Introduction to Python Programming

Python is a high-level, interpreted programming language known for its readability and simplicity. It is widely used in web development, data science, artificial intelligence, automation, and various other fields due to its extensive libraries and active community support.

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1. Why Learn Python?

Python is an easy-to-learn language with a clean syntax, making it a great choice for beginners. Some key advantages of Python include:

- **Readability & Simplicity**: Python's syntax closely resembles English, making it easy to learn and write.
- **Extensive Libraries**: A vast collection of libraries such as NumPy, Pandas, and TensorFlow support various applications.
- **Large Community Support**: Python has a huge developer community that actively contributes and provides support.
- **Versatility**: Python is used in web development, automation, AI, machine learning, cybersecurity, and more.
- **Cross-Platform**: Python runs on Windows, macOS, and Linux without modifications.

Example Use Cases of Python:

- Web Development (Django, Flask)
- Data Science (Pandas, NumPy, Matplotlib)
- AI & Machine Learning (TensorFlow, Scikit-learn)
- Scripting & Automation (Selenium, PyAutoGUI)
- Cybersecurity & Ethical Hacking (Scapy, Requests)

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2. Python Data Types

Python has several built-in data types that store different types of values:

Numeric Types

- **Integers (int)** - Whole numbers (e.g., 5, -10, 1000)

- **Floating-Point Numbers (float)** - Numbers with decimals (e.g., 3.14, -2.5)
- **Complex Numbers (complex)** - Numbers with real and imaginary parts (e.g., 2 + 3j)

Text Type

- **Strings (str)** - A sequence of characters (e.g., 'Hello', "Python")

Sequence Types

- **Lists** - Ordered, mutable collections (e.g., [1, 2, 3], ["apple", "banana"])
- **Tuples** - Ordered, immutable collections (e.g., (1, 2, 3), ("red", "blue"))
- **Range** - Represents a sequence of numbers (e.g., range(5))

Set Types

- **Sets** - Unordered collections of unique items (e.g., {1, 2, 3, 4})
- **Frozen Sets** - Immutable sets (e.g., frozenset({1, 2, 3}))

Mapping Type

- **Dictionaries** - Key-value pairs (e.g., {"name": "Alice", "age": 25})

Boolean Type

- **Boolean (bool)** - Represents True or False

None Type

- **NoneType** - Represents a null or missing value (None)

Example:

```
x = 5          # Integer
y = 3.14       # Float
name = "John"   # String
items = [1, 2, 3] # List
data = {"age": 30, "city": "New York"} # Dictionary
is_python_fun = True  # Boolean
```

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3. Writing Your First Python Program

Python programs are written in plain text files with the .py extension. Below is a simple program to print 'Hello, World!':

print("Hello, World!")

This command prints Hello, World! to the screen. Python does not require semicolons or brackets, making it simpler than many other languages.

Running a Python Program

To run a Python script, save it as hello.py and execute it in the terminal:

python hello.py # Windows/Linux/macOS

Using the Python Interactive Shell

Python provides an interactive shell where you can execute commands directly. Open a terminal and type python or python3:

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

Hello, World!

This enhanced document provides more details and practical examples to help beginners understand Python concepts better.