# Module Python -Fundamentals of Python Language

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Introduction to Python Theory:

1. Introduction to Python and its Features (simple, high-level, interpreted language).

**Python** is a high-level, general-purpose programming language known for its simplicity and readability. It is widely used in web development, data analysis, artificial intelligence, machine learning, automation, and more.

**🔹 Key Features of Python:**

* **Simple and Easy to Learn**: Python has a clean and readable syntax. Its code resembles plain English, which makes it beginner-friendly.
* **High-Level Language**: You don’t need to manage memory or deal with complex low-level operations.
* **Interpreted Language**: Python code is executed line-by-line, which makes debugging easier.
* **Dynamically Typed**: No need to declare variable types. Python determines the type at runtime.
* **Object-Oriented**: Supports object-oriented programming (OOP) concepts like classes and inheritance.
* **Extensive Standard Library**: Comes with a large collection of built-in modules and functions.
* **Portable**: Python code can run on any operating system with little or no modification.
* **Embeddable and Extensible**: You can embed Python in other languages like C/C++, or extend it with other languages.
* **Open Source**: Free to use and has a large, supportive community.
* **Large Ecosystem**: Python has frameworks and libraries for data science (Pandas, NumPy), web development (Django, Flask), machine learning (TensorFlow, Scikit-learn), and more.

1. History and evolution of Python.

**1980s**: Guido van Rossum began working on a new language that would overcome flaws of ABC language.

**1991**: Python 0.9.0 was released as the first public version.

**2000**: Python 2.0 was released with features like list comprehensions and garbage collection.

**2008**: Python 3.0 came out. It was not backward compatible with Python 2.x but included major improvements in Unicode support, syntax, and structure.

**Present**: Python is actively maintained and updated. As of now, Python 3 is the standard.

#### 📌 Note:

The name **Python** comes from the British comedy group “Monty Python,” not the snake.

1. Advantages of using Python over other programming languages.

| **Feature** | **Python** | **Compared to (e.g., C/C++, Java)** |
| --- | --- | --- |
| **Simplicity** | Highly readable syntax | More concise than Java or C++ |
| **Learning Curve** | Very beginner-friendly | Easier than Java, C++ |
| **Development Speed** | Fast prototyping | Slower in compiled languages |
| **Libraries & Frameworks** | Rich ecosystem (NumPy, Django, Flask) | Java has many too, but Python has more for data science |
| **Community Support** | Huge community & documentation | Comparable to Java |
| **Cross-platform** | Works on Windows, Mac, Linux | Same as Java |
| **Integration** | Good with C, C++, Java, and .NET | Java is more restrictive |
| **Versatility** | Used in AI, ML, Web, Scripting | Java is mostly used in enterprise, C/C++ in systems |

1. Installing Python and setting up the development environment (Anaconda, PyCharm, or VS Code).

You can write Python code in several environments.

To start:

**🔹 Step 1: Install Python**

* Visit: <https://www.python.org/downloads/>
* Download the latest version of Python (Python 3.x).
* During installation, check **"Add Python to PATH"**.

**🔹 Step 2: Choose a Development Environment**

You can write Python using:

1. **IDLE** (comes with Python)
2. **PyCharm** (best for full-scale apps)
   * Download from <https://www.jetbrains.com/pycharm/>
3. **VS Code** (lightweight and extensible)
   * Install Python extension for VS Code after installation
4. Writing and executing your first Python program.

**🔹 Using IDLE or Terminal:**

# Save as hello.py

print("Hello, Python!")

* Run it by opening terminal or command prompt:

**🔹 Using VS Code:**

* Create a .py file.
* Type: print("Hello, Python!")
* Right-click → **Run Python File in Terminal** (after Python extension is installed)

print("Hello, Python!")

OUTPUT

Hello, Python!