

Introduction to Java

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Overview

- 1 A Little History
- 2 Java Buzzwords (Selling Points in the 1990s)
 - Simple
 - Object Oriented
 - Network Savvy (Distributed)
 - Interpreted
 - Architecture Neutral → Portable
 - High Performance
 - Robust/Secure
 - Multi-Threaded (Concurrent Processing)

Part 1

- 3 First Java Application Program

A Little History

A Little History (1990-1991)

At Microsoft:

- Microsoft is well on its way to ruling the software world.
- Bill Gates talks about smart televisions and smart consumer devices (e.g., coffee makers).
- Intelligent consumer devices have their own peculiar tasks to perform, and their **day-to-day performance** must be **very reliable**.

At SUN Microsystems:

- Engineers develop the Oak Programming Language for small **multimedia applications** embedded within **consumer electronics devices** (e.g., microwave ovens).
- Marketplace for intelligent consumer devices **fails to develop**.

A Little History (1990-1994)

Meanwhile, at CERN in Europe:

- Tim Berners-Lee and co-workers (late 1980s) develop the first version of the [World Wide Web](#).
- Soon thereafter, researchers at NCSA develop [Mosaic](#), the first [graphical browser](#) for the [Web](#).

Back to SUN Microsystems:

- The developers of Oak realized that an [architecture-neutral language](#) would be ideal for programming interactive applications on the Web.
- Add [functionality](#) to the language for [networking](#) tasks.
- Change name: [Oak](#) to [Java](#).

Java Buzzwords

(Selling Points in 1990s)

Key Features

Here's how SUN Micosystems pitched Java in the 90s:

- Simple
- Object-Oriented
- Network Savvy (Distributed)
- Interpreted
- Architecture Neutral → Portable
- High Performance
- Robust / Secure
- Multi-Threaded

Java Buzzword 1: Simple

Early Claim: Learn Java, its simple!

Simplicity in a programming language means **leaving out** features that are not needed and making the **supported features work** in a **clear concise way**.

Implementation Strategy:

Experience in the development of other languages, such as C, indicates that a good way of achieving this goal is to keep the **set of language structures** and **reserved words small**,

and then ...

provide for additional functionality with **software libraries**.

Java Buzzword 1: Simple

Packages in the Java Development Kit:

- **Java 1.0 (Jan. 1996).** The first public release of Java contained **212 classes** organized into **8 packages**.
- **Java 1.4 (Feb. 2002).** The major release increased the number of classes to **2,991 classes** and interfaces located in **135 packages**.
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- **Java 1.8.** March 2014. **4240 classes**.
- **Java 1.9.** Adds support for lambda expressions (a feature that you can play with in Python!). Released, September 2017.
- **Java 1.10 and 1.11.** March 2018 and September 2018. **4411 classes**.

Java Buzzword 2: Object Oriented

Working with Objects and Classes:

- Collections of objects share similar traits (e.g., data, structure, behavior).
- Collections of objects will form relationships with other collections of objects.

Definition of a Class

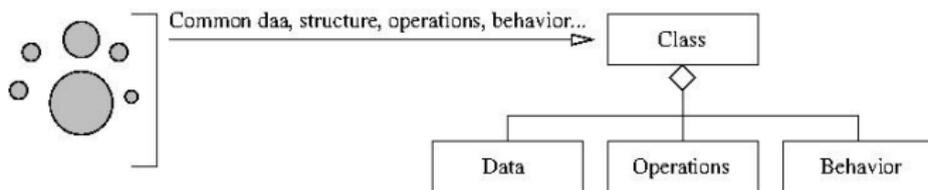
A **class** is a **specification** (or blueprint) of an object's structure and behavior.

Definition of an Object

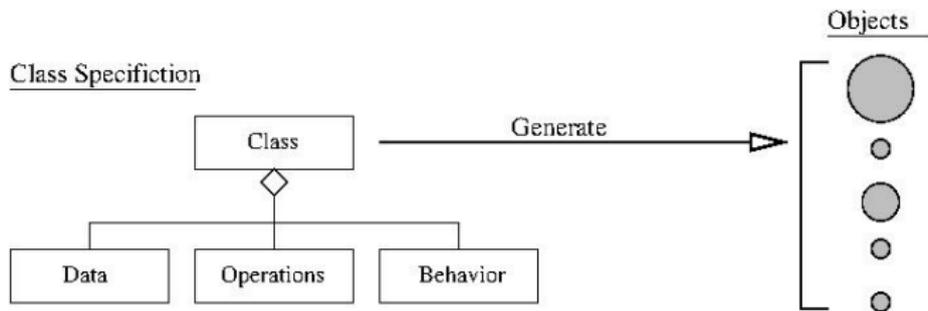
An **object** is an **instance** of a class.

