

Introduction to Python

What is Python?

Python is a high-level, interpreted programming language known for its simplicity and readability. It supports multiple paradigms including procedural, object-oriented, and functional programming. It is widely used for web development, data science, scripting, automation, AI, and more.

Why Python?

Python is preferred due to its:

- Easy syntax close to English
- Versatility across domains
- Rich libraries like NumPy, Pandas, Django
- Cross-platform capability
- Massive community support

History of Python

Python was created by Guido van Rossum in the late 1980s and first released in 1991. It was named after the British comedy show 'Monty Pythons Flying Circus'.

Major versions include:

- Python 1.0 (1991)
- Python 2.0 (2000) introduced Unicode, garbage collection
- Python 3.0 (2008) not backward-compatible

Features of Python

1. Simple and Easy to Learn The syntax is clean and readable.
2. Interpreted Python executes code line-by-line, making debugging easy.
3. High-Level Language It abstracts low-level details like memory management.
4. Object-Oriented Supports encapsulation, inheritance, and polymorphism.
5. Dynamically Typed No need to declare variable types; handled at runtime.
6. Portable Python code runs on any platform without modification.
7. Extensive Standard Library Built-in modules for web, OS, networking, and more.

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- 8. Open Source Freely available and modifiable.
- 9. Large Community Thousands of resources, tutorials, and packages are available.

Why Python is General Language / High-Level Language (HLL)?

Python is general-purpose because it's used across multiple domains: web, AI, automation, scripting, etc.
It's high-level because it hides low-level hardware details, enabling developers to focus on logic.

Limitations of Python

- 1. Slower than compiled languages due to being interpreted.
- 2. Not ideal for mobile app development.
- 3. Consumes more memory.
- 4. Runtime errors due to dynamic typing.
- 5. Weaker database access compared to Java/.NET.
- 6. Global Interpreter Lock (GIL) restricts true multi-core multithreading.