Introduction

- Overview
- Environment Setup

Overview

Introduction to Course

- Advanced Programming: CS3360
- Language: Java
- Textbooks:
  - *Core Java - Volume I—Fundamentals, 10th Ed.*, Cay S. Horstmann, 2015
  - *Core Java - Volume II—Advanced Features, 10th Ed.*, Cay S. Horstmann, 2015

Java History

- Created in 1991
  - by James Gosling in **Sun Microsystems**
- Initially called Oak
  - in honor of the tree outside Gosling's window
- Its name was changed to Java
  - because there was already a language called Oak

- **Sun Microsystems** released the first public implementation as Java 1.0 in 1995
- Java syntax is similar to C and (a little) C++

Java Motivation (1)

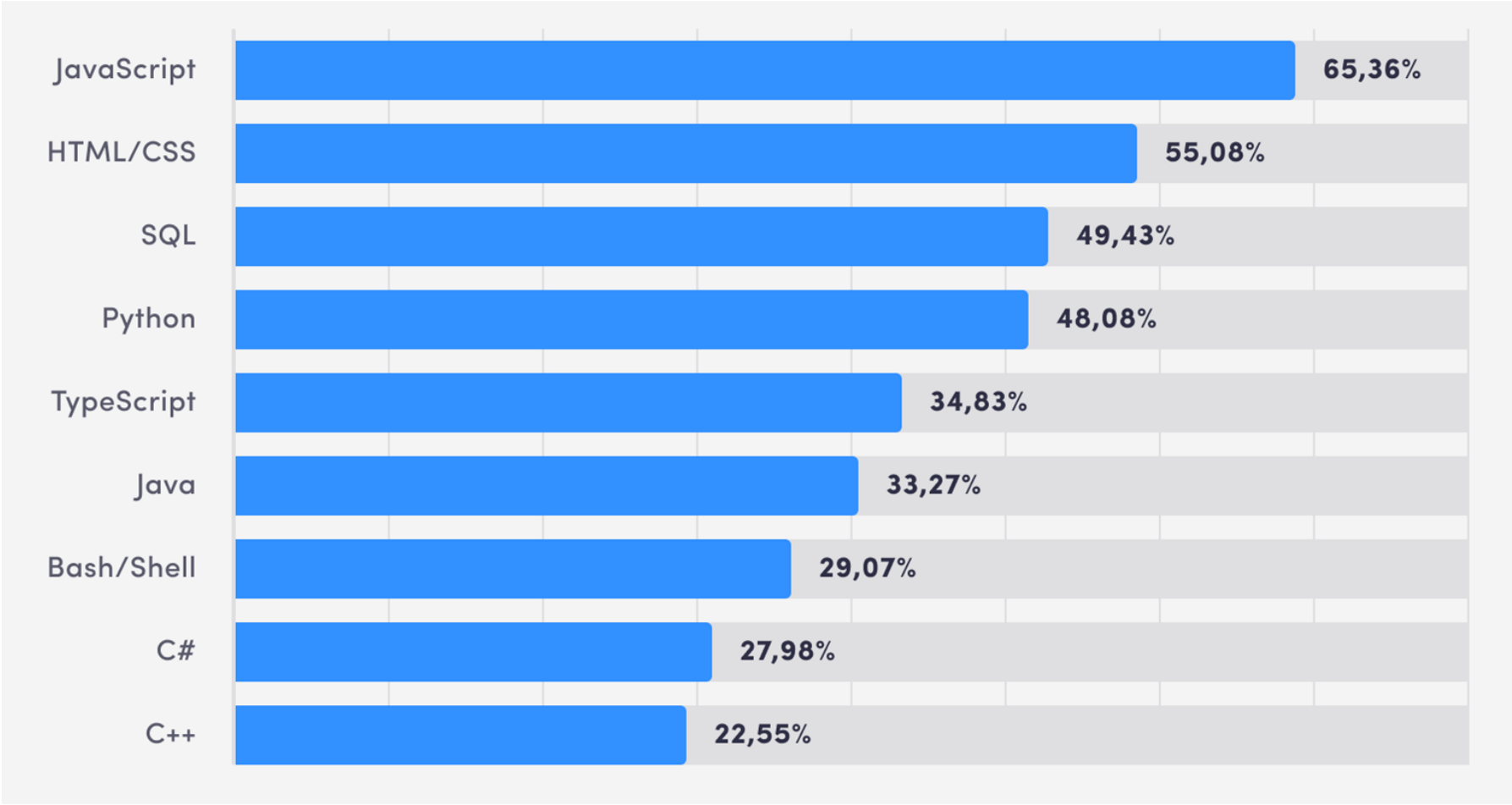
- The need for a *general-purpose* and *platform-independent* language
- To be embedded in various consumer electronic products
  - Like toasters and refrigerators
- General purpose
  - Desktop/embedded apps
  - Data management, communication, processing
  - Scientific, systems, commercial apps
- Platform independence = Portability: Write once, run everywhere (WORA)
  - Hardware
  - Operating system

