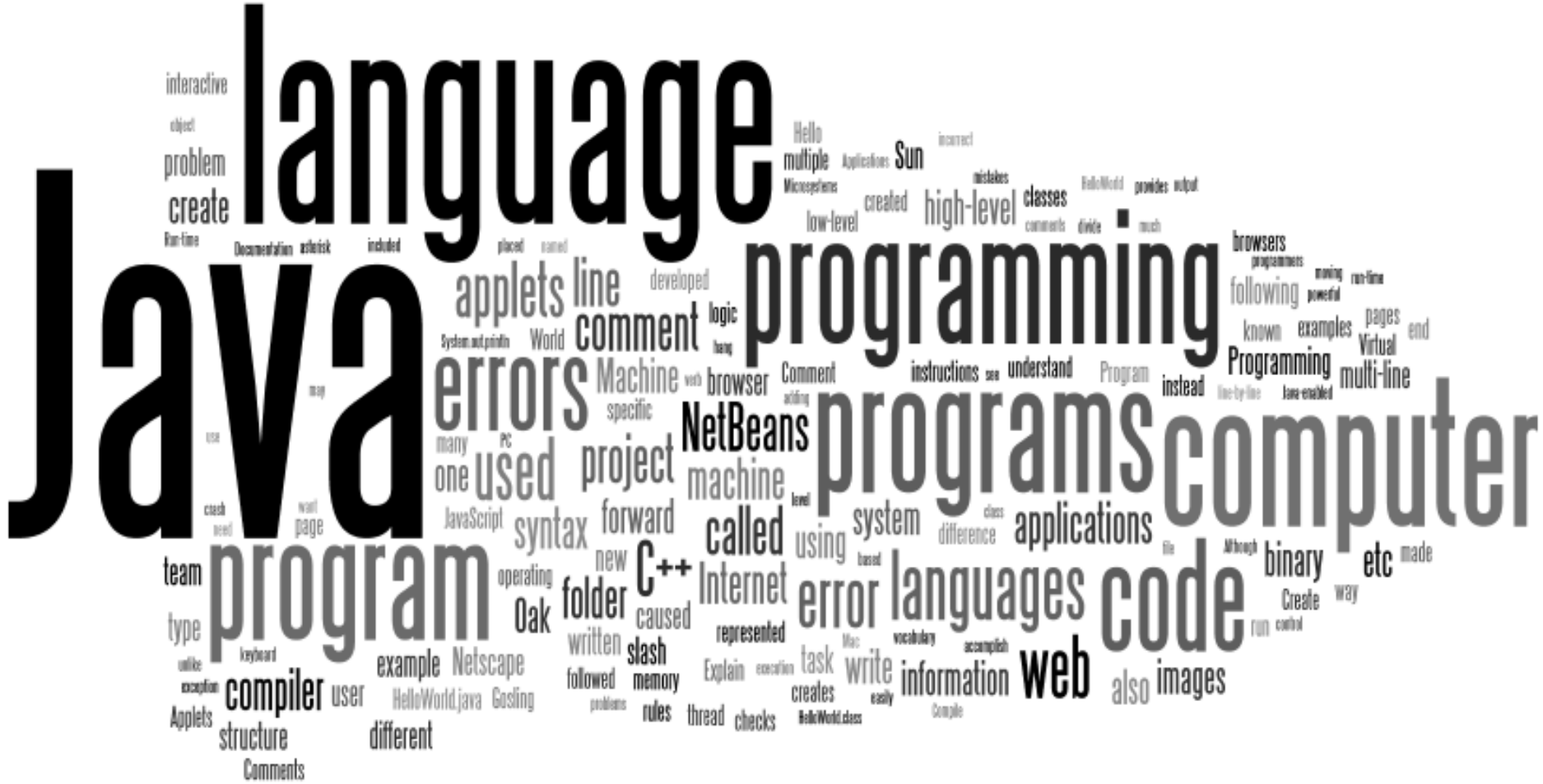
Chapter 1



Coding Introduction

Objectives

- Explain the difference between high and low level programming languages.
- Describe the history of how the Java programming language was started.
- Briefly describe the following:
  - Object Oriented Programming
  - Platform-Independence
  - Garbage Collection
  - Java Developer's Kit
- Explain the difference between Java applets, applications, and servlets.
- Explain the difference between Java and JavaScript.
- Compile and execute a Java program
- Debug errors
- Identify and fix compiler errors

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How it Works…the Beginning

- Programming is a way to tell a computer what to do.
  - **Computer program**: line-by-line instructions on how to accomplish a task.
- **Binary**: information is stored based on electronic signals.
  - **Bit** (binary digit**):** smallest unit of information storage represented by on (1) or off (0) signal.
  - **Byte:** eight bits or one character such as the letter "A" on the keyboard) uses eight bits.

