

# GEEN163

## Introduction to Computer Programming

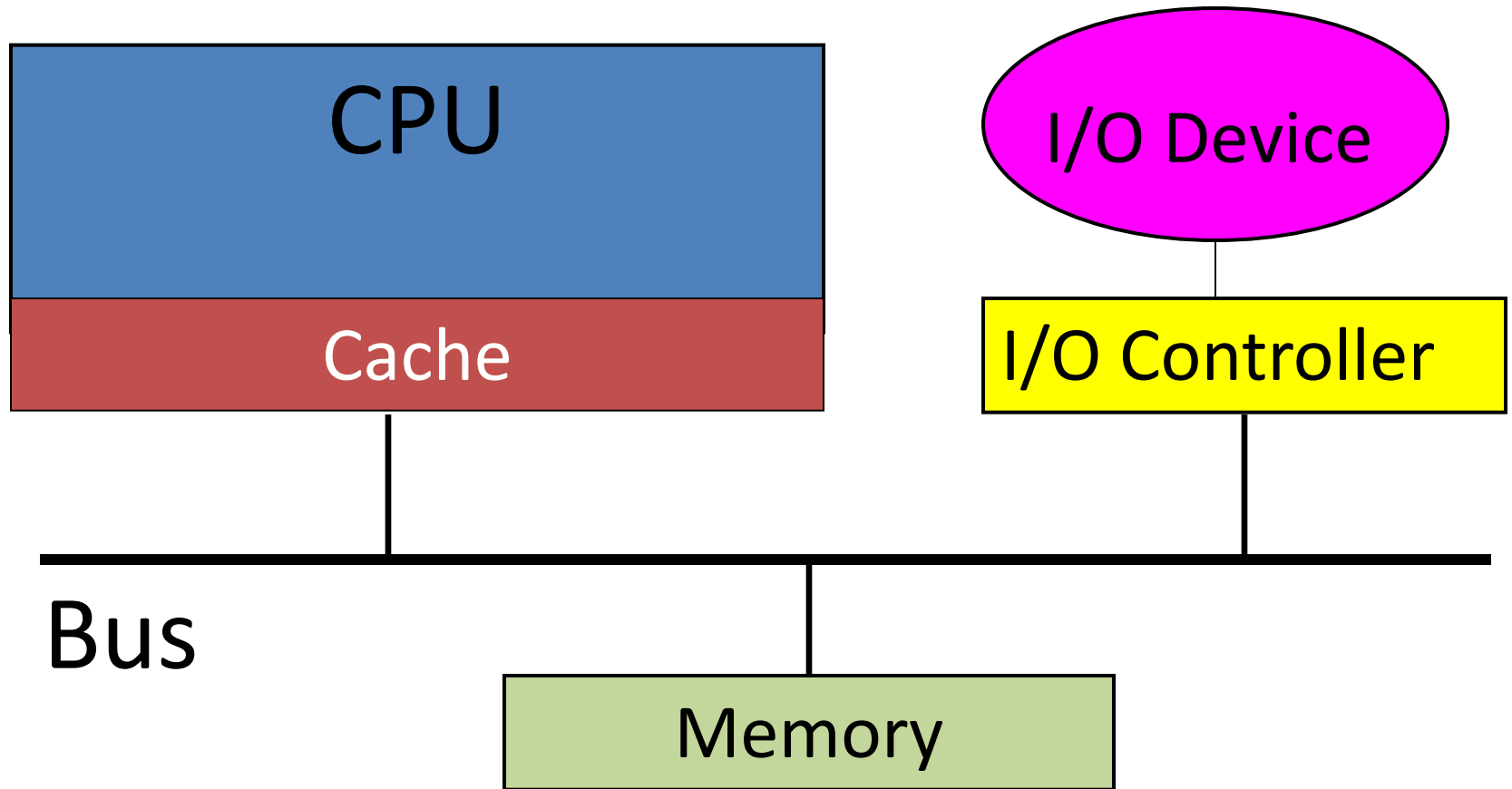
### Introduction

What is the difference between a simple calculator and a computer?

# Hardware and Software

- Hardware is the electronics of the computer. Hardware is physical stuff you can touch.
- Software is the program that runs on the hardware.
- Software allow the same hardware to be used for many different purposes.
- We will be writing software in this class.

# Basic Computer Components



# Central Processing Unit

- Contains the control logic that initiates most activities in the computer.
- The Arithmetic Logic Units of the CPU perform the math and logic calculations.

# Bus

- The bus is a set of parallel wires that connect the CPU, memory and I/O controllers.
- It has logic to determine who can use the bus at any given instant.
- Controlled by the chipset.

# I/O Controllers

- Direct the flow of data to and from I/O devices.
- The CPU sends a request to the I/O controller to initiate I/O.
- I/O controllers run independently and in parallel with the CPU.
- I/O devices include the screen, keyboard, network, printer, disk, mouse, etc.

# Memory

- The internal memory is Random Access Memory (RAM).
- Both data and program instructions are kept in RAM.
- Instructions must be in RAM to be executed.
- 8 binary bits are grouped into a byte
- 4 bytes (32 bits) are grouped into a word
- 8 bytes (64 bits) are grouped into a long word



# Programming Languages

- We will be writing software in the Java programming language.
- There are hundreds of programming languages.
- Programs must be written ***EXACTLY*** correct.
- Any syntax error (i.e. missing comma) will generate an error.

# Example Java Program

```
// A simple Java program
```

```
public class FirstDay {  
    public static void main( String[] args) {  
        System.out.println("My first program");  
    }  
}
```

# Comments

- Programs are written for both computers and humans to read.
- Comments are notes for humans that the compiler ignores.
- There are two formats for comments
  - // the rest of the line is a comment
  - /\* everything is ignored  
until \*/
- Javadoc comments start with */\*\* more to come \*/*

# Reserved Words

- Some words are special in Java. They are part of the Java language. You cannot use reserved words for names.
- **class public static void** are reserved words used in the example program.
- All Java reserved words are all lower case.
- Java is case sensitive. Upper and lower case letters are different.

# Statements

- A statement is a line of a Java program.
- One logical line can be spread over several lines on the screen.

```
System.out.println(  
    "My first program"  
);
```

- Every Java statement ends with a semi-colon ;

# Blocks

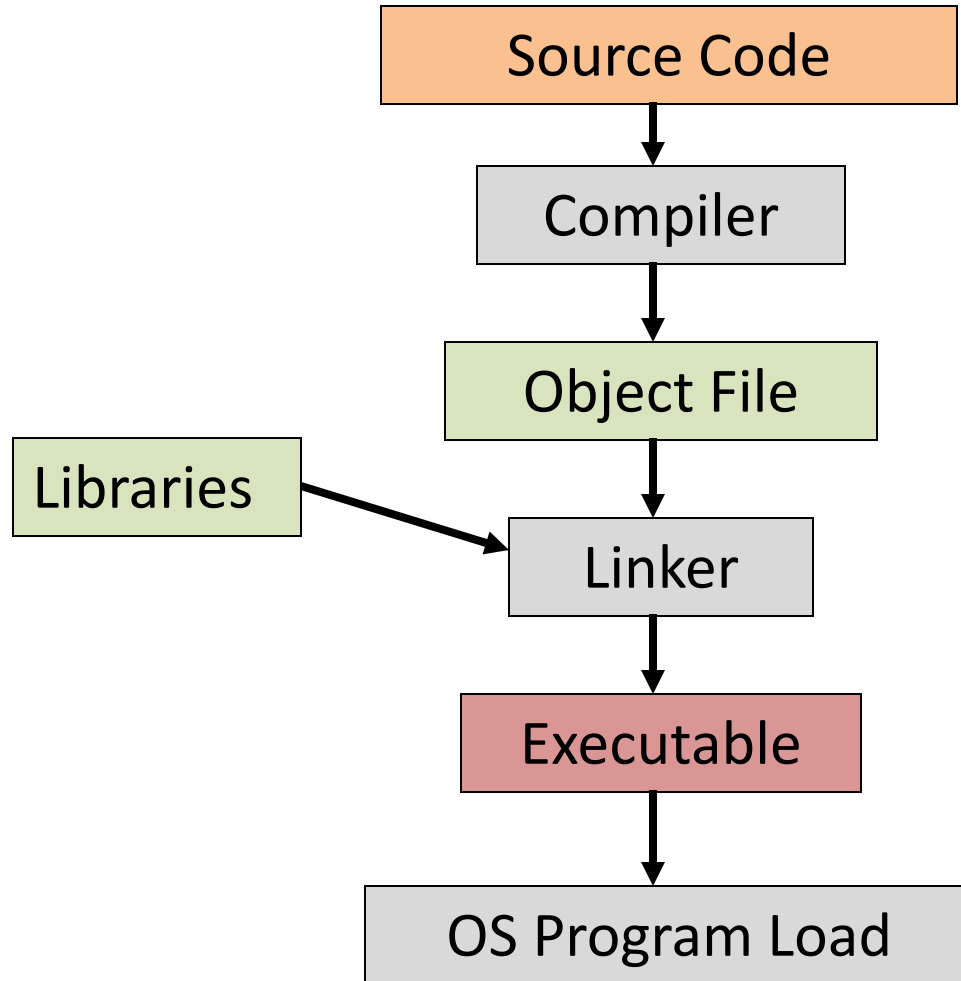
- A block is a bunch of statements surrounded by curly brackets `{ block stuff }`
- Every class has a class block.
- Every method has a method block.
- Almost any place you can put a Java statement, you can also put a block.
- Blocks can be nested

`{ outer { inner } more outer }`

# Source Code

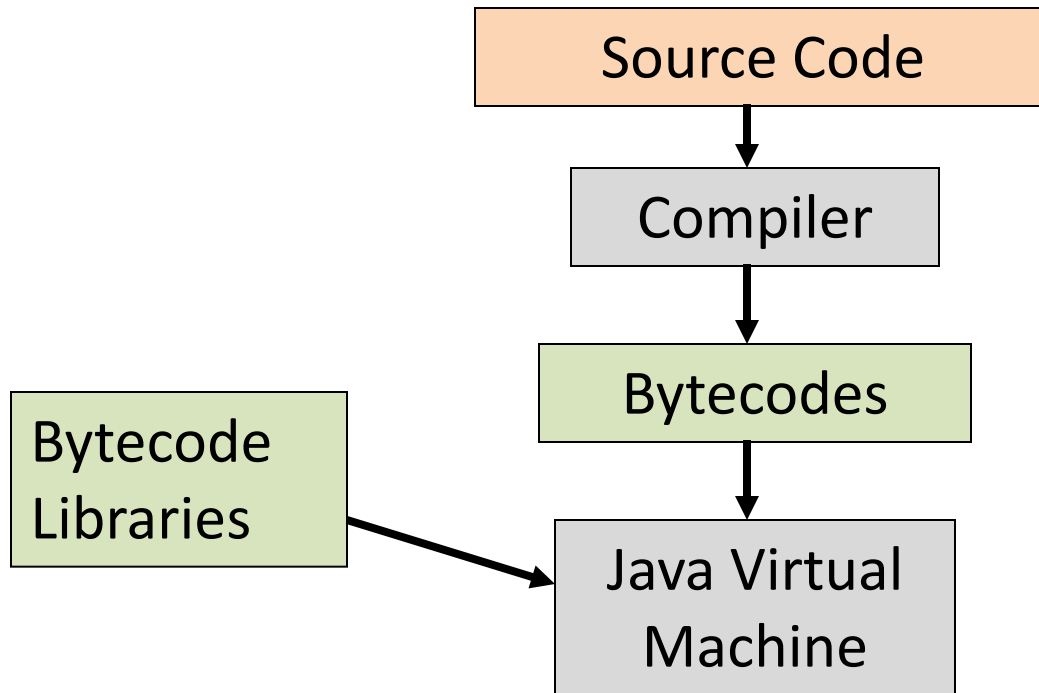
- What you type is called the source code of your program.
- The source code is not directly run by the computer.
- The source code must be compiled into an executable form before the computer can execute it.