Java Buzzword 2: Object Oriented

From Collections of Objects to Classes:

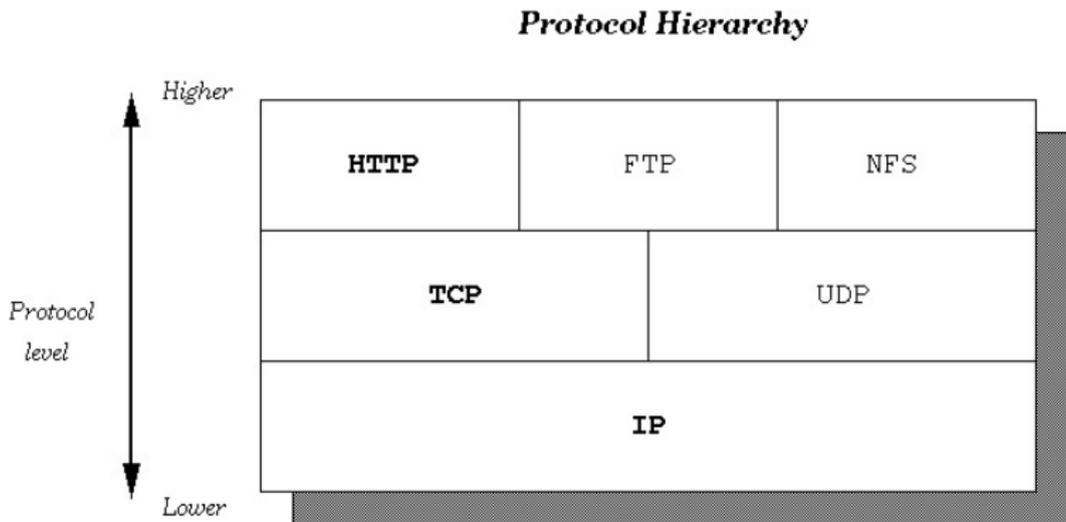


Generation of Objects from Class Specifications:



Java Buzzword 3: Network Savvy (Distributed)

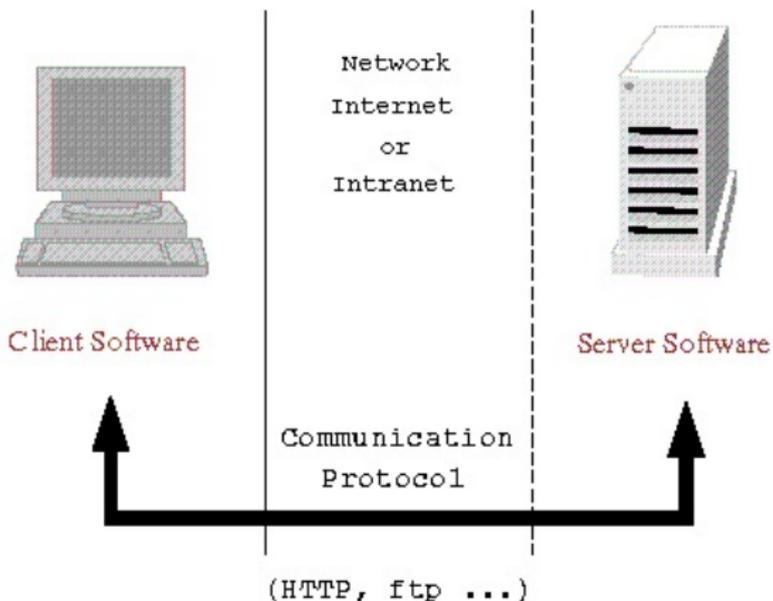
Network Protocol Stack:



Java Buzzword 3: Network Savvy (Distributed)

Client/Server Architectures:

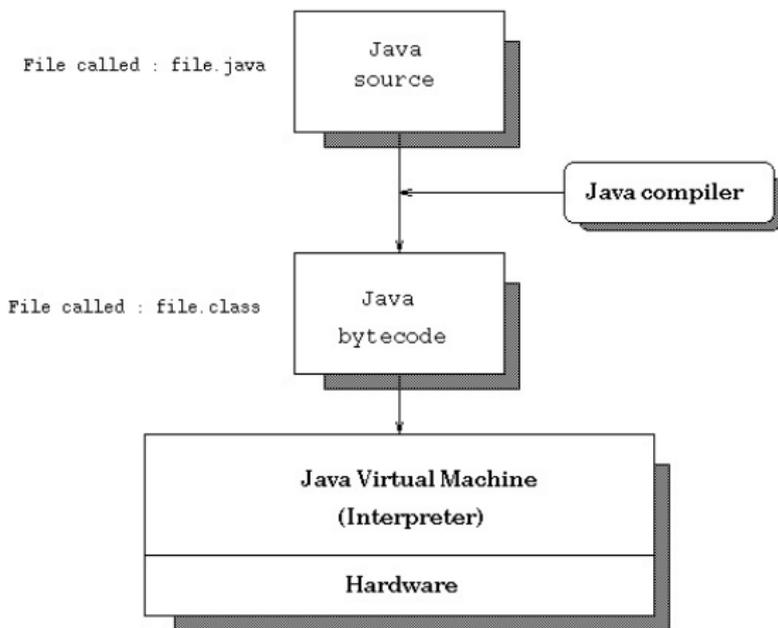
Client/Server Architecture



Java Buzzword 4: Interpreted

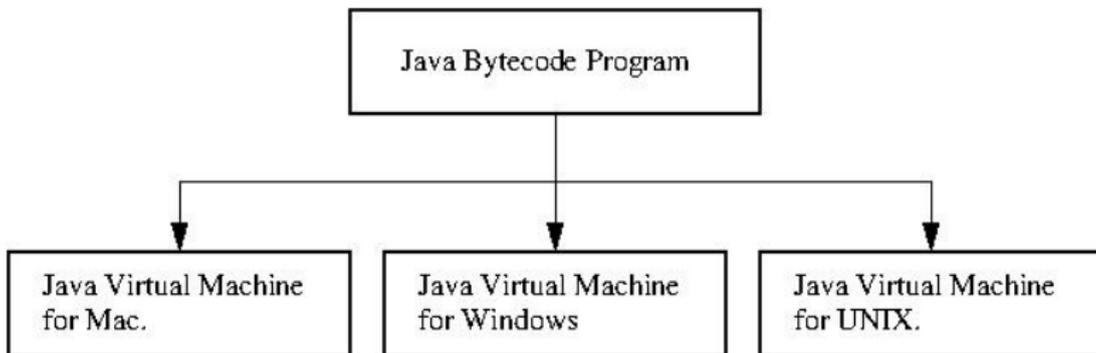
Interpreted. Compiling and Running a Java Program

Java compiling scheme



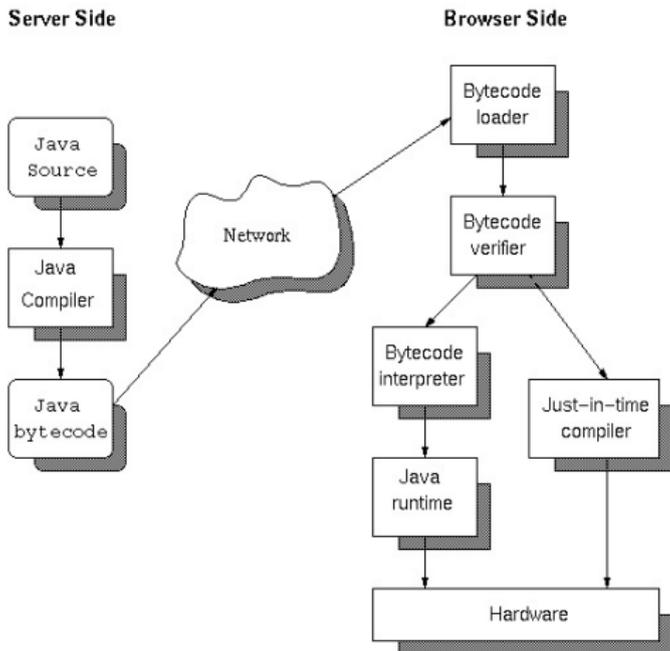
Java Buzzword 4: Interpreted

Interpreted. Execution of Java bytecodes on various platforms.



Java Buzzword 5: Architecture Neutral → Portable

Executing a Java applet



Java Buzzword 7: Robust/Secure

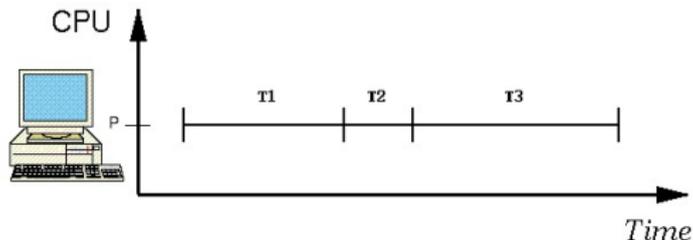
Restrictions on permissible operations can be enforced.

By default, Applets are prohibited from:

- Reading from the local disk
- Writing to the local disk
- Executing local programs
- Opening network connections other than to the HTTP server that the applet came from
- Discovering private info about user (username, directories, OS patch level, applications installed, etc.).

Java Buzzword 8: Multi-Threaded

Single Processor, Single Thread:



Multiple Processors, Multiple Threads:

