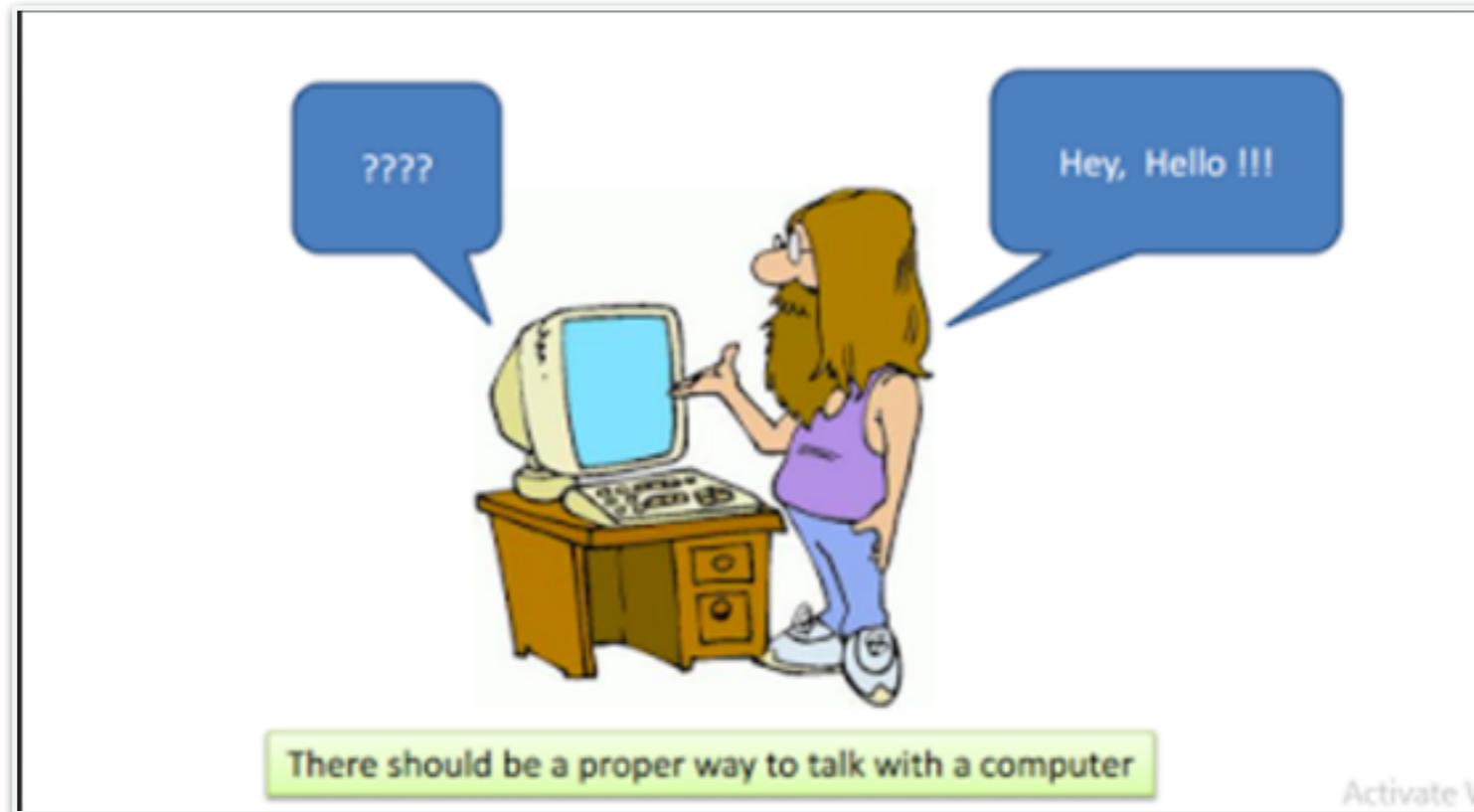
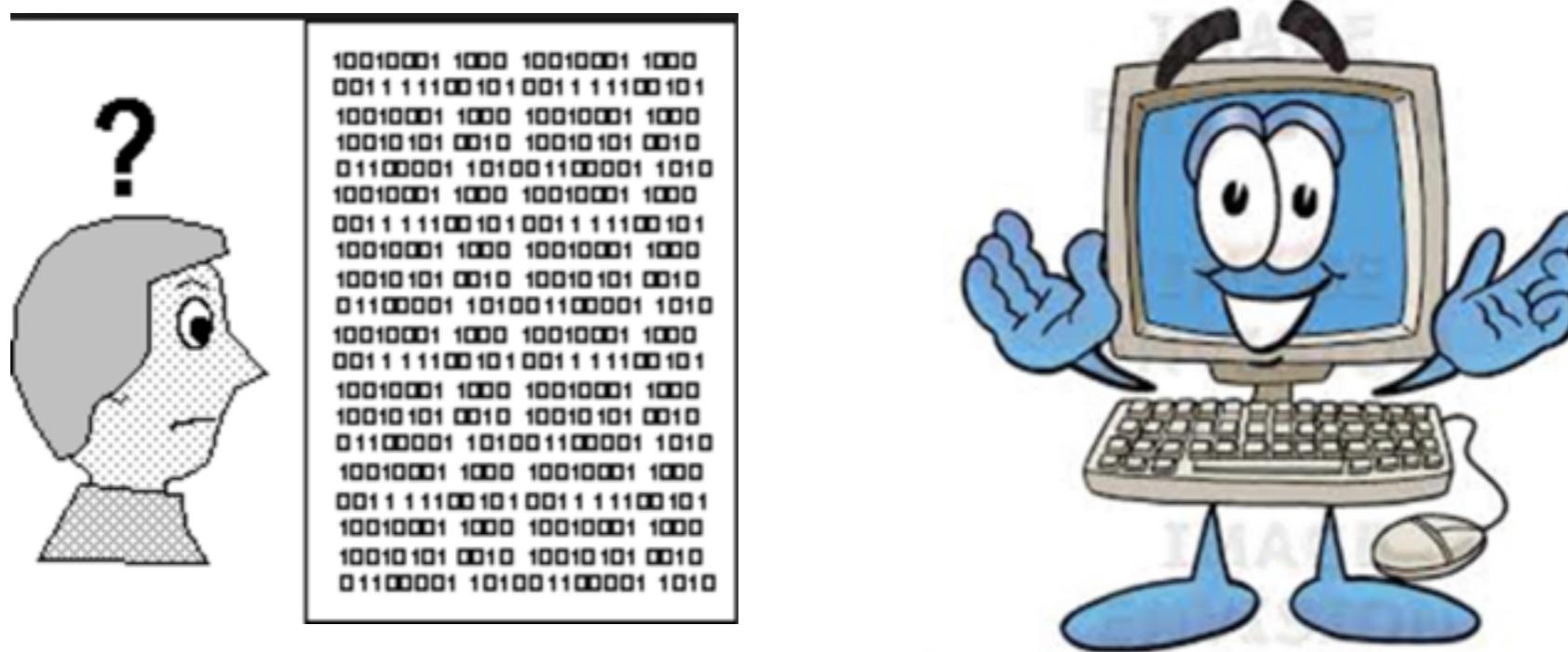


