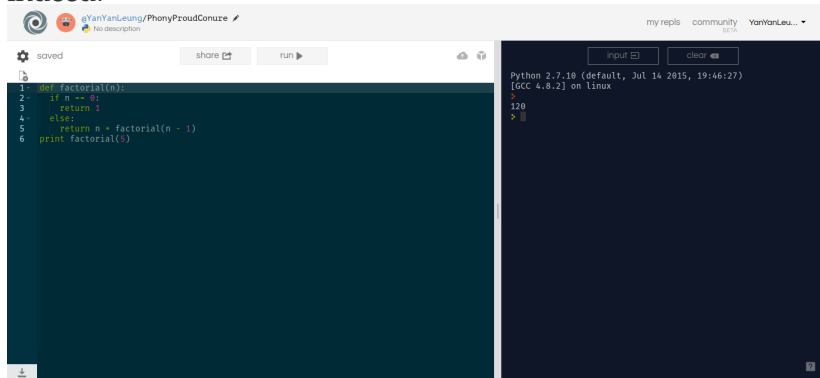
- ⦿ Add it to the first line of your script:
- ⦿ `#!/usr/bin/env python` (MacOS might be different)
- ⦿ You must then make the script executable, using the following command:
- ⦿ `chmod +x YOUR_SCRIPT.py`

# Tools for learning Python

How to strengthen your Python programming skills.

# Online Platforms

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



The screenshot shows the Repl.it interface. At the top, the user profile is '@YanYanLeung/PhonyProudConure' with a 'No description' note. Navigation links include 'my repls', 'community BETA', and the user name 'YanYanLeu...'. The main editor area on the left contains a Python script for calculating a factorial:

```
1- def factorial(n):
2-     if n == 0:
3-         return 1
4-     else:
5-         return n * factorial(n - 1)
6- print factorial(5)
```

Buttons for 'saved', 'share', and 'run' are visible above the editor. The right-hand pane shows the execution environment: 'Python 2.7.10 (default, Jul 14 2015, 19:46:27) [GCC 4.8.2] on linux'. It includes 'input' and 'clear' buttons. The output shows the result of the script execution:

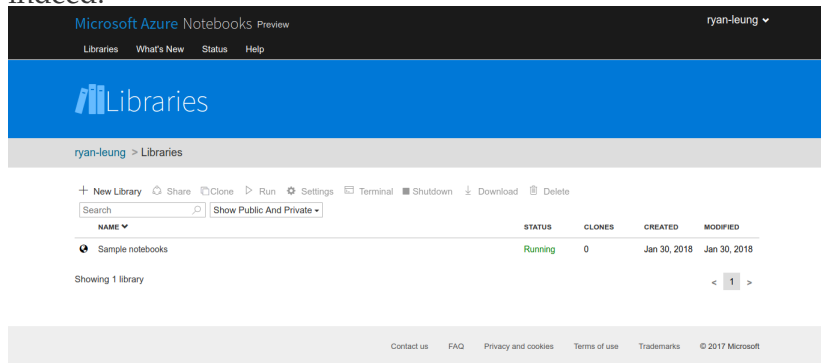
```
>
120
>
```

repl.it (<https://repl.it/>)



# Online Platforms

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



Microsoft Azure Notebooks Preview ryan-leung

Libraries What's New Status Help

## Libraries

ryan-leung > Libraries

+ New Library Share Clone Run Settings Terminal Shutdown Download Delete

Search Show Public And Private

NAME	STATUS	CLONES	CREATED	MODIFIED
Sample notebooks	Running	0	Jan 30, 2018	Jan 30, 2018

Showing 1 library

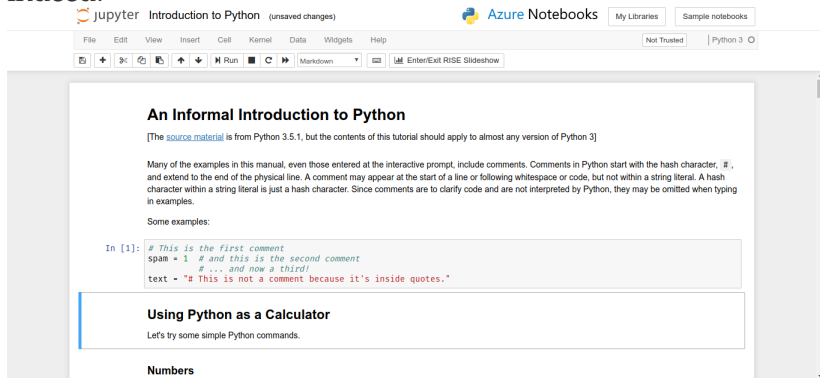
< 1 >

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Microsoft Azure Notebooks (<https://notebooks.azure.com/>)

# Online Platforms

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



The screenshot displays the Azure Jupyter Notebook web interface. At the top, the Jupyter logo and 'Introduction to Python (unsaved changes)' are visible, along with the 'Azure Notebooks' logo and buttons for 'My Libraries' and 'Sample notebooks'. Below this is a menu bar with options like File, Edit, View, Insert, Cell, Kernel, Data, Widgets, and Help. A toolbar contains icons for file operations, running, and saving. The main content area shows a document titled 'An Informal Introduction to Python'. The text includes a note about the source material being from Python 3.5.1, followed by an explanation of Python comments. A code cell is shown with the following content:

```
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."
```

Below the code cell, there is a section titled 'Using Python as a Calculator' with the text 'Let's try some simple Python commands.' and a sub-section titled 'Numbers'.

Microsoft Azure Notebooks (<https://notebooks.azure.com/>)

# Online Judge

An online judge is an online system to test programs in programming contests. They can also be used to practice your programming skills.


- ⦿ Their system can compile and execute code.
- ⦿ They provide some pre-constructed data.
- ⦿ Your submitted code will test against those data.
- ⦿ Some online judge rank the user answers against other users for comparison.

# Online Judge

An online judge is an online system to test programs in programming contests. They can also be used to practice your programming skills.

- ⦿ Sphere Online Judge (SPOJ) <http://www.spoj.com/>
- ⦿ HackerRank <https://www.hackerrank.com/>
- ⦿ CodeAcademy <https://www.codecademy.com/>
- ⦿ Aizu Online Judge (AOJ)  
<http://judge.u-aizu.ac.jp/onlinejudge/index.jsp>

# Online Judge

 **sphere online judge**

PROBLEMS STATUS RANKS DISCUSS CONTESTS PROFILE

### Learn programming

Start with our set of elementary problems. This will help you to get familiar with the basics of programming. Don't worry, nothing is difficult when you are supported by our wonderful and helpful community!

Basic problems

### Practice algorithms

Can you easily cope with all programming tasks you are asked to solve? How about taking your algorithmic skills to a higher level? We have organized our problems, grouping them in accordance with the algorithm technique and required data structure. Select your topic of interest and find the right problems.

coming soon!

### Take the challenge

If you are familiar with all basic and advanced concepts of algorithms and data structures, you are probably looking for new challenges. We can pick a problem at random for you or you can find yourself a problem from our vast database.

Random problem

#### Latest problems

- Gray Code and Twos Complement
- Just a Palindrome
- The Sum of Unitary Divisors
- Chiaki Sequence
- Counting Divisors (general)

#### TOP Coders

	last week
ravi	36
Abdul Ahad	33
roll_no_1	32
mayank1601	29
Sagar	29

#### SPOJ in other languages:

- Polish
- Vietnamese
- Portuguese
- Bolivia
- Armenian

#### Popular contests:

Sphere Online Judge (SPOJ) (<http://www.spoj.com/>)

# Online Judge

The screenshot displays the HackerRank website interface for a user named 'yanyan\_ryan\_leu1'. The top navigation bar includes links for Practice, Complete, Jobs, Rank, and Leaderboard, along with a search bar and user profile. The 'MY TRACKS' section shows three tracks: SQL, 30 DAYS OF CODE, and PROBLEM SOLVING. Each track displays the number of challenges solved and a 'Resume Practice' button. The PROBLEM SOLVING track also shows a progress bar for 84% completion towards the next star. Below this, the 'RECOMMENDED TRACKS' section features Algorithms and Java. The 'COMPETE' section is partially visible at the bottom.

**MY TRACKS** No Saved Challenges

Track	Progress	Action
SQL	Solved 22/58 challenges	Resume Practice
30 DAYS OF CODE	Solved 22/30 challenges	Resume Practice
PROBLEM SOLVING	84% 19 points to next star 2 stars	Resume Practice

**RECOMMENDED TRACKS** All Tracks

Track
Algorithms
Java

**COMPETE** All Competitions

HackerRank (<https://www.hackerrank.com/>)

# Online Judge

**AIZU ONLINE JUDGE**

Japanese English

PROBLEM RANKING STATUS CONTEST COURSE


Login Register/Setting

HOME -

For beginners

1 2 3 4 5

AOJ: Online Programming Challenge

 *A contest is coming!*  
ACM-ICPC 2017 Asia Tsukuba Regional Online Open Contest  
**2017/12/17 10:00-15:00** (tentative)

**Recent Activity**

Author	Problem	Status	Lang	Time
mipj56d	ITP1_5_B	✓ AC	C++	2018-01-30 21:21
mencotton	DPL_1_E	✓ AC	C#	2018-01-30 21:21

**Announcements and Bug reports**

“ Welcome to AOJ!

⚠

Aizu Online Judge (AOJ)

(<http://judge.u-aizu.ac.jp/onlinejudge/index.jsp>)

THE END