

Advanced Programming

Java Introduction

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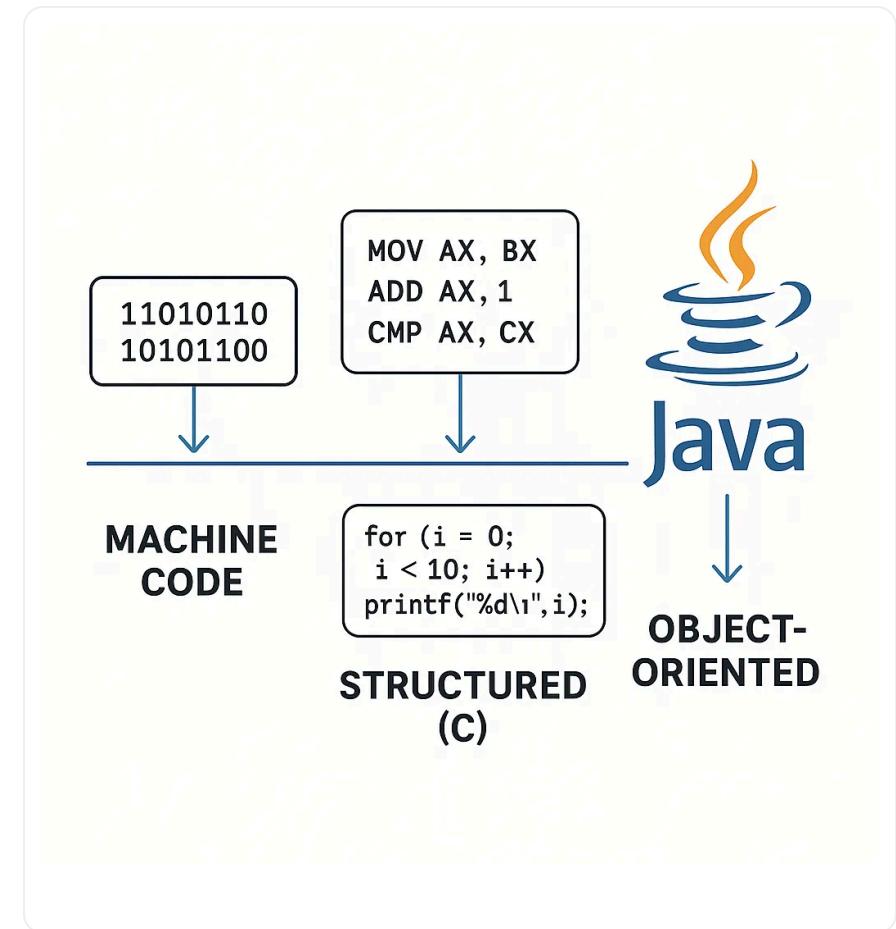
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Programming History