JAVA INTRODUCTION

HUMAN INTERACTION WITH COMPUTERS

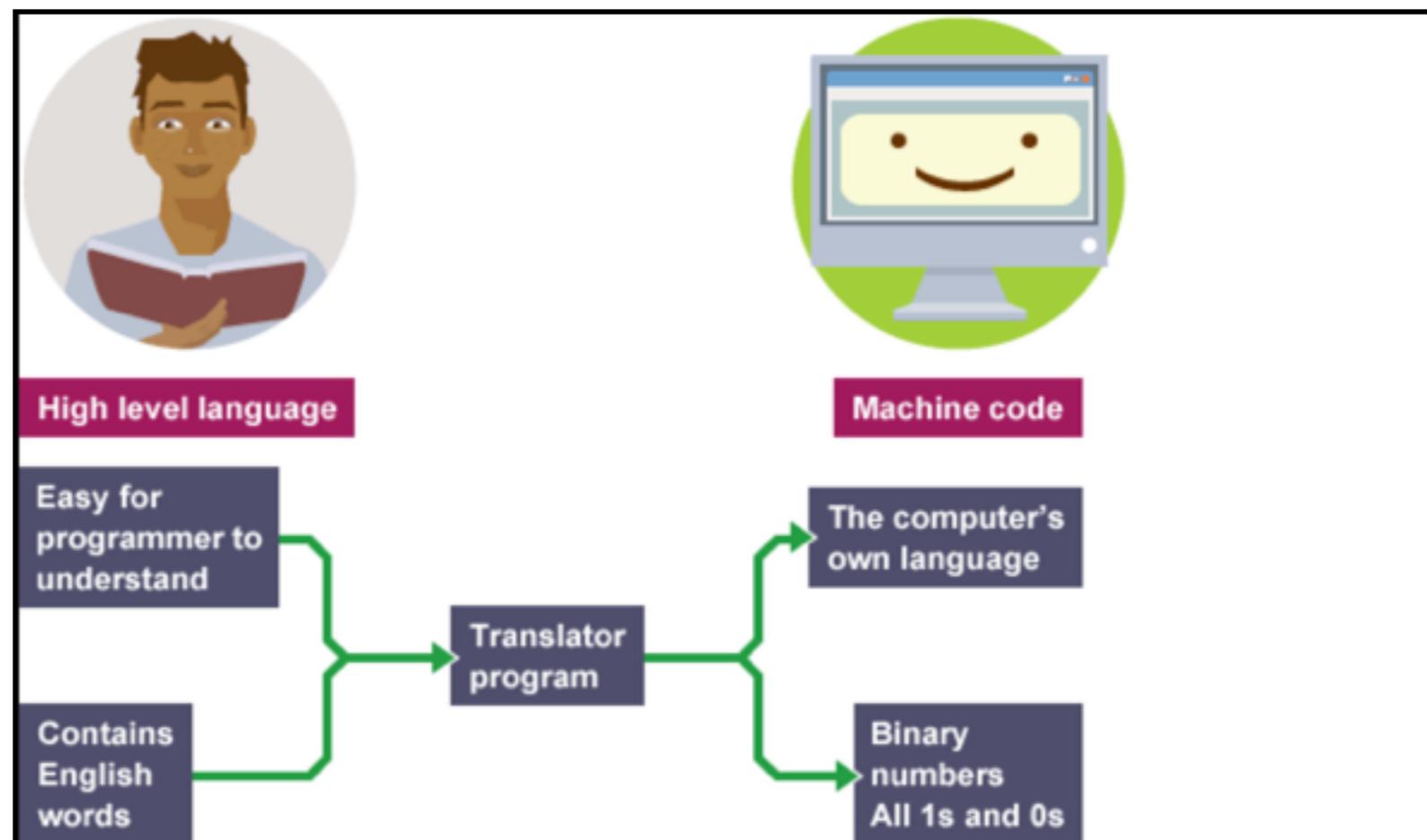


Computers only understand one language: machine language. 01011101. Binary



WHY WE NEED PROGRAM ?? OR PROGRAMMING LANGUAGE?

- Program: A set of instructions that are to be carried out by a computer.
- Programming language:
 - A systematic set of rules used to describe computations, generally in a format that is editable by humans.
 - Forms a bridge between humans and machines (computers).