Java Motivation (2)

- At the same time, the World Wide Web and the Internet were gaining popularity
- Java could be used for Internet programming
- Why?
  - “General purpose”-ness
  - Platform independence
- Web-related Java technologies:
  - Applets (now dead)
  - Servlet
  - Java Server Pages (JSP)
  - Spring Boot

Oracle, Sun,…

Popularity (2023)

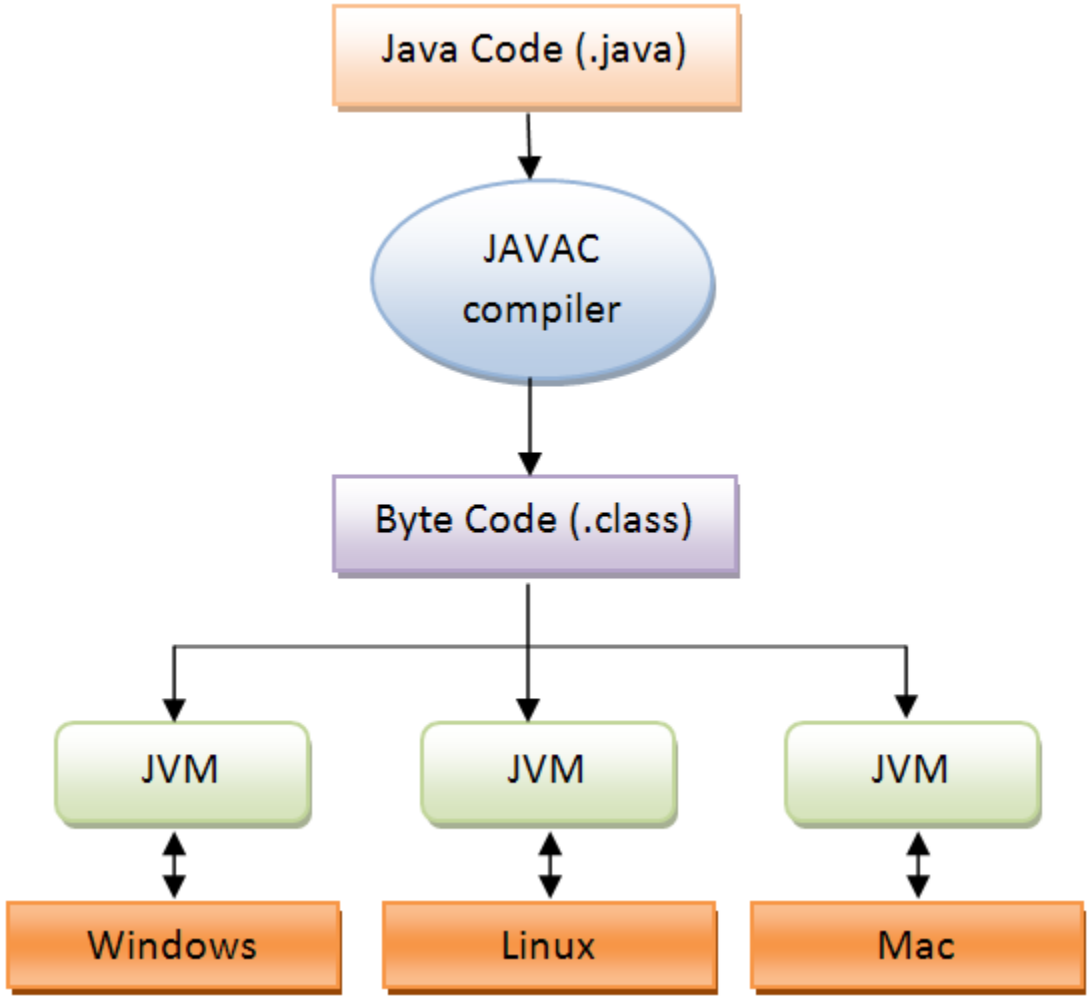


https://www.statista.com/statistics/793628/worldwide-developer-survey-most-used-languages/

