Python 101

An Introduction.

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What is Python?

Python is a **Bytecode interpreted High level** programming language.

It means it’s first converted to a bytecode and then that bytecode is interpreted.

No (*strictly modern e.g. JS, Python etc.*) Language is only compiled or interpreted.

What does the bytecode look like?*

It looks something like this.

```
0 LOAD_GLOBAL          0 (len)
2 LOAD_FAST            0 (alist)
4 CALL_FUNCTION        1
6 RETURN_VALUE
```

More information @ https://docs.python.org/3.6/library/dis.html

Who made Python? Who maintains it?

- Guido Von Rossum in 1991 created it.
- Its influenced by ABC, C, C++, Java, Modula-3.
- It is maintained by non profit organization **Python Software Foundation (*PSF*).** After v2.1
- Python is open source and the code is available at https://www.python.org/downloads/source/
- Current Development available at https://github.com/python/cpython

Python Community & PEP

- As Python is open source the members its open to join PSF as well. All the members of PSF create whats called Python Community.
- A PEP is a design document providing information to the Python community, or describing a new feature for Python or its processes or environment. It is checked by PEP Editors for regularities.
- PEPs are not small enhancement though, like addition of a little library won't be a PEP it should be something so large that it would effect the language as a whole.

PyPI (Python Package Index)

- Python comes with most of the “basic” tools that we would require for programming not “all” of the things that Python has to offer.
- A Python Package is something that contains a lot of useful code for a specific purpose abstracted for programmers to use.
- Like a set of such code for Machine Learning in python is in form of a package called Scikit-Learn.
- Python has 141,251+ such Packages. PyPI indexes all of those packages. These packages can be installed using PIP on a system.

Who uses Python?

Every Big IT firm you have heard of uses it at least somewhere if not as the primary language.

PS. NASA too.

Where CAN we use Python?

Python can be used in programming for “almost” any purpose.

Most prominent usage is seen in, ML, DL, Web Development, CLI, GUI Apps, General Purpose Scripting and Networking.

Where SHOULD we use Python?

It should be used for Scripting and Prototyping purposes.

should NOT be used if the focus is on SPEED of code.

It is ideal for Proof of Concept and also fantastic for abstraction of code.

Along with Javascript its the Perfect language for RAD like in Hackathons.

Runtime Implementations of Python*

A language is a set of instructions and the meaning of those instructions only.It does not define in what order and how the instructions should be interpreted. This interpretation is defined by the Runtimes of a language.

Python’s main runtimes are-

1. CPython (The one we use usually - C Based)
2. Jython (JVM compatible Python Runtime - Java Based)
3. PyPy (Python in Python - Python Based)
4. IronPython (Common Language Runtime compatible - C# based)
5. Brython (Browser compatible Python Runtime - Javascript Based)

Distributions of Python*

We know that Python by default doesn’t come with all of the packages that are there but organizations have created distributions of Python that are aimed at specific area, e.g. for ML and DL **Anaconda** is used and **IPython aka Interactive Python** is used for parallel, kernel based, embeddable interpreters.

Jupyter - One part of IPython distribution is Jupyter which is a Websocket and HTTP based application that interacts with a IPython kernel using ZeroMQ/JSON based messages via a server known as Notebook Server. It is often used for algorithm illustrations, Graphing and explanation of code.

Python Installation and Setup

Needed Setup

Python 3.6

Any Text Editor of your choice.

Preferably - Sublime.

Installation notes for Python 3.6

Linux - Congratulations! You already have it. Just update it to 3.6.

sudo apt install python3.6.5

Windows - https://www.python.org/downloads/windows/

Download from above link (*set PATH environment variable**)

Mac - https://www.python.org/downloads/mac-osx/

Download from above link and install.

Interview Questions

What is PSF?

Python Software Foundation.

It regulates the Python developement and releases since the launch of v2.1.

Give me a technically strong reason why Python is rising so much these days?

Due to it’s adaptability with the architecture of any language. And it’s extremely easy to port nature.

Is python slow? If it is then why is it used in process extensive tasks e.g. ML, DL?

Yes.

In its raw implementation it is slower than most of its competitors.

But it can invoke the code of C/C++ which is extremely fast using Python C API and vice versa using Python.h in C/C++ which allows the libraries to get the ease of coding in python and speed of C/C++.

Mind that being able to invoke C/C++ code doesn’t make python a fast language. And speed isn’t the aim to achieve in Python’s ideology.

What do you understand by Runtime Implementations of a language?

A language is only a set of instructions and the meaning of the instructions.

A Runtime Implementation of a language decides how those set of instructions should be interpreted at runtime.

Various runtime implementations for Python are PyPy, Jython, Cython etc.

What is environment variable in an OS?

Environment in context of OS means the “settings” of OS for a running process.

There are certain variables defined which are aimed at controlling these “settings” of this environment.

For example, in order to make a *setting* that ***where to find Temporary files?*** We declare a variable called TEMP in *NIX systems.

Classpath might also come across as one such familiar *setting* to find Java Libraries. 90% of the times these variables tell the OS where to find a particular thing that it requires.

What does PATH variable do?

When we type some command in terminal like, ls, cat, ln, python, java etc. Then Operating System needs to know where to find the implementation of these commands.

Each of the command has an executable file corresponding to it somewhere in the system. We need to tell the system explicitly where to find those files for invoking the command if the file for invoking command is not available in present working directory of system.

PATH variables does this work. It tells the system where to look for files if not found in present working directory.

Why is Bytecode called Bytecode?

Because each instruction in a Bytecode is of 1 Byte.

Which Python runtime implementation is used by default?

CPython.

Assignment (Day1)

1. Setup your github repository for submitting future assignments.

Instructions -

Make The Repository Name as <Your_name>_Python101
e.g. AshishShukla_Python101

Commit and Push a text file named README.md in this file the content should be following -
This repository contains the assignments submitted to course Python101@ABESIT
Submitted by <YOUR_UNIVERSITY_ROLL_NUMBER>

All of the content used in slides, along with the code that I write is available at

http://www.github.com/ash2shukla/Python101-ABESIT/