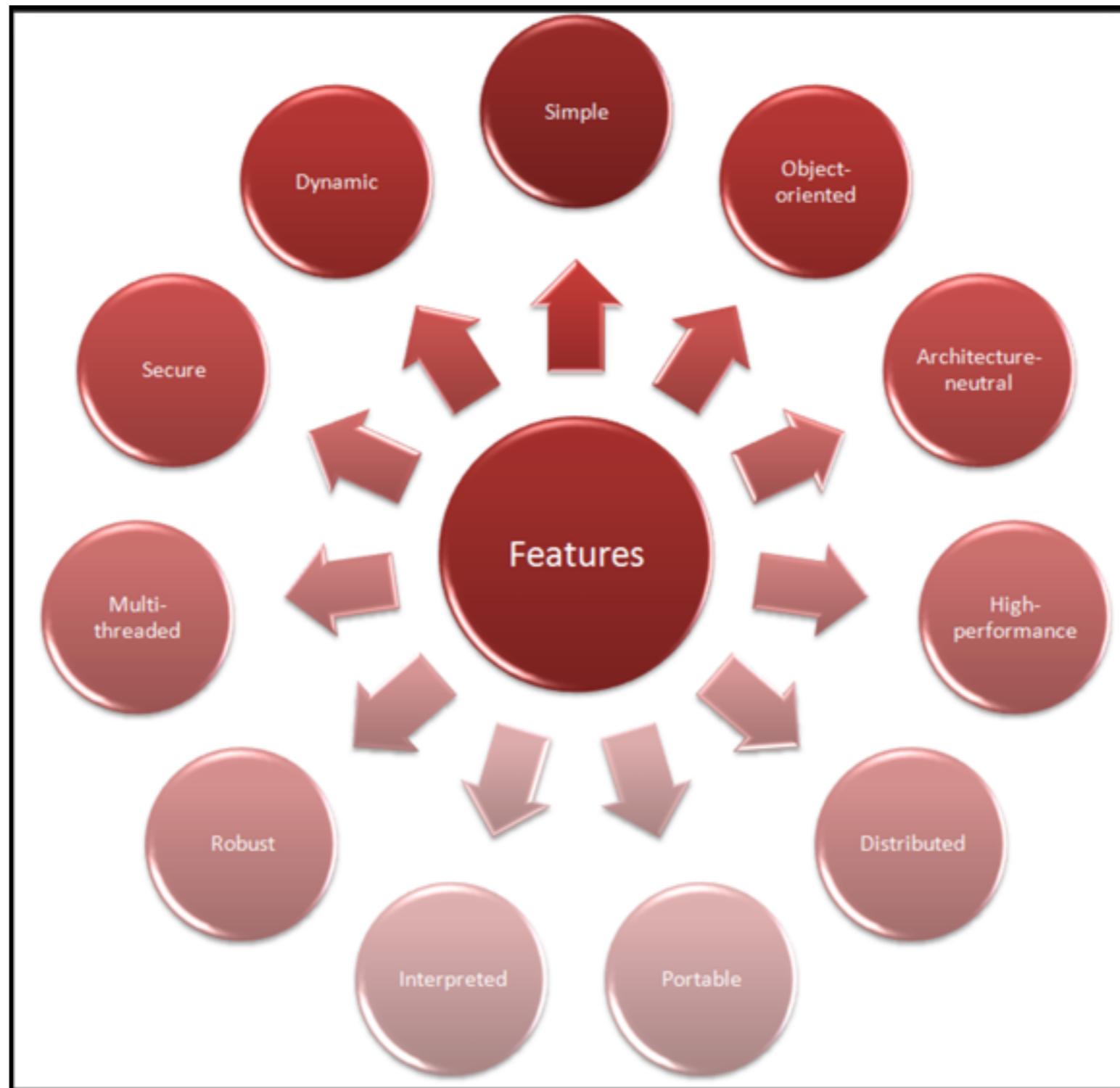
WHAT IS JAVA?

- Is one of most popular software programming language.
- Is used not only for Web programming, but also for developing standalone applications across platforms on servers, desktops, and mobile devices, even control the robotic rover that rolled on Mars.
- Is a high level programming language.
- Developed by Sun Microsystems Inc in 1991, later acquired by Oracle Corporation. It was conceived by James Gosling and Patrick Naughton.