# Traditional Program Creation

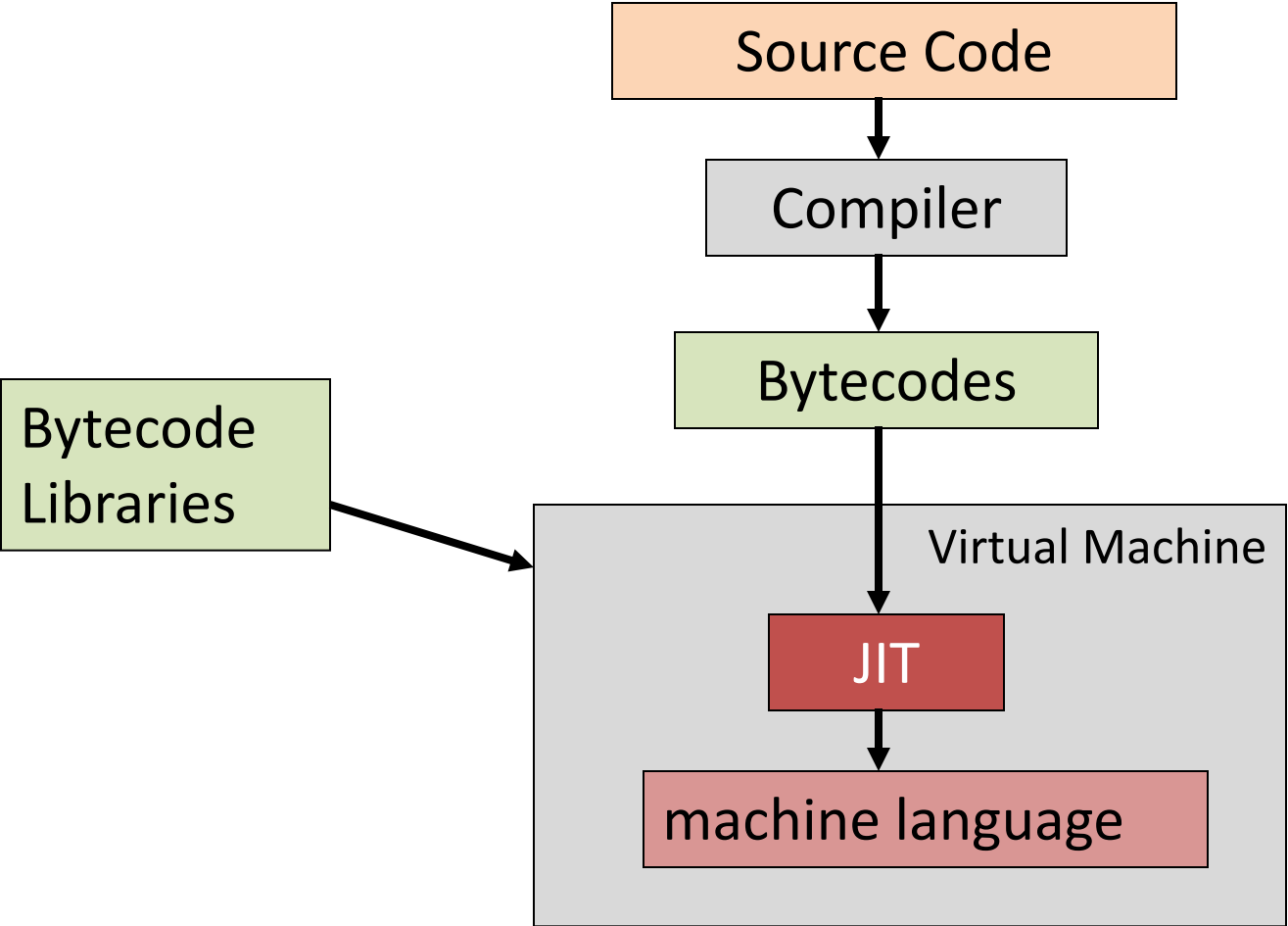




# Traditional Java Programs



# Modern Virtual Machines



# Errors

- When programming you will make mistakes.
- There are three types of programming errors
  - **Compile errors** – When you compile your program, the compiler might detect an error (i.e. missing semicolon)
  - **Run time errors** – An error can occur when you program is running (i.e. division by zero)
  - **Logic errors** – Your program might not produce the correct results
- Errors in programs are often called “Bugs”

# Keep Your Cool



- You **will** have errors
- You **will** correct them
- Seek help if you don't understand the error