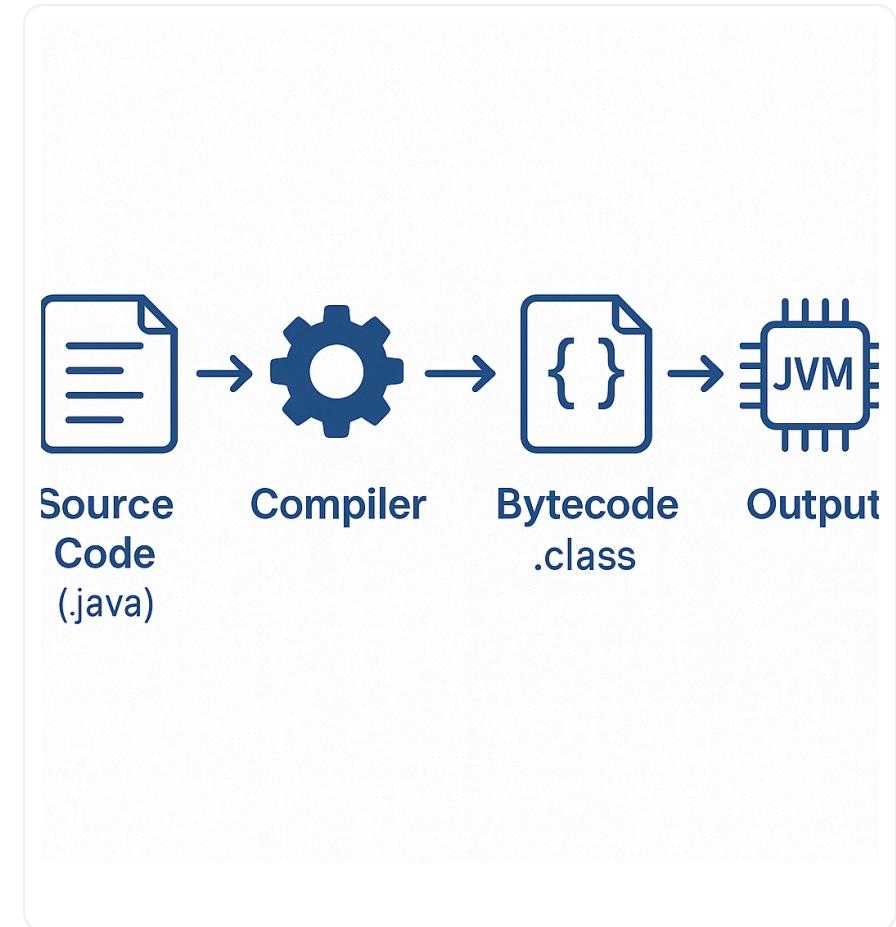
- Early languages: Machine → Assembly → Structured → OOP
- Machine & Assembly were hardware-dependent.
- Structured Programming (C) introduced functions & flow control.
- Object-Oriented Programming (Java, C++) introduced **classes & objects**.
- Java emerged in **1995** by *James Gosling* (Sun Microsystems).





What is Java?

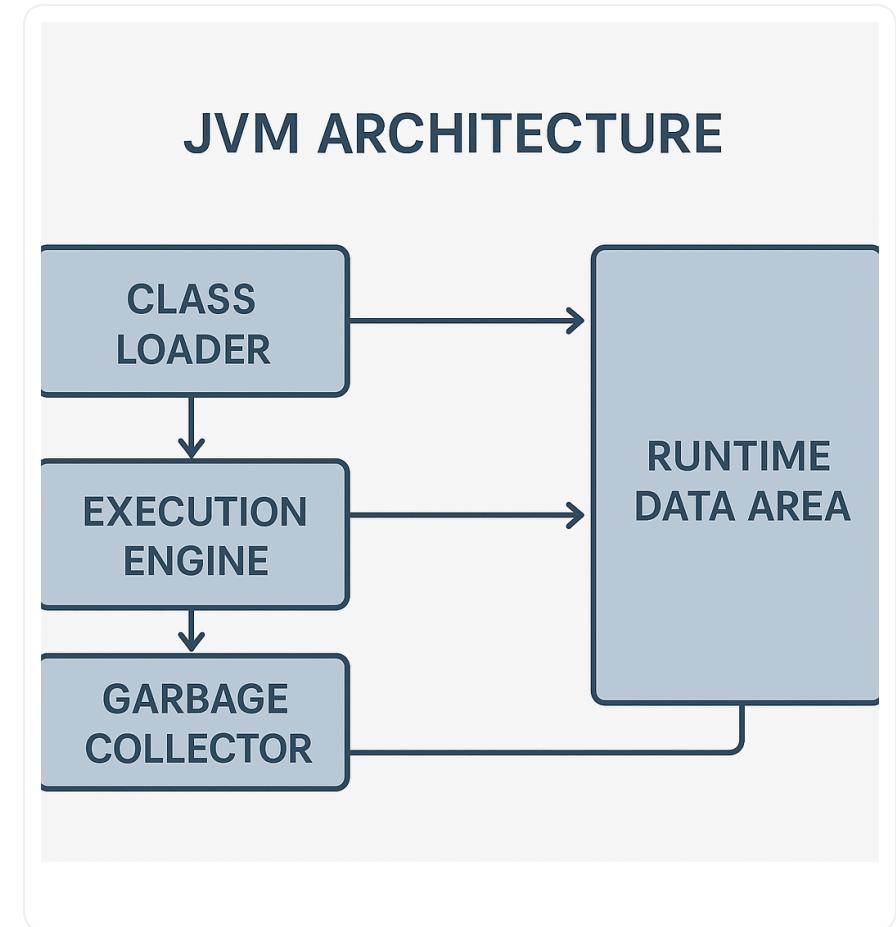
- High-level, Object-Oriented, Platform-Independent language.
- Source code compiled to **Bytecode**, executed by JVM.
- Motto: "**Write Once, Run Anywhere.**"
- Designed for portability, reliability, and security.