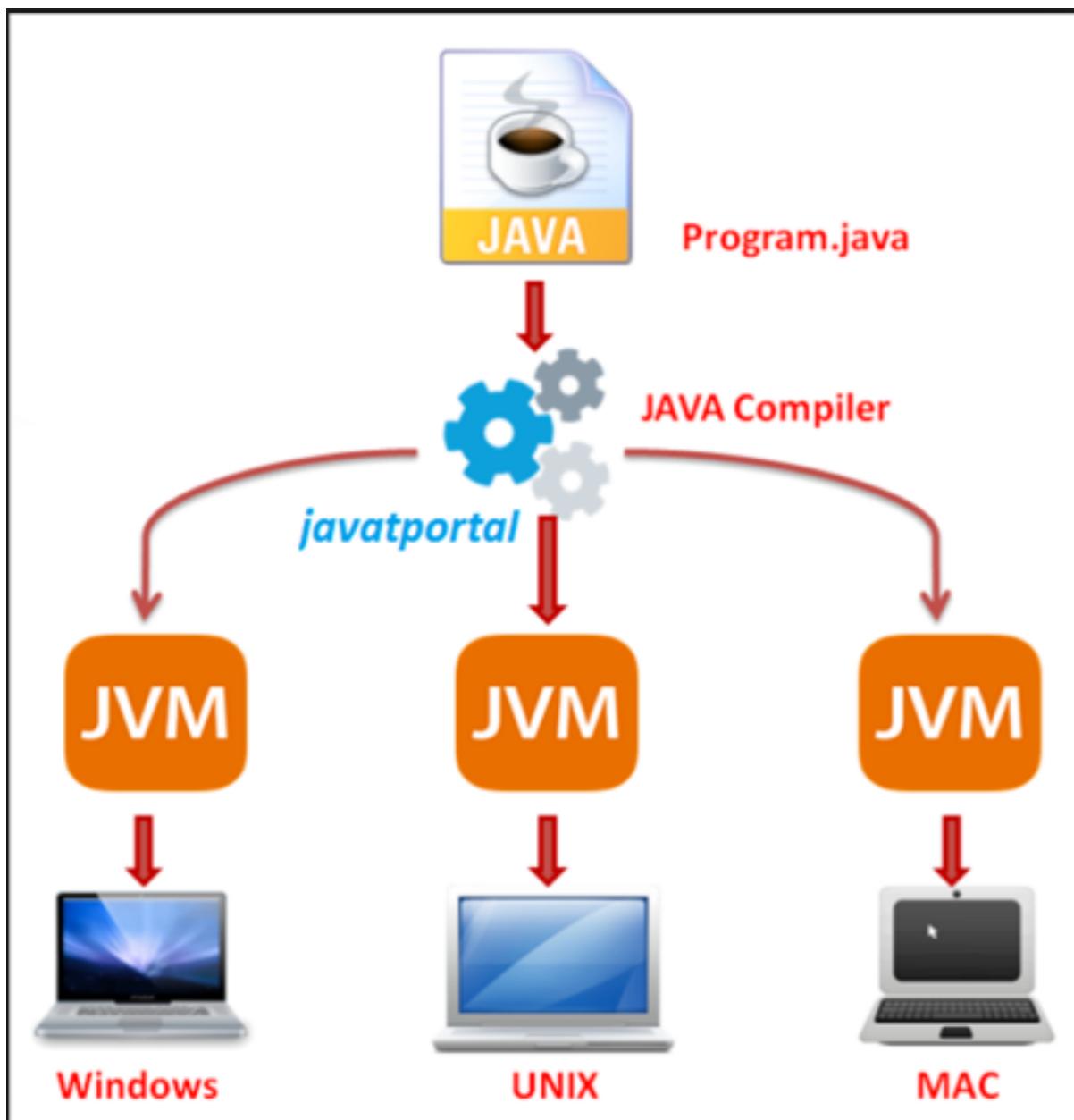




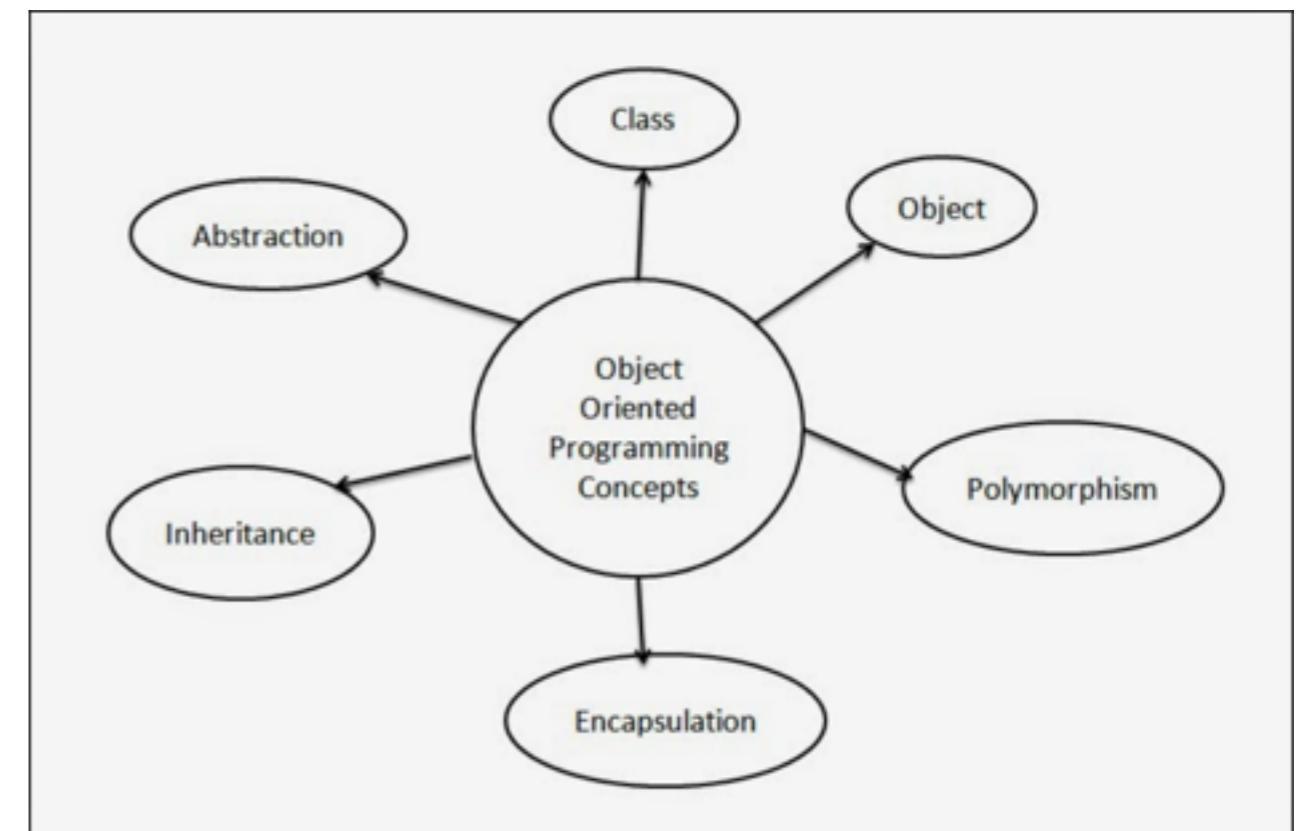
FEATURES OF JAVA



Java is Platform Independent

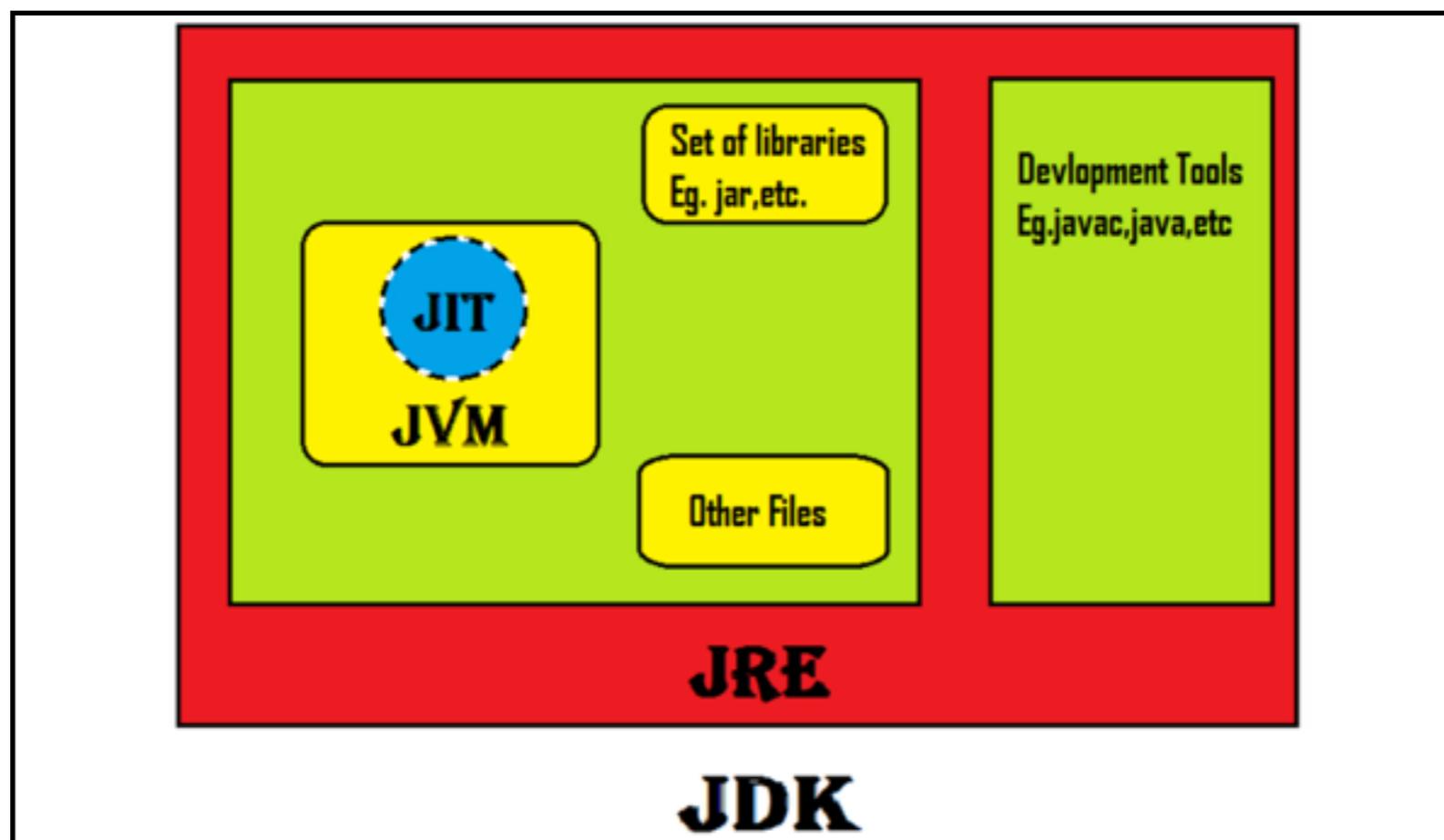


Java is Object Oriented Programming Lang

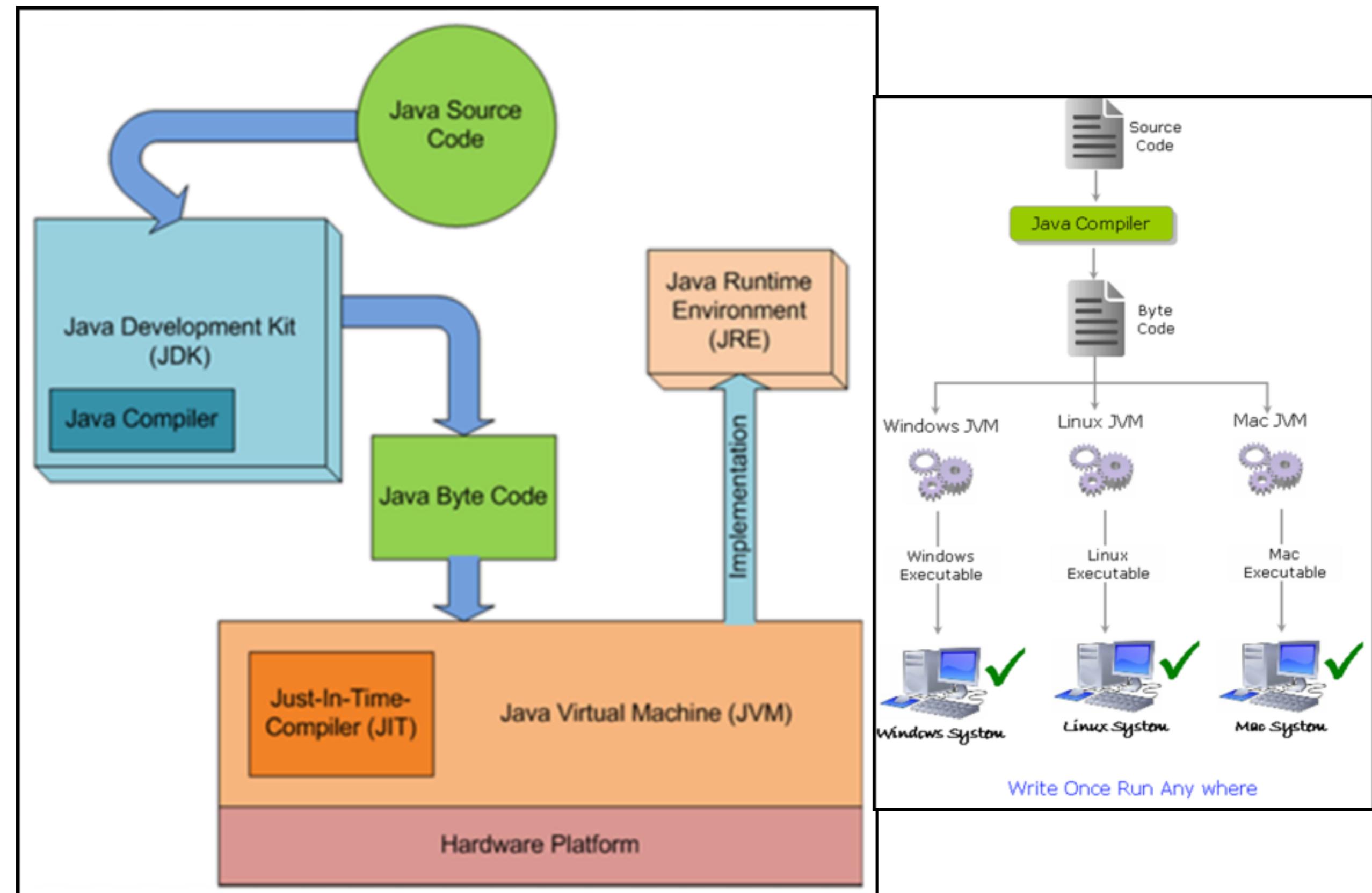


JAVA ARCHITECTURE

- JDK (Java Development Kit)
 - It is used to build and develop the java program
 - JDK=JRE + Java complier + other developing related tools
- JRE (Java Runtime Environment)
 - It is used to provide runtime environment. It is the implementation of JVM. It contains set of libraries + other files that JVM uses at runtime.
 - JRE= JVM + Class libraries + JIT complier + other supporting tools
- JVM :JVM (Java Virtual Machine) is an abstract machine. It is a specification that provides runtime environment in which java bytecode can be executed.



HOW JAVA WORKS?



WHAT IS IDE? (INTEGRATED DEVELOPMENT ENVIRONMENT)

What's your favorite IDE
for Java Development?



