

Python

High Performance Language

History

- * Creator: Guido Van Rossum
- * Place: CWI, Netherlands
- * Year:
 - Created: 1985 - 1990
 - Released: 20-02-1991 [2000]
- * Derived from: ABC, Modula 3, C, C++, Algol-68, Smalltalk, Unix
- * Reason for name [got its name from]
 - Derived from a TV show called
- BBC Comedy Series (1970): Monty Python's Flying Circus
- Short, unique and slightly mysterious name
- supports both 32-bit and 64-bit integers and wordsize.

Characteristics / Features / Reason for popularity

(Behaviours) (i) General-Purpose language

Supports a lots of today's technologies / domains

★ Web-based	★ Desktop-based	★ graphic-design
→ Twitter	→ gaming	→ Visualisation
→ Back-end server	→ software	→ Computer graphics
→ Web Testing	→ mobile application	→ AR, VR

★ Scientific

- Big Data
- Data Science
- AI / ML / DL / TL
- Data mining (Blockchain technology)
- Calculation
- NLP (Ex: Chatbot)

★ Computational

- Mathematical
- Visualisation
- Engineering simulations
- Smart Devices [IoT]

(Beginner's language)

- Interactive language
- Easy syntax - Simple English
- Easy installation → easy maintenance
- Easy integration [Portable] [no environment variables]
- Easly readable, understandable & maintainable
- easy to learn, maintain, implement and read

(iii) Open-Source language

- OSI approved Open-Source license
- free for everyone to use

(iv) Interactive language

- interactive in nature
- immediate response / result
- like a calculator

char or symbol
[Command prompt]

7
7
 $7 + 2$

2+5	7
1	2
4	5
7	6
3	9

(v)

High Level Language

- industry-oriented
- high level • extensible • scalable • library support
- natural language [English]
- easy to program [Human readable]
- Highly portable (supports any hardware)

(vi)

Interpreted language

- processed at runtime by the interpreter
- no compilation → direct execution
- line by line checking (byte code)
- Byte Code Interpreted Programming Language

(vii)

Extensible language

- embeddable with hardware
- embed within C, C++, Java, JavaScript programs

(viii)

Scalable language

- better structure
- support for large programs than shell scripting

(ix)

Library and Script language

- great community for developing libraries

(x)

Dynamically typed language

- every variable name bound to an object not type.

Ex: $a = 5$; $a = "He"$

(X) Dynamically-typed language

→ every variable name is bound to an object only, not to type.

Ex: $a = 5$

$a = "Hi"$

(xi) Reflexive language [Reflection / Introspection]

→ determines the type of object at runtime.

→ Built-in functions

- `dir(object)`
- `type(object)`
- `id(object)`
- `inspect module`

(xii) Multi-paradigm language

→ programmed using any programming style

★ Procedural - line by line

★ Functional - block of statements called

★ Object oriented - (encapsulates code within objects) object contains fields & methods

★ imperative - change the state of program
(doubt) as each one is executed in turn

★ Scripting - interpreted scripts for automation

★ Programming - control of 1/more software application
→ platform independent.

Advantages for programmers

- (i) Love to code (vi) RAD (Rapid Application Development)
- (ii) Earn you a lot of money
- (iii) Change in resume
- (iv) Get your dream job in dream company
- (v) Freelancing Projects
- (vi) Huge applications
- (vii) Future scope is more!

Afflications / Companies using Python

- (i) Google - Search engine
- (ii) YouTube - Video Sharing system
- (iii) Instagram (or) Facebook -
- (iv) Netflix - Machine Learning Video Recommendations
- (v) Dropbox - Server & Client Software
- (vi) Pinterest -
- (vii) Mozilla -
- (viii) Openstack -
- (ix) Maya -
- (x) Nyse -
- (xi) G-Robot -
- (xii) NASA - Cryptography & Intelligence Analysis
- (xiii) Intel - Scientific Calculations
- (xiv) IBM -
- (xv) HP -
- (xvi) Cisco -
- (xvii) Bit Torrent - File Sharing b/w peer to peer
- (xviii) Raspberry Pi - Educational Language
- (xix) National Security Agency, USA
Cybersecurity Analysis, Encryption & Decryption

Python Job Description

- * Extensive Programming experience in Python.
- * Familiar with various machine learning techniques and libraries
- * Programming experience in spark, framework and pyspark
- * Tensor Flow, Skikit learn, Spark ML lib, MXNet, Caffe, H2O or other

Python Developer Salary

Average: \$113,462 per annum

Website: glassdoor.com

Best Websites To Learn Python (Resources)

YouTube Channels

Books

Tutorials

Top Job Portal Websites

- (i) naukri.com
- (ii) indeed.com
- (iii) linkedin.com
- (iv) angellist
- (v) monsterindia
- (vi) glassdoor.co.in

Top Freelancing websites

- (i) truelancer
- (ii) fiverr
- (iii) upwork
- (iv) envato
- (v) freelancer

Python Interpreter



Python 2 to Python 3

	Python 2	Python 3	
(i) <u>Print statement</u>			
(ii) <u>Print statement</u>		<u>Print Function</u>	
print 'Hello'	supported ←	print ('Hello')	→ not supported

	Python 2	Python 3
(iii) <u>Raw input</u>		<u>Input</u>

myinput	myinput
= raw_input('Enter a no:')	= input('Enter a no:')
type(myinput)	type(myinput)
<type 'int'>	<type 'str'>

Python Installation

IDE

Step 1: Go to browser and search
Python Download

Step 2: Click the very 1st link that appears
(or)

Step 1: Click <https://www.python.org/downloads/>

Step 2: Click Download Python version box

Step 3: Click and open the executable file
downloaded

Step 4: Click Next button with adding the
python path

Step 5: Search & open python IDLE.

