

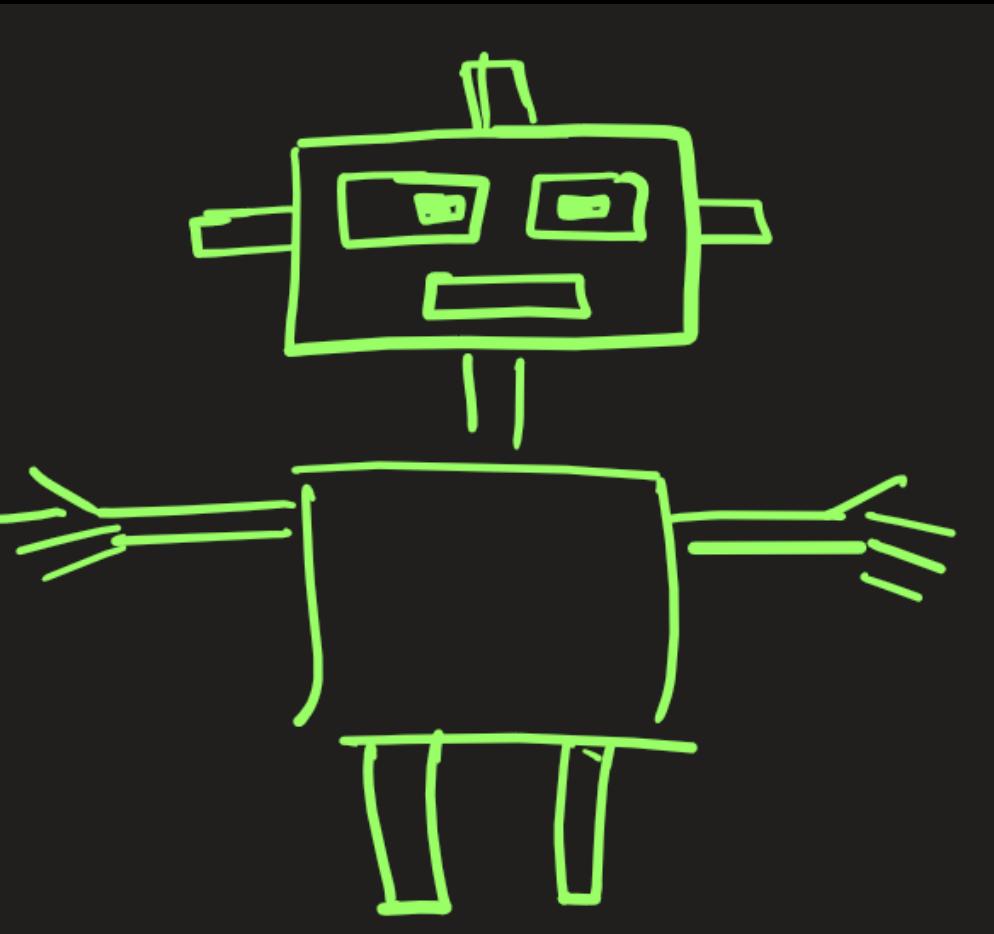


What is Programming?



Programming is the process of giving instructions to a computer so it can perform tasks for us.

What is Programming?