Eclipse



IntelliJ IDEA



NetBeans



BlueJ



JDeveloper



DrJava



Android Studio

Other



JAVA PROGRAM BASIC COMPONENTS

- When we consider a Java program, it can be defined as a collection of objects that communicate via invoking each other's methods.
- Let us now briefly look into what do class, object, methods, and instance variables mean.
 - **Object** – Objects have states and behaviours. Example: A dog has states - colour, name, breed as well as behaviour such as wagging their tail, barking, eating. An object is an instance of a class.
 - **Class** – A class can be defined as a template/blueprint that describes the behaviour/state that the object of its type supports.
 - **Variables** – Each object has its unique set of instance variables. An object's state is created by the values assigned to these instance variables.
 - **Methods** – A method is basically a behaviour. A class can contain many methods. It is in methods where the logics are written, data is manipulated and all the actions are executed.

JAVA ANATOMY

- **Comments**
- **Package**
- **Reserved words/Keywords**
- **Identifiers**
- **Modifiers**
- **Variables**
- **Statements**
- **Blocks/Areas of the class**
- **Classes**
- **Methods**
- **The main method**
- **<http://www.javatpoint.com/java-tutorial>**
- **<http://www.tutorialspoint.com/java/>**

COMMENTS IN JAVA

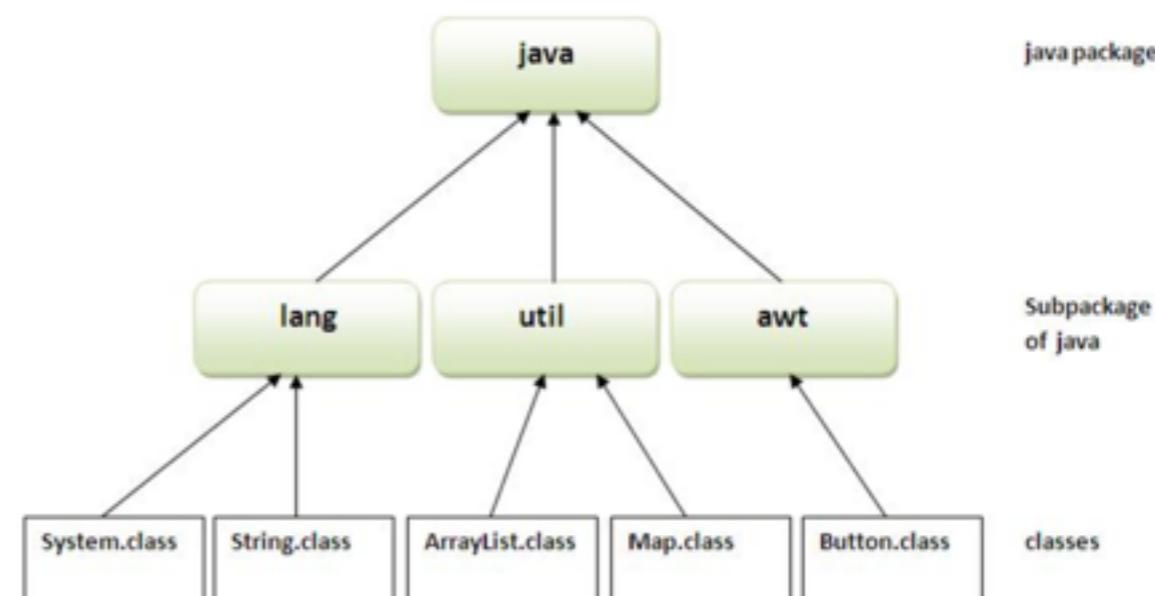
- Comments in a program are called **inline documentation**
- Normally used to explain the purpose of the program, describe processing steps - imp for human understanding. Not affect how a program works -java complier ignores comments
- Java comments can take three forms:

```
// this comment runs to the end of the line  
  
/* this comment runs to the terminating symbol, even across line breaks */  
  
 *//** this is a javadoc comment  */
```

```
/* Olivia Scott  
CS 305j, Fall 2006  
This program prints lyrics from a song!  
*/  
public class PartOfSong {  
    /* Runs the overall program to print the song  
       on the console. */  
    public static void main(String[] args) {  
        displayVerse();  
  
        // Separate the two verses with a blank line  
        System.out.println();  
  
        displayVerse();  
    }  
  
    // Displays the first verse of song.  
    public static void displayVerse() {  
        System.out.println("The road goes on forever,");  
        System.out.println("And the party never ends!");  
    }  
}
```

