Introduction to
Java
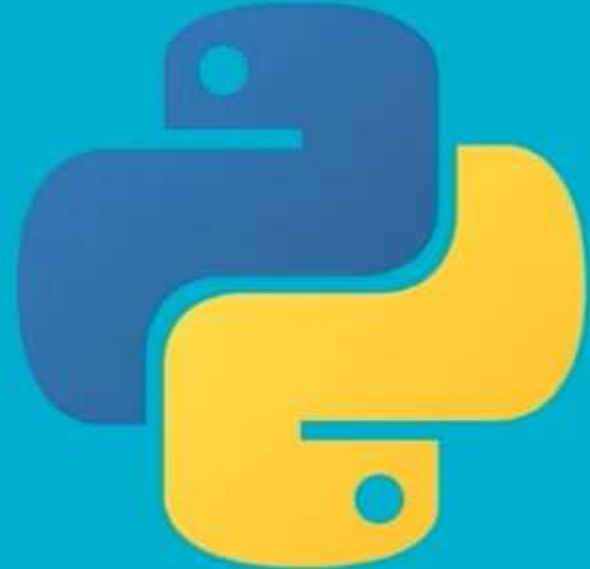# Programming

Dennis Ritchie
C Language

Guido Van Rossum
Python

Bjarne Stroustroup
C++

Statically Typed Vs. **Dynamically Typed** Programming Languages

Major Differences

- Type Checking is done at compile time.

- Need to mention the data type explicitly while declaring a variable.

- Example: int a = 10.

- The variable can only hold the values that belong to the associated type.

- As type checking and type error detection are done at compile time, no further type checking is needed during runtime. Thus, the program becomes more optimized, resulting in faster execution.

- Examples: C, C++, Java, Go, Rust, Swift, etc.

- Type Checking is done at runtime.

- Data type of the variable will be decided (inferred) based on the value that is being stored in it.

- Example: a = 10.

- As there is no association with type, variable can hold any type of value.

- As type checking and type error detection is done at runtime, a dynamically typed program is less optimized, results in slower execution.

- Examples: Python, PHP, JavaScript, Ruby, etc.

Java Programming Language

- Java is a General Purpose, Multi-Paradigm Programming Language that is developed by **James Gosling**, Mike Sheridan, and Patrick Naughton at **Sun Microsystems** during early 1990s.

- It is a programming language intended to let programmers write once, run anywhere (WORA), meaning that compiled Java code can run on all platforms that support Java without the need to recompile.

- The first ever version of Java is released in the year 1995 making it a 28 years old language to date.

James Gosling, 1955, Designer of Java

Source - Wikipedia

A Brief History of

- James Gosling, Mike Sheridan, and Patrick Naughton initiated the Java language project in June 1991. The small team of sun engineers called Green Team.

- Initially it was designed for small, embedded systems in electronic appliances like set-top boxes.

- Firstly, it was called "Greentalk" by James Gosling, and the file extension was .gt.

- After that, it was called Oak and was developed as a part of the Green project.

- In 1995, Oak was renamed as "Java" because it was already a trademark by Oak Technologies.

- Java is an island in Indonesia where the first coffee was produced (called Java coffee). It is a kind of espresso bean. Java name was chosen by James Gosling while having a cup of coffee nearby his office.
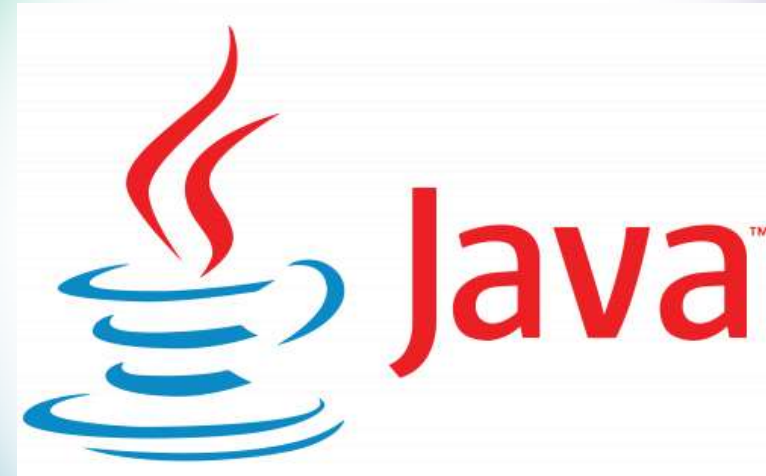
Java Legacy