Text Editor

* Any 1 for your preference.

- | | | | |
|----------------|-----------|-------------------------|---------------|
| (i) Notepad | (ii) VB | (v) PyCharm | (vii) Eclipse |
| (ii) Notepad++ | (iv) Atom | (vi) Visual Studio Code | (viii) Spyder |
| (ix) Jupyter | | | (ix) PyDev |
| | | | (x) Sublime |

Atom Installation

Step 1: Click <https://www.atom.io/>

Step 2: Click next again & again

Step 3: Search & open atom text editor.

Software Python PreRequisites

To check whether python is installed properly

CMD | Software Verifications

Step 1: Open cmd

Step 2: Type python

Step 3: If you get basic installation lines, then python is installed properly. Otherwise, not.

Software Python Usage Simple Programs / Commands

>>> print('Hi')

'Hi'

>>> print("Hello!")

'Hello!'

>>> 3

3

>>> 5+2

7

>>> "Hi"

'Hi'

>>> "Hello World"

'Hello World'

Atom Text Editor / Notepad

- Step 1: Open Atom / Notepad Text Editor
- Step 2: Type the Python code
- Step 3: Save it with any name with extension .py
- Step 4: Open cmd
- Step 5: Type the following command to change the directory to Python folder
cd C:\Python\Code [exact path name to be given]
- Step 6: Type the file name and enter to run it test.py
- Step 7: Check whether output is displayed or not.
Hello'

Python Online Editors

Basic Requirements

- (i) Laptop / PC / Mobile
- (ii) Good working internet connection
- (iii) Deep interest

Websites

- | | |
|--------------------------------|-----------------------|
| (xiii) interviewbit.com | (xv) udemy.com |
| (xiv) microsoft learn | (xvi) coursera |
| (i) ideone.com | (xvii) skillshare |
| (ii) colab.research.google.com | (xviii) leetcode |
| (iii) programiz.com | (xix) greatlearning |
| (iv) w3schools.com | (xx) npTEL.org |
| (v) tutorialspoint.com | (xxi) intellicast |
| (vi) ide.geeksforgeeks.org | (xxii) edureka |
| (xxiii) drivendata | (xxiii) Onlinegdb.com |
| (xxiv) codechef.com | (xxiv) takufoward.com |
| (xxv) hackerrank.com | (xxv) hockerearth.com |

IDLE

- * Integrated Development Learning Environment
- * Graphical user interface [GUI] which is completely written in Python.
- * Bundled with the default implementation of the Python language.
- * Comes with optional part of the Python packaging.
- * Used to type and run Python programs.

Features of IDLE

- * Multi-window text editor with syntax highlighting.
- * Auto completion with smart indentation.
- * Python shell to display output with syntax highlighting.
- * Debugger, Compiler/Interpreter with language support.

Modes of Python Interpreter : 2

(i) Interactive mode

- * Python code can be directly typed and the interpreter displays the results immediately.
- * Allows us to interact with OS.
- * Also be used as a simple calculator.
- * IDLE is the default interactive mode.
e.g. Python Prompt, Command Prompt (CMD)

Invoking Python IDLE [In Windows OS]

Start → All Programs → Python 3.x → IDLE (Python 3.x)

- * The chevron symbol (`>>>`) is called prompt.
- * Prompt indicates that interpreter is ready to accept instructions [symbol differs for different versions].
- * So, IDLE is working in interactive mode.

Working in Interactive mode

Example 1

```
>>> 5
5
>>> 5 + 10
15
>>> 5 * 10 - 15
35
>>> 5 ** 2
25
```

Example 2

```
"Hi"
>>> print("Hi")
'Hi'
>>> print("Hello World")
'Hello World'
>>> print('Hello !')
'Hello !'
>>> print("Sum =", 5)
Sum = 5
```

Advantages

- * Good enough to learn, experiment or explore.
- * Convenient for beginners to work.
- * Testing small pieces of code.

Disadvantages

- * We cannot save the statements and have to re-type all the statements once again to re-run them.
- * We cannot edit the code.

(ii) Script mode

- * Script is a text file containing the Python statements.
- * Reusable code as python scripts can be saved to disk for future use.
- * Once created, it can be executed again and again without re-typing and are editable.
- * Interpreter executes the content of the file.

A) Creation

(i) Creating Python Scripts

Step 1: Choose File → New File (or) press Ctrl + N in Python Shell Window

Step 2: An untitled blank script text editor will be displayed on the screen.

Step 3: Type the Python code you want in script editor.

Step 4: Saving Python Script

Step 4: Choose File → Save (or) Press Ctrl + S

Step 5: Now, Save As dialogue box appears on the screen

Step 6: Select the location where you want to save your Python code and type the file name in FileName box.

Python files are by default saved with extension .py so no need to specify the file extension

Step 7: Finally, click save button to save your Python script.

B) Running

Executing Python Script (Execution)

Step 8: Choose Run → Run module (or) Press F5

Step 9: If your code has any error, it will be shown in red color in IDLE window. Python describes the type of error occurred.

Step 10: To correct any errors, go back to Script Editor, make corrections, save the file using Ctrl + S (or) File → Save and execute it.

Step 11: For all error free code, the output will appear in the IDLE window of Python.

Key	Interactive mode	Script mode
Saving, Editing [Modification]	Cannot be done (after execution)	Can be done
Definition	Type commands and Read and execute expressions at the prompt(>>>)	statements in a script
Immediate Result	We can see	We cannot see
Usage	To experiment/Test/ learn the code	When we are very clear about the syntax of code
Rerunning, Rerunning	Need	No need
Example	Python IDLE	Notepad (with extension .py)