Java Technology

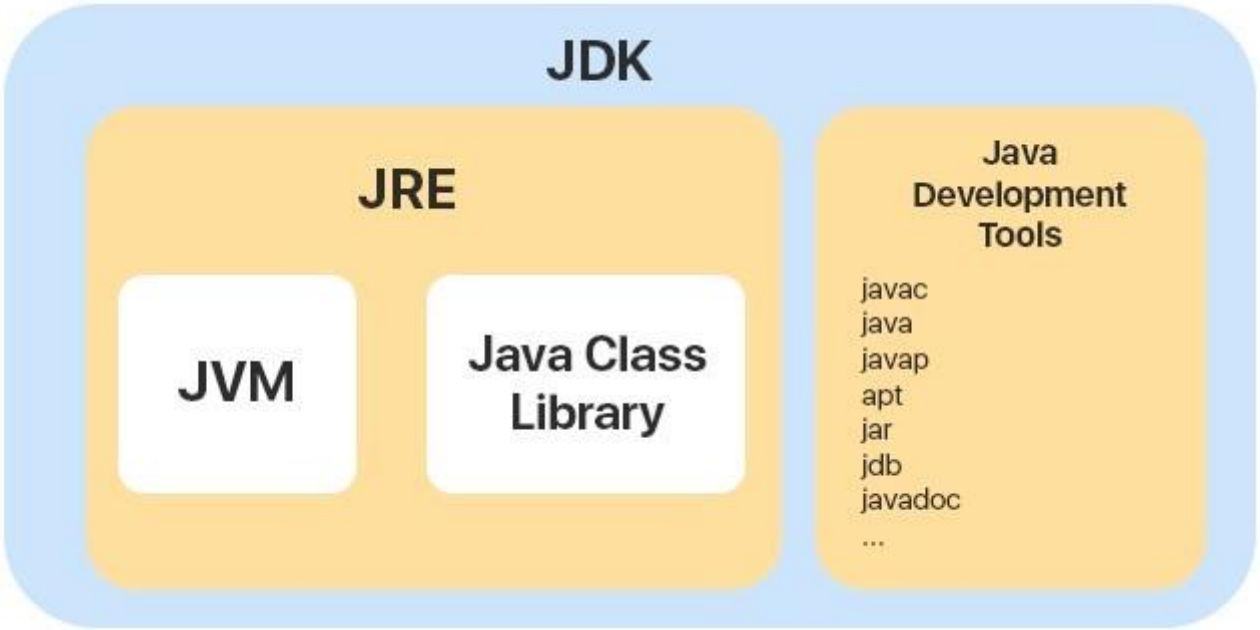
- Includes
  - A *programming language*
    - Java can create all kinds of applications
  - A *development environment*
    - A compiler (`javac`)
    - A documentation generator (`javadoc`)
  - A *runtime environment*
    - An interpreter (`java`)
  - …
- Compare it to C++

Compile and Execution Stages



- Compare to:
  - C++ and Assembly
  - .NET Framework
  - Scripting languages

The Ecology



- JDK: Java Development Kit
- JRE: Java Runtime Environment
- JVM: Java Virtual Machine

Characteristics of Java

- Java is simple: partially modeled on C but with fewer negative aspects
- Java is object-oriented: provides great flexibility, modularity, clarity, and reusability through encapsulation, inheritance, and polymorphism
- Java is architecture-neutral: write once, run anywhere
- Java is portable: runs on any platform without being recompiled
- Java is interpreted: runs on any machine that has a Java interpreter, which is part of the JVM
- Java is multithreaded: multithreading is smoothly integrated in Java
- Java is secure: eliminated certain types of error-prone programming constructs found in other languages
- Java is robust: exception-handling feature provides support for robustness

Environment Setup

JDK

- Go to: https://www.oracle.com/java/technologies/downloads/
- Download the right version
  - Operating system
  - LTS (long-term support) release – currently JDK 17 (2023)
- Install
  - Set environment variables:
    - `JAVA_HOME` to `<JDK-folder>`
    - `PATH` to include `<JDK-folder>\bin`

IDE

- Some options
  - NetBeans: https://netbeans.apache.org/
  - Eclipse: https://www.eclipse.org/
  - IntelliJ IDEA: https://www.jetbrains.com/idea/
  - VS Code: https://code.visualstudio.com/download
- For VS Code
  - Install: Extension Pack for Java (prefered option)

Build Tool

- Needed to manage complex projects
  - May be considered later!
- Options
  - Gradle: https://gradle.org/
  - Maven: https://maven.apache.org/download.cgi
- Install Maven:
  - Download and unpack to a folder
  - Set environment variable `PATH` to include the target folder
  - Install VS Code extension: Maven for Java

Exercises

- Setup working environment for Java
- Research and write a hello world application in Java
- Learn how to start a Java application