



Python

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Introduction

Growth of major programming languages

Based on Stack Overflow question views in World Bank high-income countries

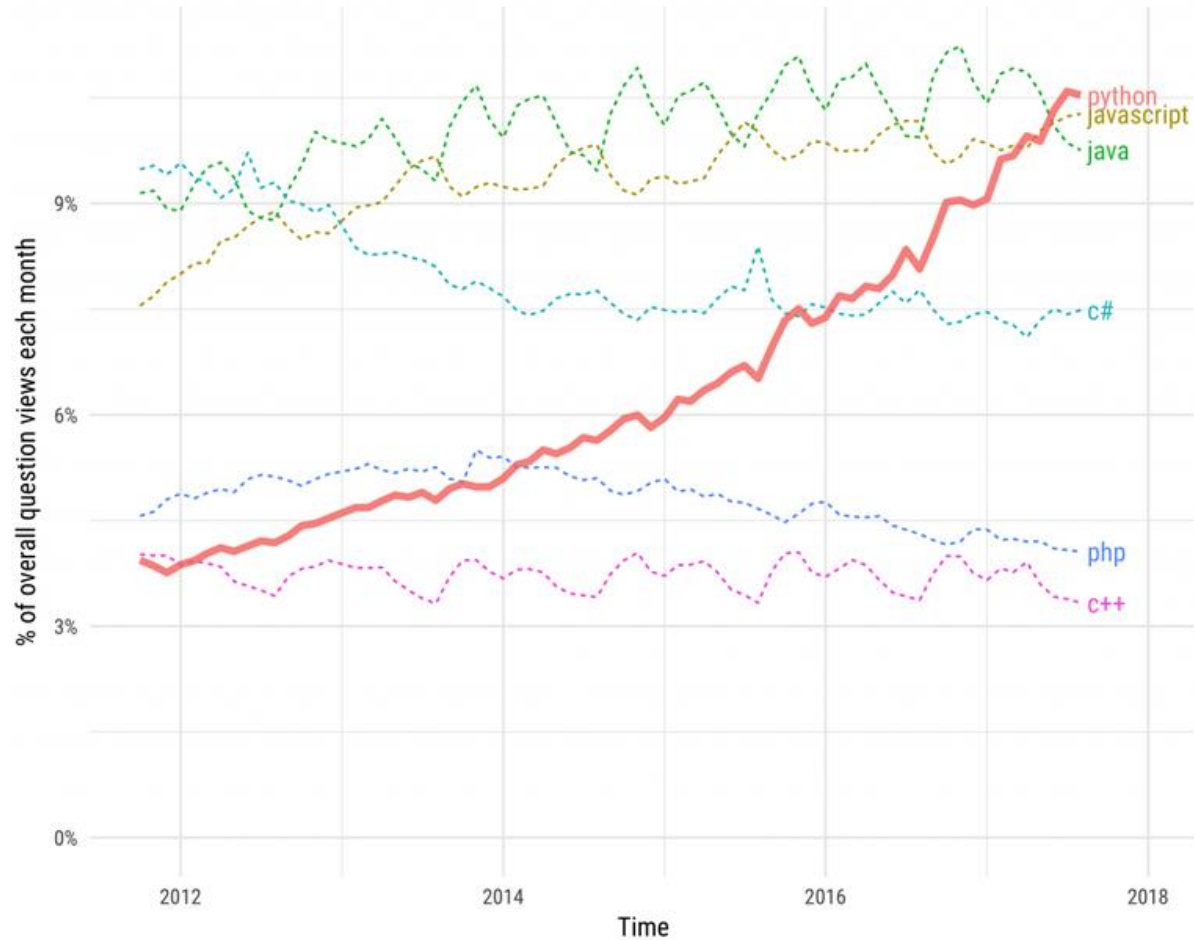
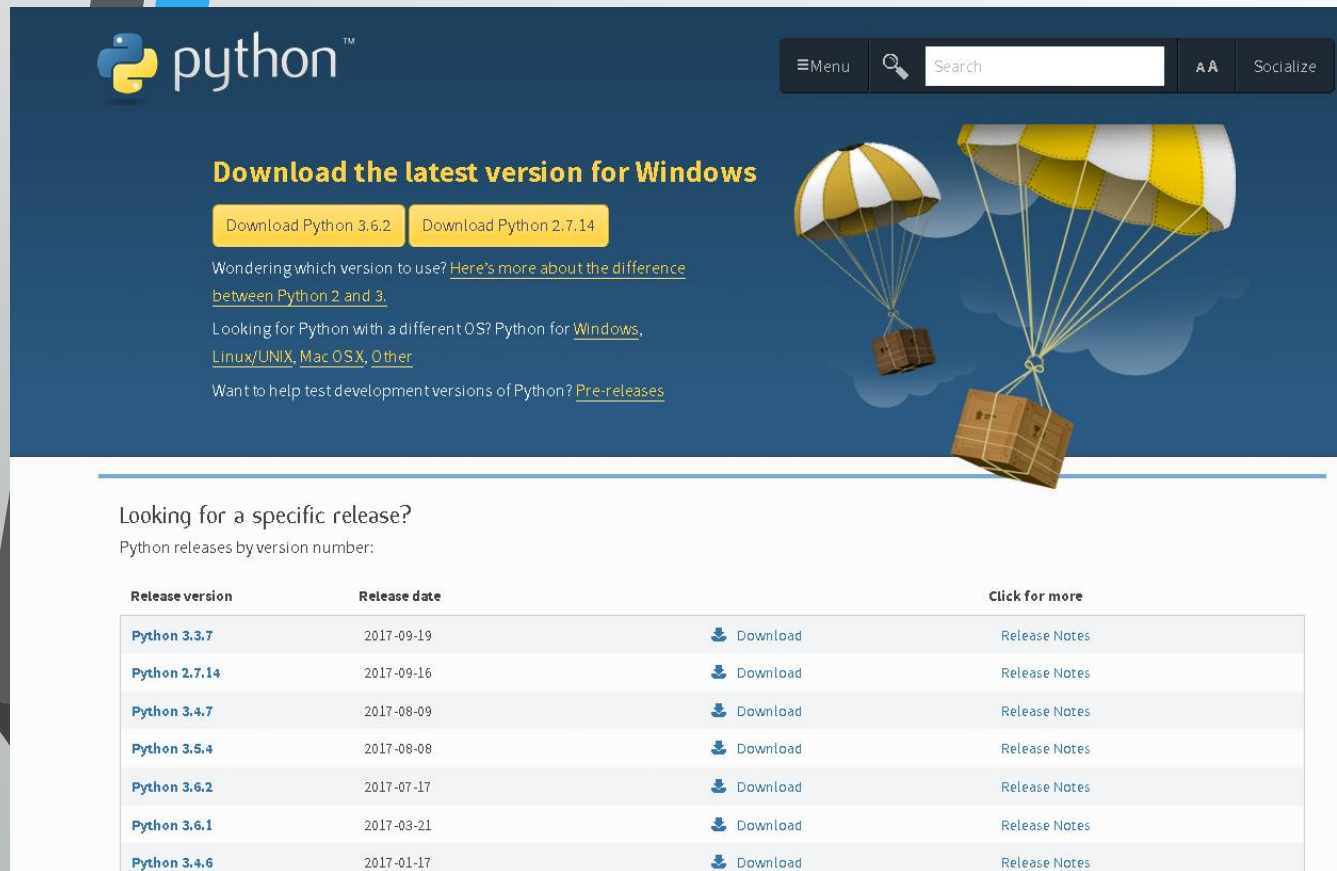


Image: Stack Overflow

- Python (www.python.org): Free, open-source programming language
- Major increase in popularity recently

How to Start: Python

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



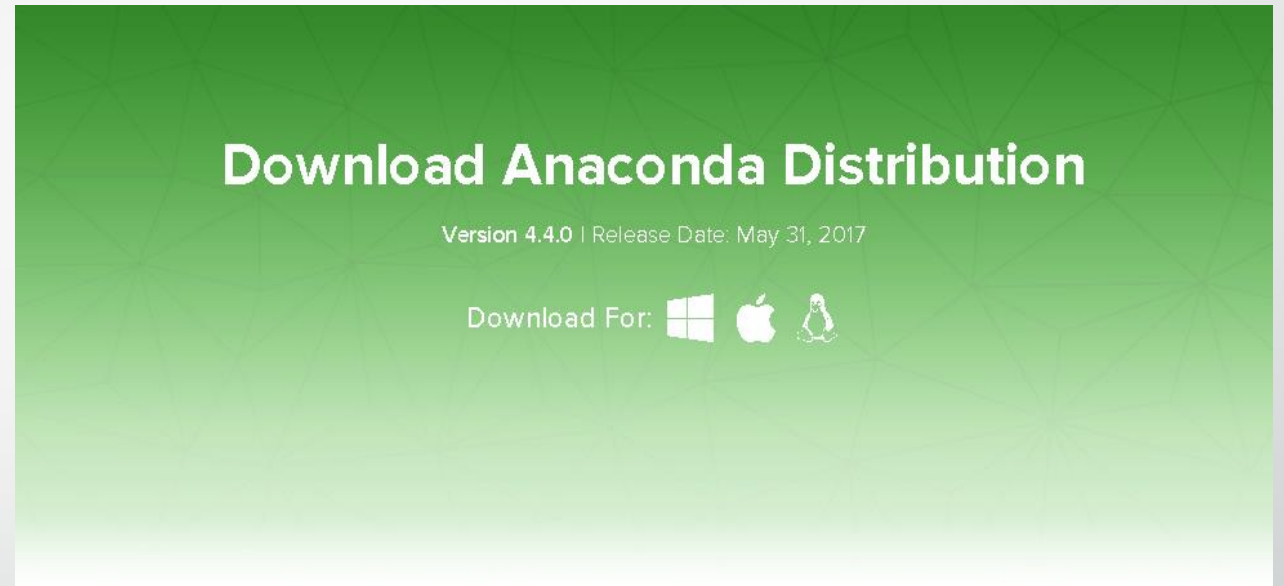
The screenshot shows the Python.org website. At the top, there's a navigation bar with the Python logo, a menu icon, a search bar, and links for 'AA' and 'Socialize'. Below the navigation bar, there's a large blue banner with the text 'Download the latest version for Windows'. Under this text are two yellow buttons: 'Download Python 3.6.2' and 'Download Python 2.7.14'. Below the buttons, there's a paragraph of text: 'Wondering which version to use? [Here's more about the difference between Python 2 and 3.](#) Looking for Python with a different OS? Python for [Windows](#), [Linux/UNIX](#), [Mac OSX](#), [Other](#). Want to help test development versions of Python? [Pre-releases](#)'. To the right of the text is an illustration of two parachutes with boxes hanging from them, floating in the sky. Below the banner, there's a section titled 'Looking for a specific release?' with the text 'Python releases by version number:'. Below this is a table with three columns: 'Release version', 'Release date', and 'Click for more'. The table lists several Python versions with their release dates and links to download and release notes.

Release version	Release date	Click for more
Python 3.3.7	2017-09-19	Download Release Notes
Python 2.7.14	2017-09-16	Download Release Notes
Python 3.4.7	2017-08-09	Download Release Notes
Python 3.5.4	2017-08-08	Download Release Notes
Python 3.6.2	2017-07-17	Download Release Notes
Python 3.6.1	2017-03-21	Download Release Notes
Python 3.4.6	2017-01-17	Download Release Notes

- Python 2.x or 3.x
- What's the difference?
- "Python 2 is legacy ; Python 3 is future"

How to Start: Anaconda

- Anaconda for Python 2.7 or Python 3.6
- Comes with a large number of useful Python modules already installed
- Highly recommend!



<https://www.anaconda.com/download/>

How to Start: PyCharm



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

- IDE (integrated development environment?) that can be used with Python/Anaconda for more simple syntax
- Performs tasks such as: Highlighting functions vs special words (list, max, f(), ect.), automated indenting, bracket counting, other debugging assistance
- Helps with coding efficiency

Some differences: For loops

Define a variable to iterate until STOP

FOR loops normal:

```
for(variable i, i<30, i=i+1) {  
  Do things....  
}
```

Define an array and loop through its elements

FOR loops Python:

```
for i in range(len(30)):  
  Do things ....
```

Indentation instead of curly brackets

Some differences: Variable definition

Variables normal:

`double x = 5.7`

`int x = 2`

`boolean x = True`

`etc...`

Variables Python:

`x = 5.7`

`x = 2`

`x = True`

`etc...`

You can check the data type later on with `type()` function

Some differences: Indexing

MATLAB:

Starts at 1

`A = [5, 6, 7, 8]`

`A[1] = 5`

`A[2] = 6`

Python:

Starts at 0

`A = [5, 6, 7, 8]`

`A[0] = 5`

`A[1] = 6`

Useful Modules

- Numpy (<http://www.numpy.org/>)
 - Scientific package especially for array/matrix manipulation
- Scipy (<https://www.scipy.org/>)
 - Scientific package especially ODEs, numerical methods, integrate, differentiate
- Matplotlib (<https://matplotlib.org/>)
 - Plotting package
- Pandas (<http://pandas.pydata.org/>)
 - Data analysis/management package. Useful for data mining and other database problems
- Scikit-learn (<http://scikit-learn.org/stable/>)
 - Machine learning package in Python. Really good documentation and easy to start machine learning algorithms.
- pdb (python debugger)
 - Good to debug code. Can pause code in the middle of running and test variables etc to debug problem

Python Examples

- Single Die Roll
- Two Dice Roll
- Single Biased Die Roll
- Two Biased Die Roll
- Radiation Transport Monte Carlo