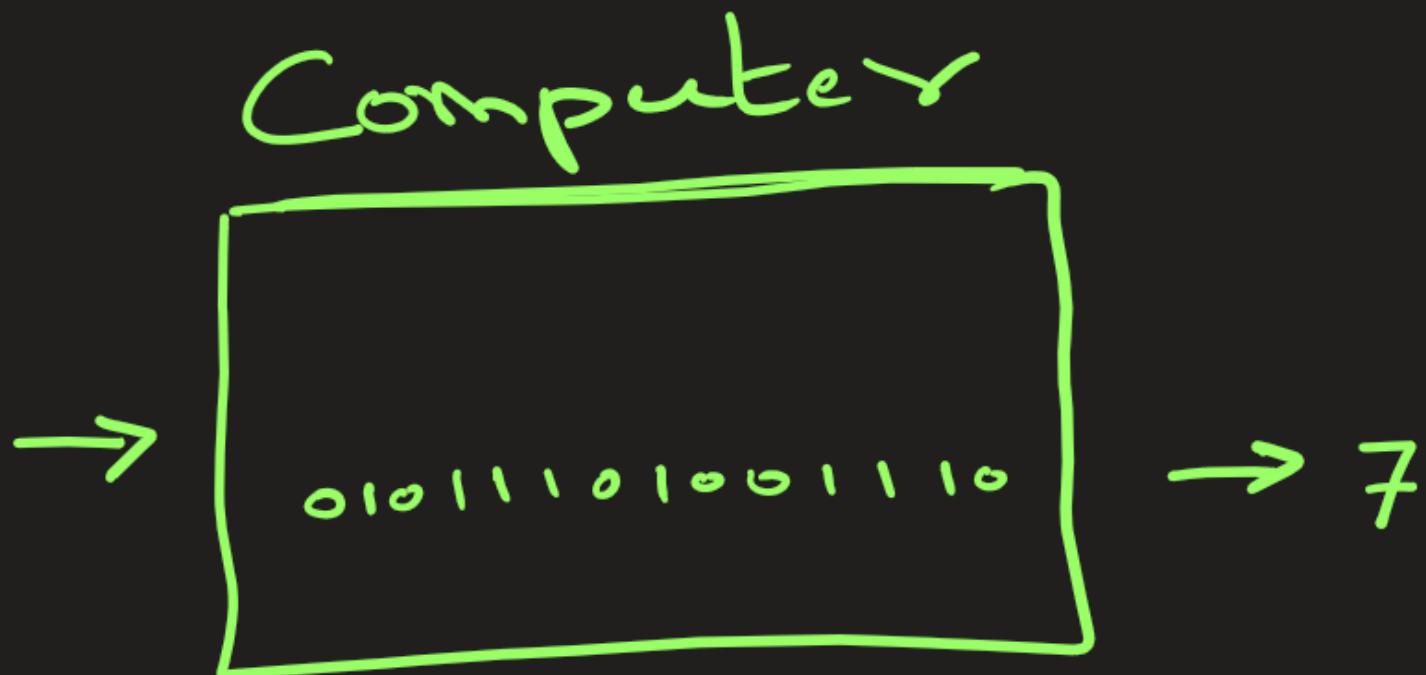


What Is a Program?



A **program** is a set of instructions written in a programming language.

```
a = 2  
b = 5  
  
result = a + b  
  
print(result)
```



What are different programming languages ?



GO

Why Go ▾ Learn Docs ▾

Build simple, secure, scalable systems with Go

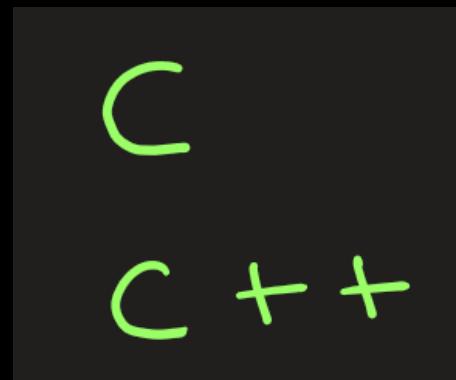
- ✓ An open-source programming language supported by Google
- ✓ Easy to learn and great for teams
- ✓ Built-in concurrency and a robust standard library
- ✓ Large ecosystem of partners, communities, and tools

[Get Started](#) [Download](#)

Download packages for [Windows 64-bit](#), [macOS](#), [Linux](#), and more

The go command by default downloads and authenticates modules using the Go module mirror and Go checksum database run by Google.

[Learn more](#)



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Search docs

php

A popular general-purpose scripting language that is especially suited to web development.

Fast, flexible and pragmatic, PHP powers everything from your blog to the most popular websites in the world.



What Can Programming Do?