Let's have a look at some popular applications built using Java Programming Language*

But **WAIT**, before that try to guess the answers to the following questions.

Question 1

- **Which one is the most widely used Mobile Operating System currently?**

Question 2

- **The BEST-SELLING MULTI-PLATFORM VIDEO GAME IN THE HISTORY?**

Question 3

- **OTT Platform with the highest number of subscribers in the WORLD?**

Question 4

- **The Most popular MUSIC APP in-terms of downloads and usage in the WORLD?**

Question 5

- **The Most widely used free online Encyclopedia?**

Question 6

- The **Most widely used Integrated Development Environment (IDE)?**

Question 7
Disclaimer: This is a question that seeks relative answers

- **The Topmost Space Research Organization in the World?**

Java Legacy

Few Popular Applications that are built using Java as one of the programming languages

1. Android OS
2. Netflix
3. Twitter, Face Book
4. Spotify
5. Opera Browser
6. Uber

7. Minecraft
8. IDEs like NetBeans, Eclipse and IntelliJ IDEA
9. Financial applications for companies like Citibank
10. LinkedIn, AWS

Java Legacy

Top 10 greatest java apps even written

1. Maestro Mars Rover controller
2. NASA WorldWind
3. Wikipedia Search
4. Hadoop
5. Parallel Graph AnalytiX (PGX)
6. Minecraft
7. NetBeans and the Eclipse IDE
8. IntelliJ IDEA
9. Jenkins
10. BioJava

1. Maestro Mars Rover controller

- In 2004, Java became the first programming language to expand humanity's planetary reach. For three months that year, NASA scientists at the Jet Propulsion Laboratory (JPL) in Pasadena, California, used the Java-based Maestro Science Activity Planner built by JPL's robot interface lab to control the Spirit Mars Exploration Rover as it explored the red planet. Experimentation with Java had begun many years earlier at JPL via the creation of a command-and-control system for the 1995 Mars Sojourner. Java founder James Gosling spent so much time at JPL that he became an advisory board member.

2. NASA's WorldWind

- The work of rocket scientists became free for all to use with NASA's release of the open source WorldWind, an SDK for a virtual globe that lets programmers add the US space agency's geographic rendering engine to their own Java, web, or Android apps. Going far beyond Google Earth, WorldWind's geospatial data is generated by NASA engineers who visualize terrain from elevation models and other data sources. According to the website: "Organizations around the world use WorldWind to monitor weather patterns, visualize cities and terrain, track vehicle movement, analyze geospatial data, and educate humanity about the Earth."

3. Wikipedia Search, Lucene and ElasticSearch Engines

- It's fitting that an encyclopedia for the people, by the people should run on open-source software—and feature a search engine powered by Java. Lucene, written by Doug Cutting in 1999 and named after his wife's middle name, was actually the fifth search engine Cutting developed. He created the others as an engineer for Xerox PARC, Apple, and Excite. In 2014, Wikipedia replaced the Lucene engine with Elasticsearch, a distributed, REST-enabled search engine also written in Java.