JVM (Java Virtual Machine)

- JVM converts bytecode → machine instructions.
- Provides abstraction from underlying hardware.
- Components:
 - Class Loader
 - Execution Engine
 - Garbage Collector
- Enables the same code to run across Windows, Linux, and macOS.





Java Versions

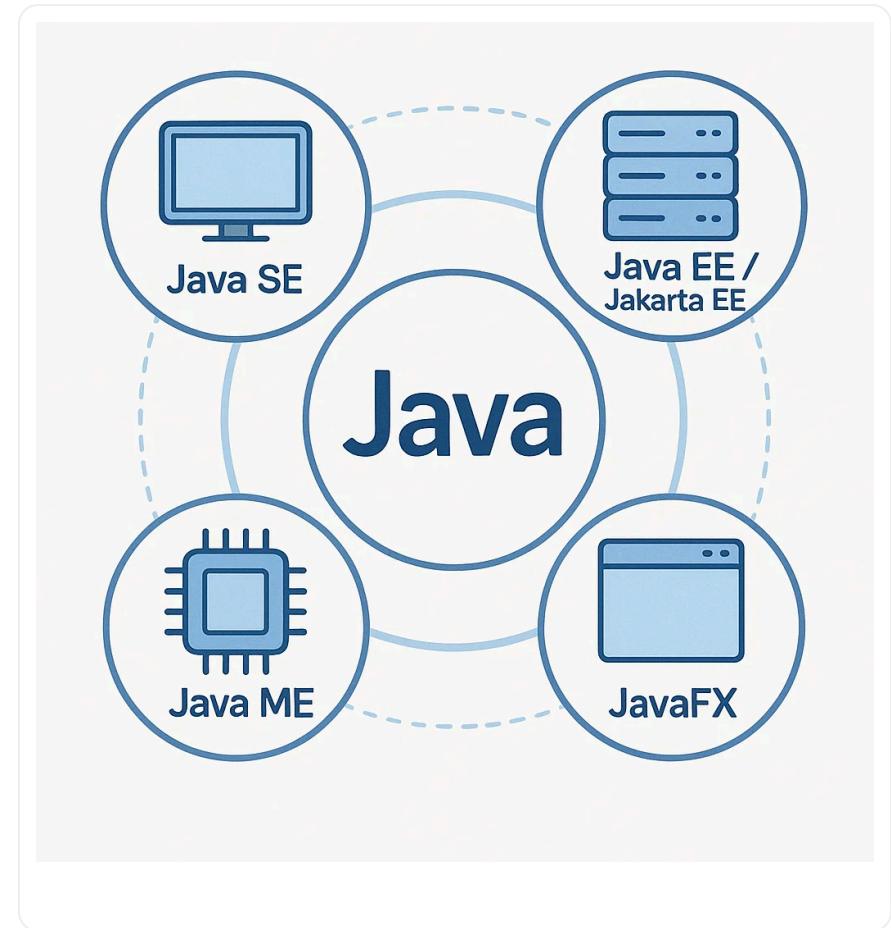
- **Java 1.0 (1995)** – initial release
- **Java 5 (2004)** – generics & annotations
- **Java 8 (2014)** – LTS, introduced lambdas
- **Java 11 (2018)** – LTS, modern baseline
- **Java 17 (2021)** – LTS, sealed classes & records
- **Java 21 (2023)** – LTS, virtual threads
- **Java 25 (2025)** – LTS, pattern matching enhancements





Platforms

- **Java SE:** Standard Edition — desktop apps.
- **Jakarta EE (formerly Java EE):** Enterprise — web & servers.
- **Java ME:** Micro Edition — embedded & mobile.
- **JavaFX:** GUI toolkit for desktop applications.

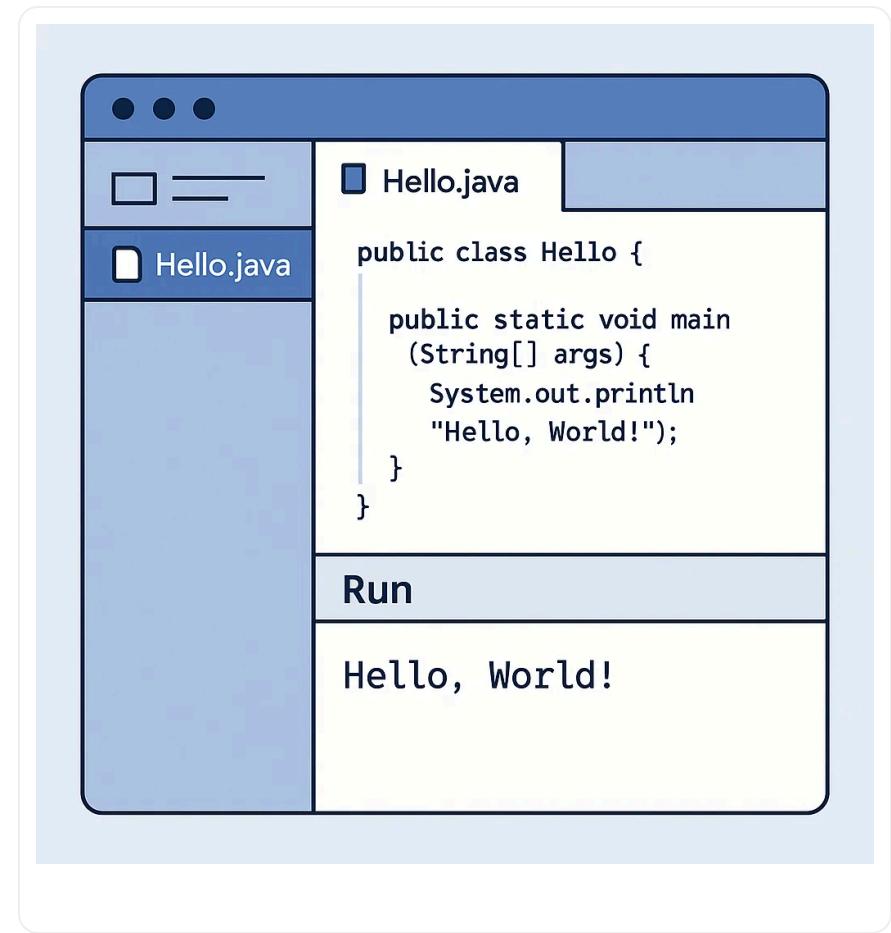




Executables & Extensions

- Common Java file types:
 - `.java` → source code
 - `.class` → compiled bytecode
 - `.jar` → Java Archive
 - `.war` → Web Archive
 - `.jmod` → Java module
- Compile & run:

```
javac Hello.java  
java Hello
```