With programming, we can:

- Build mobile apps
- Create websites
- Analyze data
- Build AI & Machine Learning models
- Create games
- Automate medical systems



Why should I learn Python instead of other languages?



Python Is Easy to Learn

Compare this to other languages:

- Fewer symbols
- Less confusing syntax
- Easy to read and write

- ✓ Perfect for **beginners**
- ✓ No programming background required



Why should I learn Python instead of other languages?



Python Is Beginner-Friendly but Powerful

Python is used by:

- Beginners
- Professionals, Scientists, AI Engineers



Why should I learn Python instead of other languages?



Python Has Huge Community & Libraries

Python has **ready-made tools** (called libraries):

- **numpy** → math & arrays



- **pandas** → data analysis



- **matplotlib** → plotting graphs



- **scikit-learn** → machine learning



- **tensorflow, pytorch** → deep learning

You write **less code** and You build **more powerful applications**



Why should I learn Python instead of other languages?

Ideas into Reality

EXTRA







2. Introduction to Programming

- Process that involves writing instructions for a computer to follow in order to solve problems. The instructions are written in a language that the computer can understand, and this process is a collaboration between humans and computers.
- Common languages are Python, C, C++, java, GoLang, C#, R, VB.Net, PHP, R, Fortran, Pascal, Bash, PERL, prolog etc

The screenshot shows the Python website's homepage. It features a search bar and navigation links for About, Downloads, Documentation, Community, Success Stories, News, and Events. On the left, there's a code editor window displaying Python code for list comprehensions and enumerate functions. On the right, there's a section titled "Compound Data Types" with text and a small image of a hand pointing at a screen.



The screenshot shows the Go website's homepage. It has a large "GO" logo at the top. Below it, there's a section titled "Build simple, secure, scalable systems with Go" featuring a cartoon character climbing a ladder. The page also includes a "Get Started" button and a "Download" button.

The screenshot shows the R website's homepage. It features a large "R" logo on the left. The main content area is titled "What is R?" and includes sections on "Introduction to R" and "R Project". The "Introduction to R" section provides a brief overview of what R is and its capabilities. The "R Project" section links to various R-related resources.

Perl

The screenshot shows the PHP website's homepage. It features a large "php" logo in white on a dark background. Below the logo, there's a brief description of PHP as a general-purpose scripting language suited for web development.

The screenshot shows the Fortran website's homepage. It features a large "F" logo on the left. The main content area includes sections on "Join us!", "Mailing list", "Discourse", "High performance", and "Statically and strongly typed". Each section contains a brief description and a "Get started" button.

Types of programming Language



- **Procedural programming languages:** These languages follow a sequence of commands or statements to achieve a desired output. Example: Python, C, Fortran, Pascal, etc
- **Object-oriented programming languages (OOP):** These languages help manage complexity in large programs by using class(say, Planets) and objects(say mars, saturn, earth,etc). Example: Java, Python, C++, C#, Delphi/Object Pascal, VB.NET
- **Scripting languages:** These languages are used for specific purposes, such as web development. Example JavaScript, PHP, Python, Bash, Perl
- **Logic programming languages:** These are another type of programming language. logic programming focuses on what the program should achieve: You define rules and facts(**Knowledge Representation**), and the system determines how to use them to reach a solution. Example Prolog, Answer Set Programming (ASP)