Two bytes meet. The first byte asks, "Are you ill?"
The second byte replies, "No, just feeling a bit off."

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Low-Level Programming Languages

- Written at the very low technical circuitry level of the computer.
  - Examples: machine language and assembly language
    - Machine language is composed of binary 1's and 0's and is not intended for humans to read.

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High-Level Programming Languages

- Allows programmers to write programs using English terms.
- Computers do not understand high-level languages so they must be converted to machine language (1's and 0's)
  - Examples: Java, BASIC, C++, Visual Basic

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History of Java

- **James Gosling** was given the task of creating programs to control consumer electronics (TV's, VCR's, toasters, etc.).
- Gosling and this team at Sun Microsystems started designing their software using **C++**
- C++ was not suitable for the projects they had in mind. Thus, a new programming language named **Oak** (after a tree outside his window) was born.

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Continued History of Java

- Oak was used in a few projects, but they never made it to the public eye.
  - Sun discovered that the name Oak was already copyrighted and so after going out for coffee one day, they named their new language **Java**.
- In **1995**, Sun Microsystems officially announced Java and **Netscape Navigator 2.0** was the first to embrace the new language.
  - Browsers that are "Java-enabled" mean that they can download and play Java applets on the user's system

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Java Is…

- Simpler than C++
- An Object Oriented Language
- Platform-independent
- Used on the Internet
- General purpose
- Secure
- Capable of containing multiple threads
- Capable of supporting various multimedia
- Programmed to collect garbage automatically
- Reliable and Robust

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Types of Java Programs

- **Applets** appear in a web page much in the same way as images do, but unlike images, applets are dynamic and interactive.
  - Used to create animations, games, ecommerce, etc.
- **Applications** are programs that can be run from the command line on a computer.
  - Sun's Star Office is a word processor, spreadsheet, etc. completely written in the Java language.
- **Servlets** are programs that respond to requests from clients.

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Java Programming Tools

- **Integrated Development Environment (IDE):** software application that provides programmers with a programming environment equipped with the tools that they need to quickly and efficiently develop code.
  - Examples: JCreator, JPad, Eclipse, JBuilder, BlueJ
- **Java Development Kit (JDK)**: contains a compiler, a debugger, extensive class libraries, an execution environment, and sample codes.
  - **Java Virtual Machine (JVM)**: reads the bytecode found in the class file and translates the commands into machine language instructions for that computer's specific processor
    - The JVM is included with the JDK

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Program Errors

- Syntax Errors
  - Found during compilation
  - Usually caused by incorrect capitalization or spelling mistakes
- Run-Time Errors
  - Found during execution
  - Usually caused by invalid data such as dividing by zero
- Logic Errors
  - Found during testing
  - Usually caused by human error such as using the wrong equation, wrong strategy, etc.

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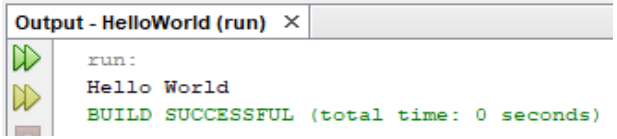
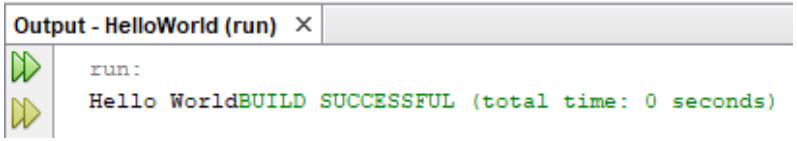
Statements

- **Statements** form a single Java operation.
  - Generally end with a semicolon.
    - Samples :
      - System.out.println("Hello World");



      - System.out.print("Hello World");



  - Block of statements are surrounded by curly braces { }.

```
public static void main(String[] args) {
    System.out.print("Hello World");
}
```

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Escape Codes

\n	Newline
\t	Tab
\\	Displays a Backslash
\'	Displays a single quote
\"	Displays a double quote

```
System.out.println("I am going to earn an \"A\" in this course");
```

I am going to earn an "A" in this course.

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Sample Program

through
Alice

HelloWorld.java

```
1  /*************************************************************
2  * This is a simple Java program to print Hello World
3  * written by your name
4  * written on date
5  * JDK version
6  *************************************************************/
7
8  public class HelloWorld
9  {
10         public static void main (String [ ] args)
11         {
12                 System.out.println("Hello World");
13
14         } //ends the main method
15 } // ends program
16
```

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