4. Hadoop for Big Data Analysis

- Lucene isn't the only Cutting creation to make our list. Inspired by a Google research paper describing the MapReduce algorithm for processing data on large clusters of commodity computers, in 2003 Cutting wrote an open-source framework for MapReduce operations in Java and named it Hadoop, after his son's toy elephant. Hadoop 1.0 was released in 2006, spawning the big data trend and inspiring many companies to collect "data lakes," strategize on mining their "data exhaust," and describe data as "the new oil." By 2008, Yahoo (where Cutting worked at the time) claimed their Search Webmap, running on a Linux cluster of 10,000 cores, was the largest production Hadoop application in existence. By 2012, Facebook claimed to have more than 100 petabytes of data on the world's largest Hadoop cluster.

5. Hadoop for Big Data Analysis

- Graph analysis is about understanding relationships and connections in data. PGX is one of the world's fastest graph analytics engines, according to benchmarks. Written in Java and first publicized in 2014 by a team led by Oracle Labs researcher Sungpack Hong, PGX lets users load up graph data and run analytics algorithms such as community detection, clustering, path finding, page ranking, influencer analysis, anomaly detection, path analysis, and pattern matching on them. Use cases abound in health, security, retail, and finance.

6. Minecraft

- The peaceful environment of this game—comprising biomes, people, and abodes that you build yourself out of blocks—holds an enduring fascination for children and adults everywhere, making it the most popular video game in history. Developed in Java by Markus "Notch" Persson and released in alpha in 2009, Minecraft and its 3D universe are a never-ending source of creativity, because no two spawned worlds are alike. The video game's use of Java also lets programmers at home and school create their own mods.

7. NetBeans and Eclipse IDEs

- The integrated development environment that first entranced the Java world was NetBeans, started at Charles University in Prague in 1996 (under the name Xelfi) and commercialized in 1997 by a company of the same name founded by entrepreneur Roman Staněk. Sun bought the modular IDE, which supports all Java application types, in 1999 and open sourced it the following year. In 2016, Oracle donated the entire NetBeans project to the Apache Software Foundation.

- Another popular Java-based integrated development environment is the open source Eclipse IDE, which can be used not only for Java coding but also for other programmling languages ranging from Ada to Scala. Launched in 2001 by IBM and based on IBM VisualAge, the Eclipse SDK is meant for Java developers but can be extended via plugins. The Eclipse IDE was spun out of IBM into the Eclipse Foundation in 2004, and it remains one of the top IDEs available.

8. Intellij IDEA from JetBrains

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9. Jenkins

- Created in 2004 by Sun Microsystems engineer Kohsuke Kawaguchi, Jenkins is a powerful open-source continuous integration server. Written in Java, Jenkins helps build, test, and deploy applications quickly and automatically. It's often recognized as one of the early DevOps tools that made "infrastructure as code" possible. Jenkins and its more than 1500 community-contributed plugins tackle myriad deployment and testing tasks, from working with GitHub, to supporting color-blind developers, to providing a MySQL Connector JAR file.

10. BioJava

- Launched in 2000 and still going strong, BioJava is an open-source library for processing biological data, a field known as bioinformatics. Scientists using this library can work with protein and nucleotide sequences and study data on gene-to-protein translation, genomics, phylogenetic development, and macromolecular structures. The project is supported by the Open Bioinformatics Foundation, and its contributors worldwide are funded by a variety of pharmaceutical, medical, and genomics interests. "BioJava is a popular option for method and software development thanks to the tooling available for Java and its cross-platform portability," writes Aleix Lafita and colleagues in a 2019 paper titled "BioJava 5: A community-driven open-source bioinformatics library." The paper goes on to note that BioJava had accepted contributions from 65 different developers since 2009, and over the previous year had accumulated 224 forks and 270 stars on GitHub and had been downloaded more than 19,000 times.

Features of Java

1. Platform Independent

2. Object-Oriented

3. Simple

4. Robust

5. Secure

6. Distributed

7. Architecture–Neutral

8. Dynamic

9. High Performance

10. Compiled and Interpreted

11. Multi-Threaded

12. WORA

Behold the main method

public · static · void main(String[] args)

Training–wise Challenges

- **Continuity**

- **Practice**

- **Extra long sessions**