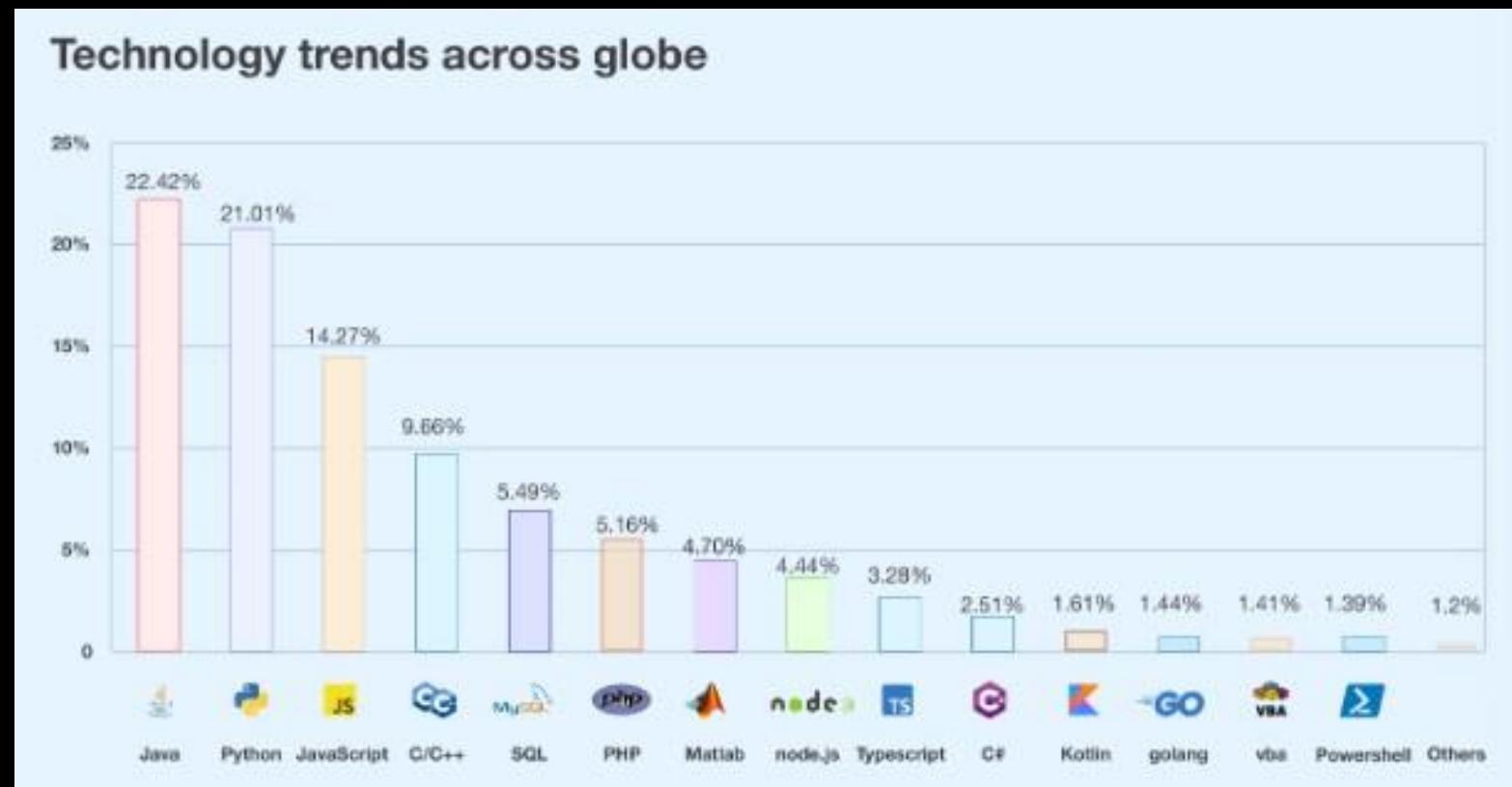


Evolution of Python

- Created by **Guido van Rossum** in 1991.
- **Python 1.x (1991-2000)**
 - Introduced core features like exception handling, functions, and modules.
 - Included basic data structures like lists, tuples, and dictionaries.
- **Python 2.x (2000-2010)**
 - Added list comprehensions, garbage collection, and Unicode support.
 - However, it suffered from inconsistencies, leading to Python 3.
- **Python 3.x (2008-Present)**
 - Introduced better Unicode handling, print as a function, and type hints.
 - Removed legacy features for better consistency.
 - Gained popularity for web development, AI, and data science.
- Over time, Python has become one of the most widely used programming languages, with major contributions in **machine learning, data science, automation, and web development**.

