Data Analytics with Python

1. Introduction to Python and Installation

What is Programming

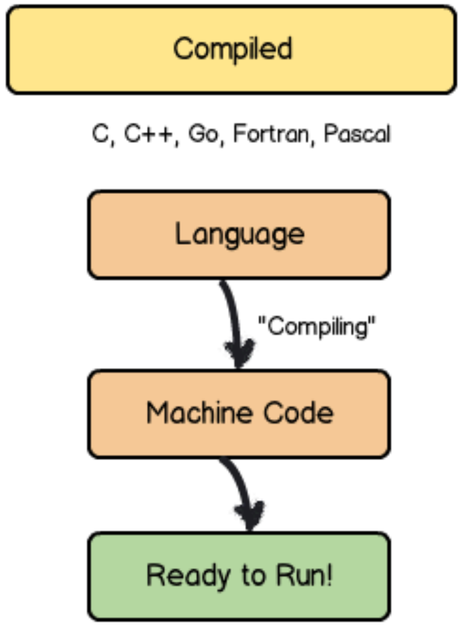
- Programming is the process of writing sets of instructions (code) that tell a computer how to do things.
- It include creating algorithms, developing code in programming languages, testing, debugging, and maintaining code to ensure that it works as expected.
- Some of the common programming languages used are; Python, Java, C, C++, R and JavaScript.

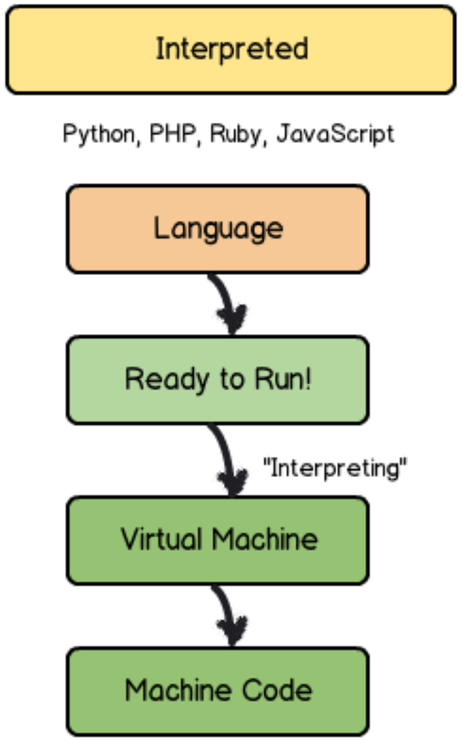
What is Python?

- First released in 1991, Python is an easy to learn, powerful programming language.
- It has efficient high-level data structures and a simple but effective approach to object-oriented programming.
- Python is a general-purpose programming language that passes programs to computers through interpretation rather than compilation.

How does a Computer Read Code

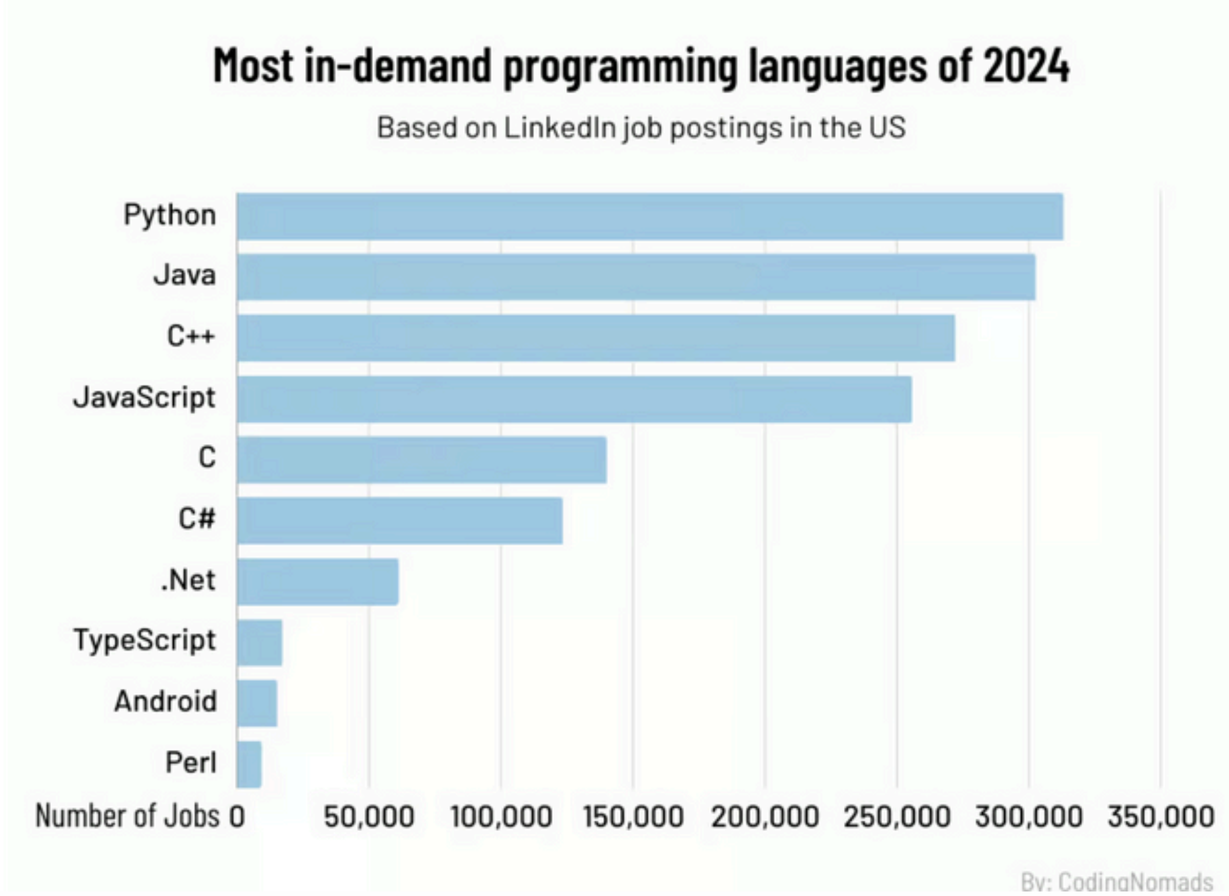
- Computers read code via a process called compilation or interpretation, depending on the language.
- Interpretation is the process of running source code directly, line by line, and then converting it at runtime into machine code.
- Compilation creates an executable file by translating the source code in its entirety into machine code in advance.
- While compiled languages often give superior speed, interpreted languages are typically more flexible and easier to debug.