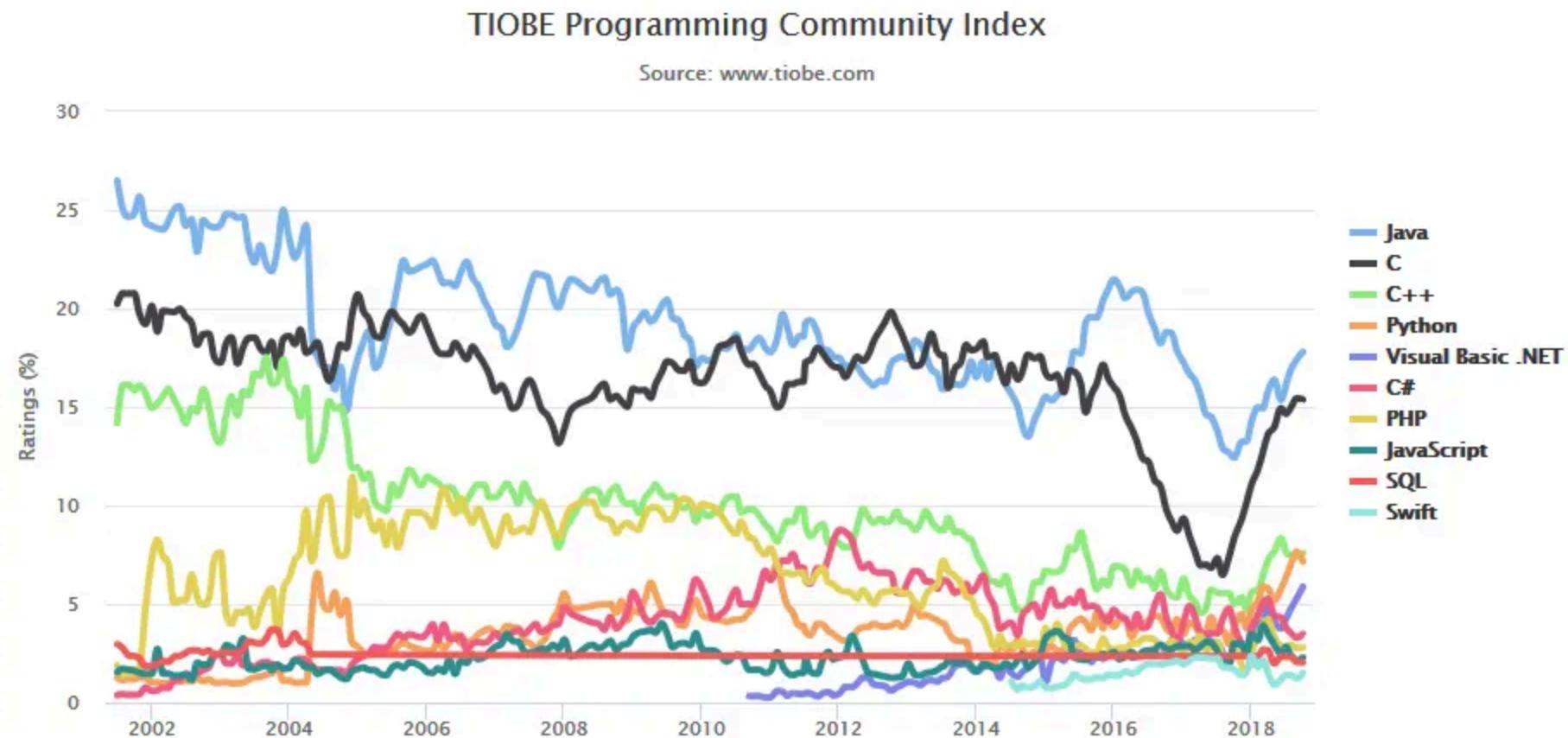




Popularity & Usage

- Java remains among the top languages globally.
- Heavy use in enterprise, Android (legacy), and cloud services.
- Ranking factors include community size, job demand, and ecosystem.
- Stable presence alongside Python and JavaScript.