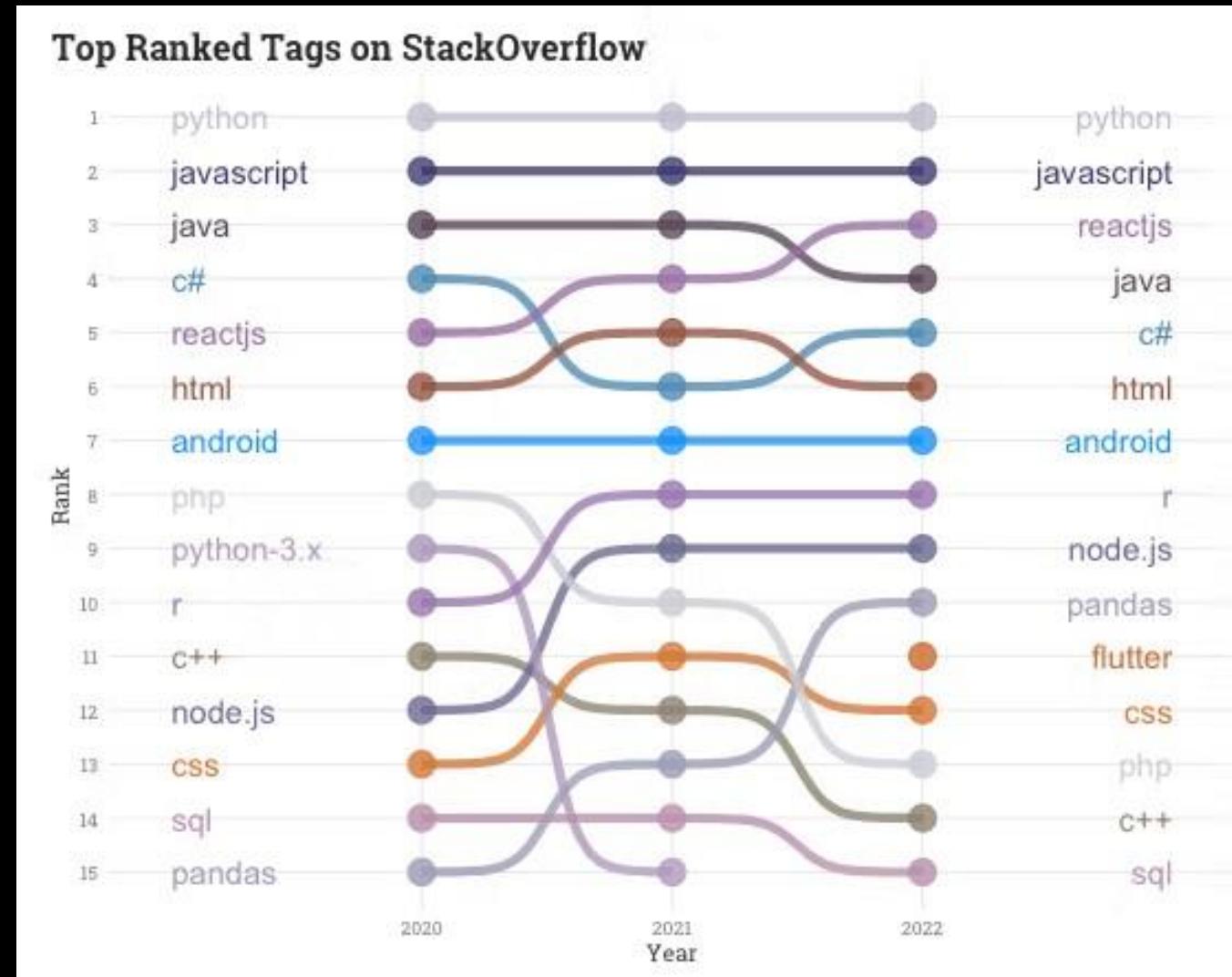
Where is Python Used?