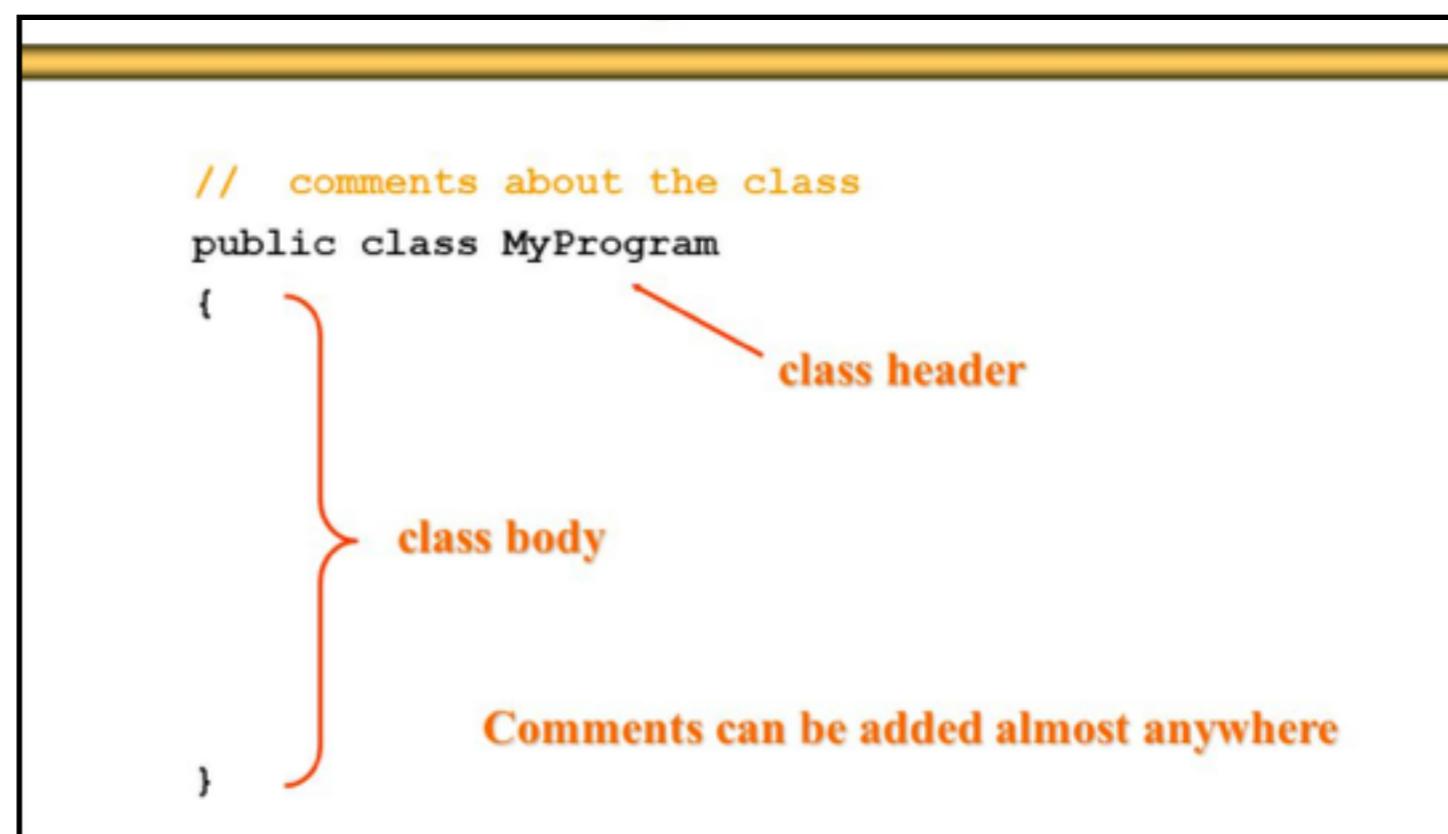
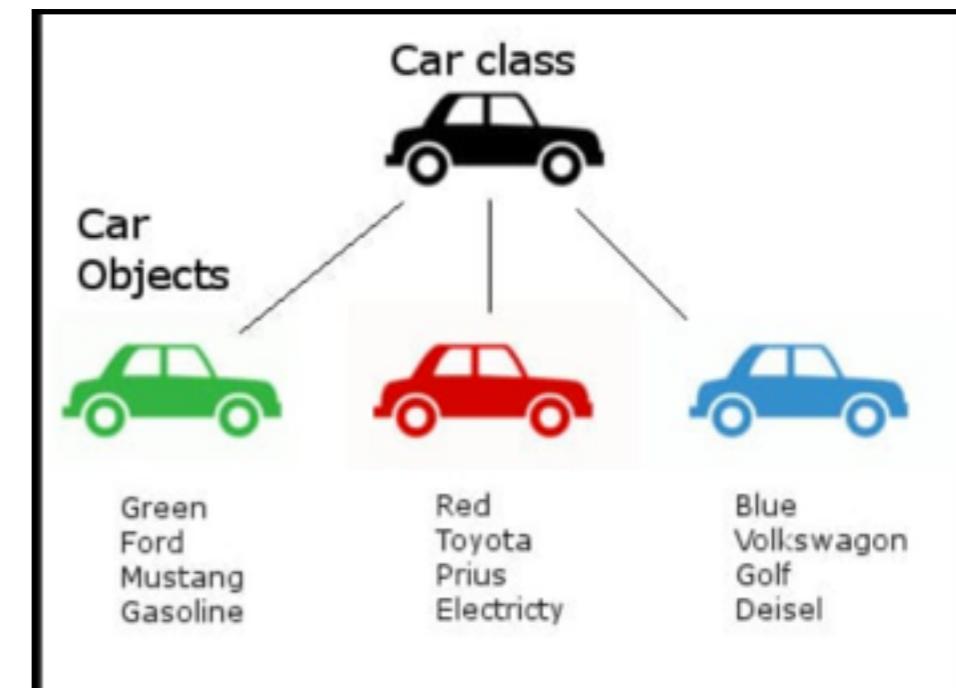
JAVA PACKAGE

- A java package is a group of similar types of classes, interfaces and sub-packages.
- Package in java can be categorised in two form, built-in package and user-defined package.
- There are many built-in packages such as java, lang, awt, javax, swing, net, io, util, sql etc.
- Advantage of Java Package
 - 1) Java package is used to categorise the classes and interfaces so that they can be easily maintained.
 - 2) Java package provides access protection.



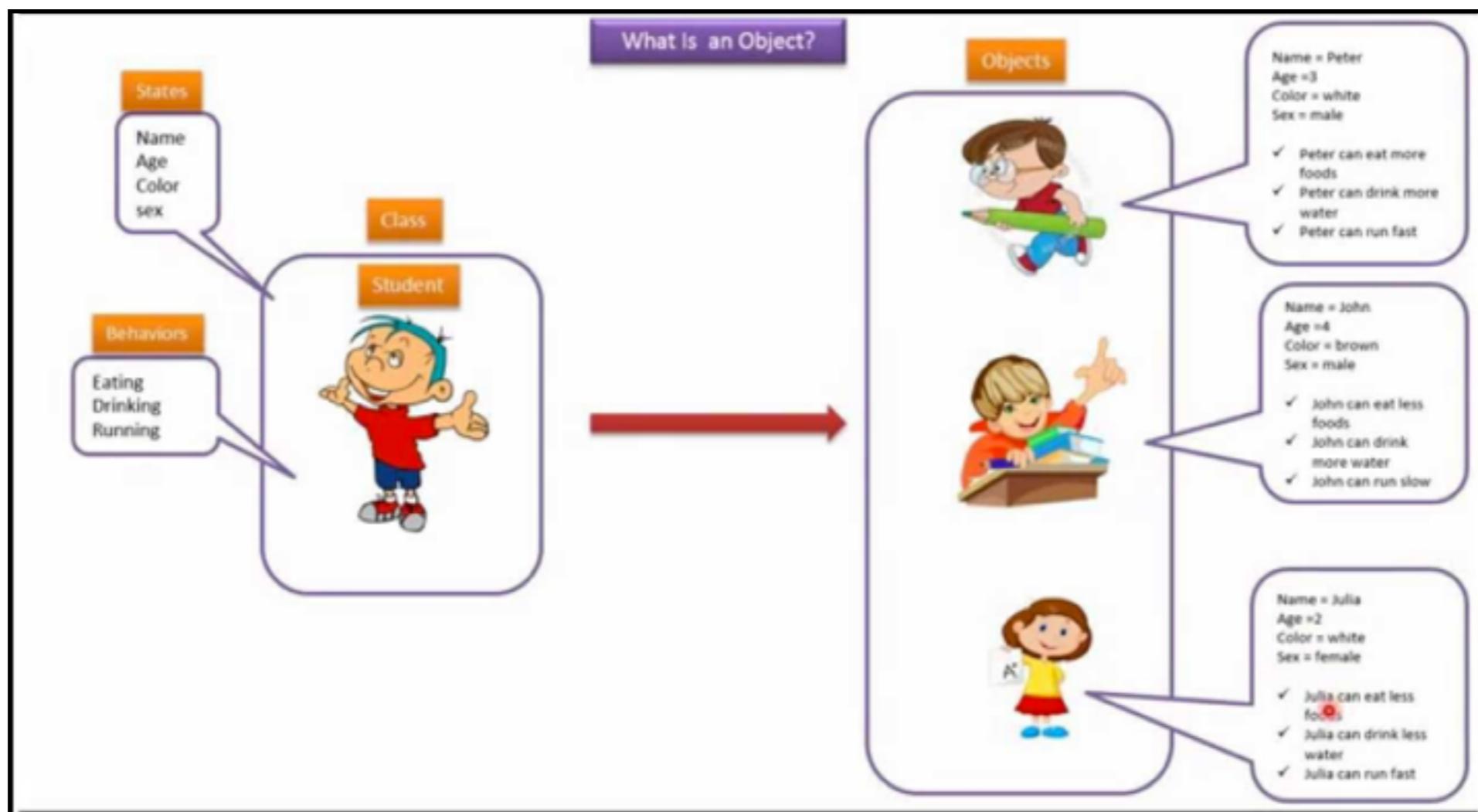
WHAT IS CLASS IN JAVA ?