Frameworks & Tooling

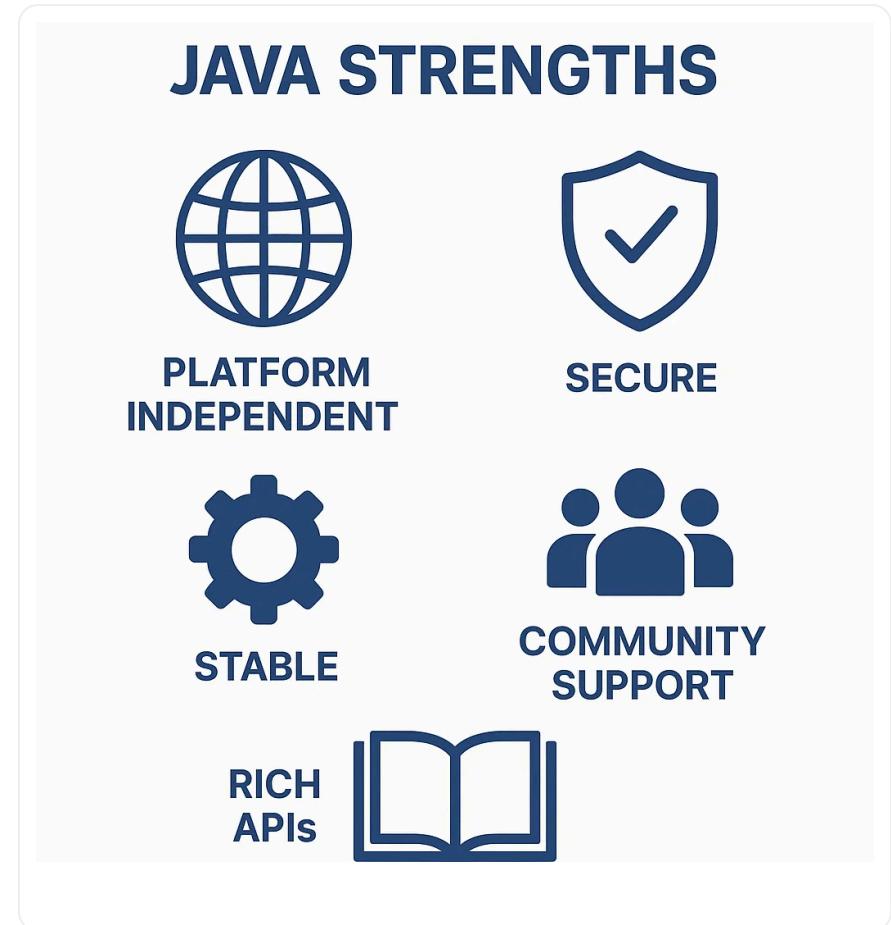
- Spring Boot — web & enterprise.
- Hibernate — ORM.
- Maven / Gradle — build automation.
- JUnit — testing framework.





Why Java?

- Platform independence
- Strong memory management
- Large community & ecosystem
- Secure and stable
- Rich standard libraries
- Backward compatibility

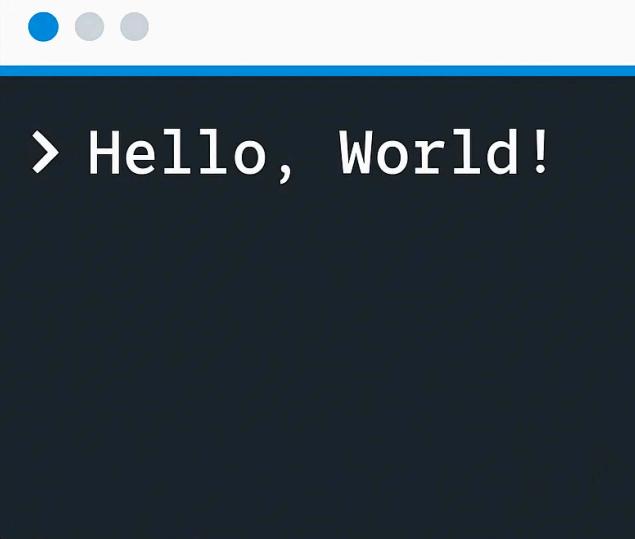




Hello World!

```
public class HelloWorld {  
    public static void main(String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

- Entry point: `main(String[] args)`
- `System.out.println` writes to stdout
- Class name matches file name





Thank You 🙌

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