Why Python?

- Python's syntax is easy to understand.
- Python's interpreted nature facilitates debugging and provides for more flexible coding methods.
- Python makes it easy to re-use the code we have already written.
- Python has a large standard library as well as various third-party libraries, which enable a wide range of functionality from file handling to machine learning.

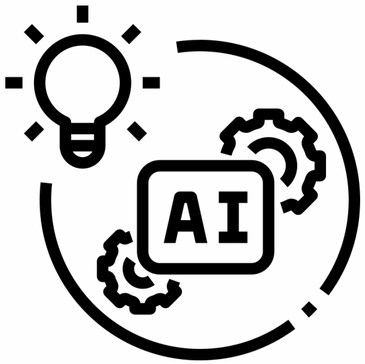


How is Python Used?

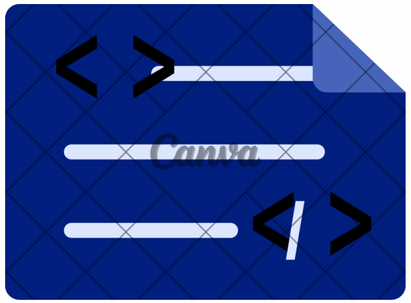
1. Data Analytics

3. Web Development

5. Software Testing



2. Data Science



4. Automation and Scripting

Installing Python

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Want to help test development versions of Python 3.13? Prereleases, Docker images

Active Python Releases

For more information visit the Python Developer's Guide.

Python version	Maintenance status	First released	End of support	Release schedule
3.13	prerelease	2024-10-01 (planned)	2029-10	PEP 719


Python 3.12.3 (64-bit) Setup
Install Python 3.12.3 (64-bit)
Select Install Now to install Python with default settings, or choose
Customize to enable or disable features.
Install Now
C:\Users\Administrator\AppData\Local\Programs\Python\Python312
Includes IDLE, pip and documentation
Creates shortcuts and file associations
Customize installation
Choose location and features
python
for
windows
Use admin privileges when installing py.exe
Add python.exe to PATH
Cancel

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2. Python Syntax, Comments and Data Types

`2.0 Basic Python Command

1. Interactive Mode Programming

```
Microsoft Windows [Version 10.0.22621.3447]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Administrator>python
Python 3.12.3 (tags/v3.12.3:f6650f9, Apr  9 2024, 14:05:25) [MSC v.1938 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> print('Hello World')
Hello World
>>>
```

1. Script Mode Programming

Python Syntax

- A programming language ***syntax*** is a collection of rules and practices that govern how the language's symbols, keywords, and structure are written and processed by computers.

- It specifies the language's grammar, which includes rules for statements, expressions, variables, and control structures, and ensures that code generated in the language is understood and executable by computers.

Python Syntax Rules

- Python is a case sensitive language.
- You can't use one of python's key words as a variable name.
- Python uses indentation to define blocks of code, such as loops, conditionals, and functions.
- Python statements are typically written one per line. End-of-line terminates a statement unless it is continued by a backslash / , an open parenthesis (, an open square bracket [, or an open curly brace {.
- Comments in Python begin with the hash symbol (#) and continue to the end of the line. They are used to explain code and make it more readable.