- Web Development (Django, Flask)
- Data Science & AI (NumPy, Pandas, TensorFlow)
- Automation & Scripting (Selenium, PyAutoGUI)
- Cybersecurity (Scapy, Nmap)
- Game Development (Pygame)
- Embedded Systems & IoT (MicroPython, Raspberry Pi)



Popularity contest

- According to current trends, the most widely used programming languages are **Python, Java, and JavaScript**; with Python generally considered the most popular overall, followed by Java and then JavaScript, based on data from the TIOBE Index and other developer surveys.





Companies that use Python:



- Google makes extensive use of Python in its web search systems.
- The popular YouTube video sharing service is largely written in Python.
- The Dropbox storage service codes both its server and desktop client software primarily in Python.
- The Raspberry Pi single-board computer promotes Python as its educational language.
- EVE Online, a massively multiplayer online game (MMOG) by CCP Games, uses Python broadly.
- The widespread BitTorrent peer-to-peer file sharing system began its life as a Python program.
- Industrial Light & Magic, Pixar, and others use Python in the production of animated movies.
- ESRI uses Python as an end-user customization tool for its popular GIS mapping products.
- Google's App Engine web development framework uses Python as an application language.
- The IronPort email server product uses more than 1 million lines of Python code to do its job.
- Maya, a powerful integrated 3D modeling and animation system, provides a Python scripting API.
- The NSA uses Python for cryptography and intelligence analysis.
- iRobot uses Python to develop commercial and military robotic devices.
- Netflix and Yelp have both documented the role of Python in their software infrastructures.
- Intel, Cisco, Hewlett-Packard, Seagate, Qualcomm, and IBM use Python for hardware testing.
- JPMorgan Chase, UBS, Getco, and Citadel apply Python to financial market forecasting.
- NASA, Los Alamos, Fermilab, JPL, and others use Python for scientific programming tasks



Python in AI & Data Science



- **Machine Learning** (scikit-learn, TensorFlow, PyTorch)
- **Data Visualization** (Matplotlib, Seaborn)
- **Big Data Processing** (Dask, PySpark)



Compared with other languages

5 Python vs Other Languages

Feature	Python	C++	Java	JavaScript	Go
Ease of Use	✓	✗	✗	✓	✗
Speed	✗	✓	✓	✓	✓
AI & Data Science	✓	✗	✗	✗	✗
Web Development	✓	✗	✓	✓	✓
System Programming	✗	✓	✗	✗	✓

Disadvantages of Python(p2)

2. High Memory Usage

Reason: Python's dynamic typing and garbage collection lead to high memory consumption.

Impact: Not ideal for applications with **limited memory** (e.g., embedded systems).

```
python

import sys

x = 10 # Small integer
y = [i for i in range(10000)] # Large list

print(sys.getsizeof(x)) # output: 28 bytes
print(sys.getsizeof(y)) # output: ~87,000 bytes
```

Lists consume **more memory** than arrays in C/C++.

Solution: Use **NumPy arrays** instead of lists for large data.

Disadvantages of Python(p3)



3. Global Interpreter Lock (GIL)

- Reason: Only one thread executes at a time
- Impact: Inefficient multi-threading for CPU-bound tasks
- Solution: Use multiprocessing for CPU-heavy tasks

4. Weak in Mobile & Game Development

- Reason: Not optimized for mobile or games
- Impact: Rarely used for Android/iOS apps or major games
- Solution: Use Kivy or BeeWare (limited support)

5. Limited Support for Frontend Web Development

- Reason: Primarily a backend language
- Impact: Cannot replace JavaScript for frontend
- Solution: Use JavaScript + Python for full-stack

6. Poor Performance in Real-Time Applications

- Reason: Interpreted nature and GIL cause delays
Impact: Not ideal for real-time systems
Solution: Use Cython or C/C++ modules

7. Dependency Management Issues

- Reason: Multiple versions & libraries lead to conflicts
- Impact: Harder to maintain projects
- Solution: Use virtual environments (venv, conda)

Heading Goes Here



Fhdsklf
Fjdsklf
Fjskldf

