What is Python?

Python is a general-purpose, interpreted, high-level programming language known for its readability, simplicity, and versatility. It supports multiple programming paradigms: procedural, object-oriented, and functional. Created by Guido van Rossum and first released in 1991, Python is widely used in web development, data science, machine learning, automation, and many other domains.

Installation and Setup

- Download Python from the official website and install it on Windows, macOS, or Linux.
- Use interactive environments like IDLE, or advanced editors/IDEs like VS Code, PyCharm, or Jupyter Notebook.
- Verify installation by running python --version or python3 --version in the terminal/command prompt.

Comments:

- Single-line: # This is a comment
- Multi-line: triple quotes """ This is a multi-line comment """

Basic Syntax

- Write your first program to print "Hello, World!":

python

```
print("Hello, World!")

# If you want to print on the same line instead of moving to a new line,
# you can change the end parameter of print (which defaults to "\n"). For example:
# This will add a space after print string

print("Hello", end=' ')
print("World")

# You can set end="" to prevent any extra character after printing
print("Hello", end="")
print("World")

# To insert explicit line breaks within a string, you can use the newline escape character \n

print("Hello\nWorld")
```

Important:

Python uses indentation (usually 4 spaces) to define code blocks instead of braces.

Variables in Python

- A variable is a symbolic name that references or points to a value stored in memory.
- You do not need to declare variable types explicitly in Python; the interpreter infers the type based on the assigned value.
- Variables are assigned using the equals sign (=):

python

```
x = 10
name = "Alice"
```

Variable names:

- Must start with a letter (a-z, A-Z) or underscore (_).
- Cannot start with a number.
- Can contain letters, numbers, and underscores.
- Are case-sensitive (age and Age are different).

Examples:

python

```
age = 25
_salary = 50000
employee_name = "John Doe"
```

Data Types in Python

Data types define the category of data that a variable can hold. Python has several built-in data types:

Numeric Types

- int: Integer numbers, e.g., 10, -25.
- float: Floating-point (decimal) numbers, e.g., 3.14, -0.001.
- complex: Complex numbers with real and imaginary parts, e.g., 1 + 2j.

Text Type

- str: Sequence of Unicode characters (strings), e.g., "Hello", 'Python'.

Sequence Types

- list: Ordered, mutable collection of items, e.g., [1, 2, 3].
- tuple: Ordered, immutable collection, e.g., (1, 2, 3).
- range: Represents a sequence of numbers, commonly used in loops.

Mapping Type

- dict: Collection of key-value pairs, where keys are unique, e.g., {"name": "Alice", "age": 25}.

Set Types

- set: Unordered collection of unique items, e.g., {1, 2, 3}.
- frozenset: Immutable version of a set.

Boolean Type

- bool: Represents True or False.

Binary Types

- Includes bytes, bytearray, and memoryview, used for handling binary data.

None Type

- NoneType: Represents the absence of a value, denoted by None.

Checking Data Types

- Use the type() function to check the data type of a variable:

python

```
x = 10
print(type(x))  # Output: <class 'int'>
```