Python Reserved Names

A python *identifier* is a name used to identify **a variable, a function, a class or any other object**. It's rules include;

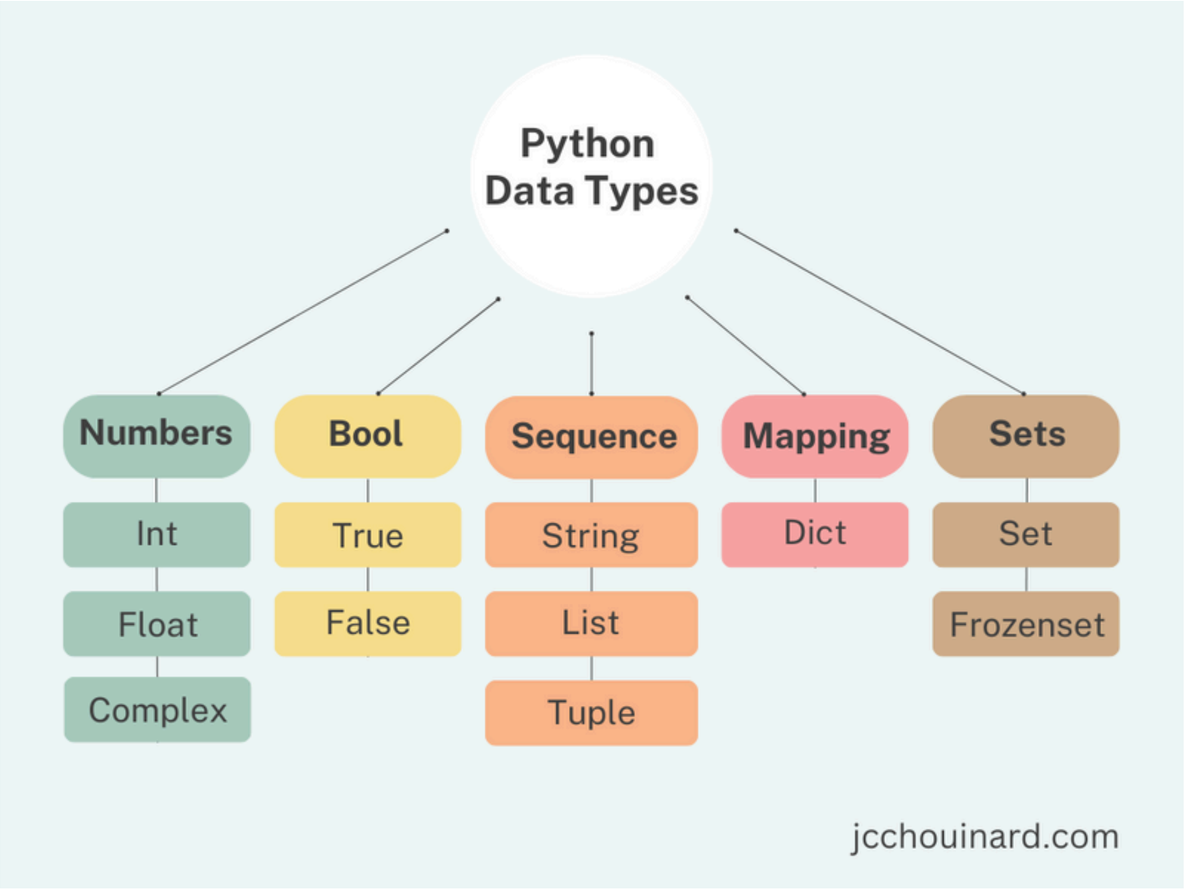
1. You can't have spaces in your variable names.
2. All identifiers except a Class, start with small letters.
3. If an identifier starts with a single leading _, it means it's a private identifier.
4. If an identifier starts with a double leading underscore (__), it means it's a public identifier.

2.1 Python Comments

- ***Comments*** are statements within your code.
- They are meant to make it more readable, easier to understand and to explain certain parts or concepts about your code.
- For this reason, comments will have no output or result in your code.
- In Python, comments are initiated with the symbol “#”.
- If your line begins with a #, the interpreter renders the rest of the line as a comment and will not execute it.

2.3 Python Data Types

- A ***data type*** is a representation of the data we have and what operations can be performed on the data.
- As discussed earlier, computers store data in memory, and perform tasks on it based on the given set of instructions.
- In Python, you can get the data type of any object by using the type() function:



Numeric Data Types

There are three types of numerical data types in python

- **Integers**: also known as (int) is a whole number without a limit or a decimal point. This could be a positive or negative number
- **Float**: This is a positive or negative number that contains one or more decimals. Float can also be scientific numbers with an "e" to indicate the power of 10.
- **Complex**: These are numbers that include the letter “j” as an imaginary part

String & Boolean Data Types

- **A string** is a combination of Unicode characters enclosed under single ‘’ or double “” quotes.
- Python strings are immutable which means when you perform an operation on strings, you always produce a new string object of the same type, rather than mutating an existing string.
- **Boolean type** is one of built-in data types which represents one of the two values either *True(1)* or False(0).
- Python bool() function allows you to evaluate the value of any expression and returns either True or False based on the expression.

Sequence Data Types

Sequence is a collection of items and there are three types of sequence data types in python;

- Lists: A Python list consists of objects separated by commas and surrounded in square brackets ([]).
- Tuples: A Python tuple has elements separated by commas, however tuples are wrapped in parenthesis (...).
- Strings: A combination of Unicode characters enclosed under single ‘’ or double “” quotes.

3. Python Variables and Data Structure