- A blueprint or a template for creating different objects which defines its properties and behaviours.
- A class is a group of objects which have common properties. It is a logical entity.
- Every java Program has at least one class
- A class in Java can contain:
 - fields/variables
 - methods
 - constructors
 - blocks/areas
 - nested class and interface



WHAT IS OBJECT?

- Object is an instance of a class. It is a real world entity. Object is a run time entity. Class is a template or blueprint from which objects are created. So object is the instance(result) of a class.
- An object (A dog) has:
 - **state** - descriptive characteristics - like colour, name, breed
 - **behaviours** - what it can do (or what can be done to it) - like wrapping the tail, barking, eating



HOW TO DECLARE OBJECT?

Class

```
public class Book{  
    String name;  
    String author;  
}
```



Object

```
Book objBook = new Book();
```

Name of an
Object

www.c4learn.com

```
Rectangle myrect = new Rectangle();
```



Class Name

Automatically Calls
the
Constructor



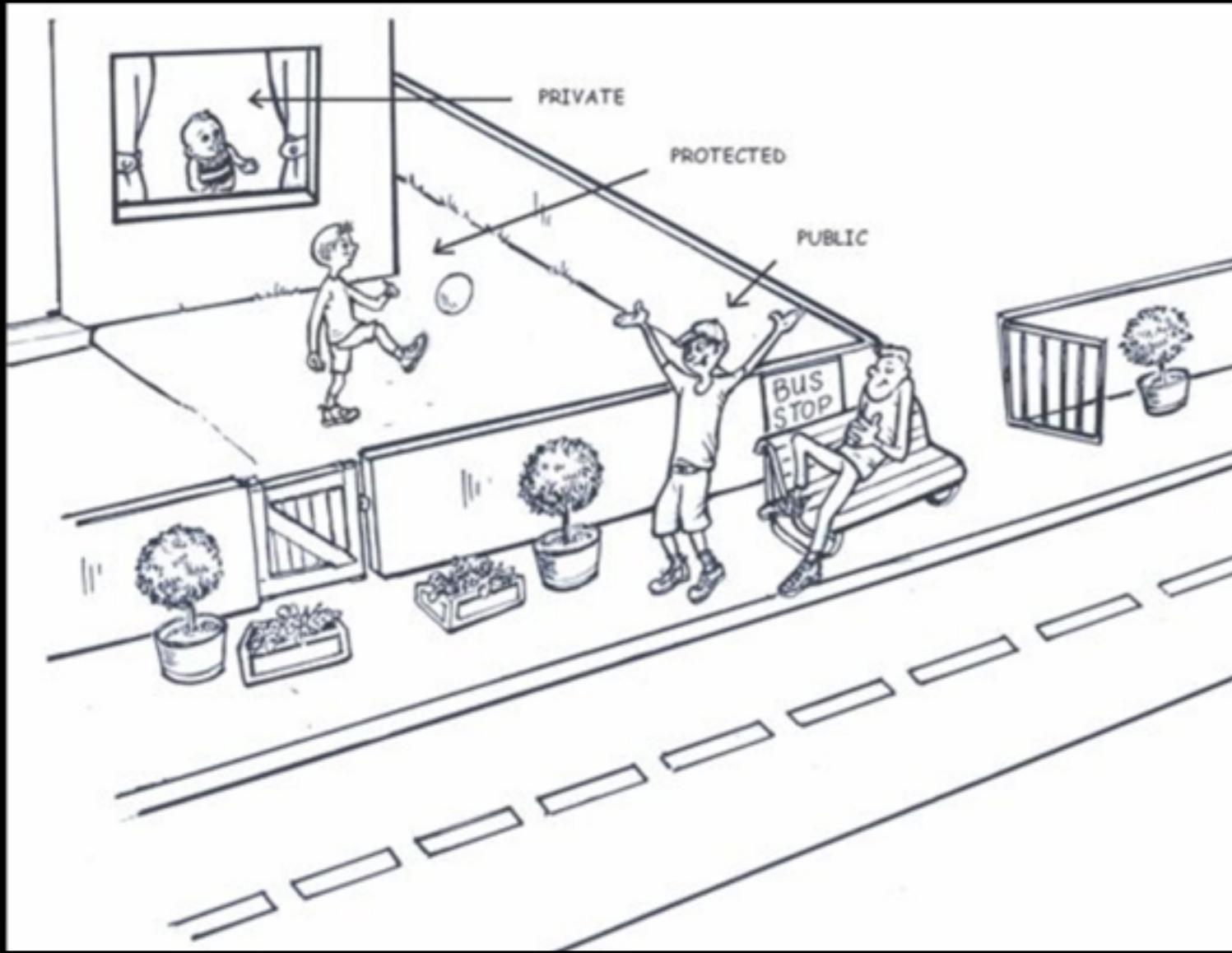
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Dynamically
Create Object
using new

MODIFIERS IN JAVA

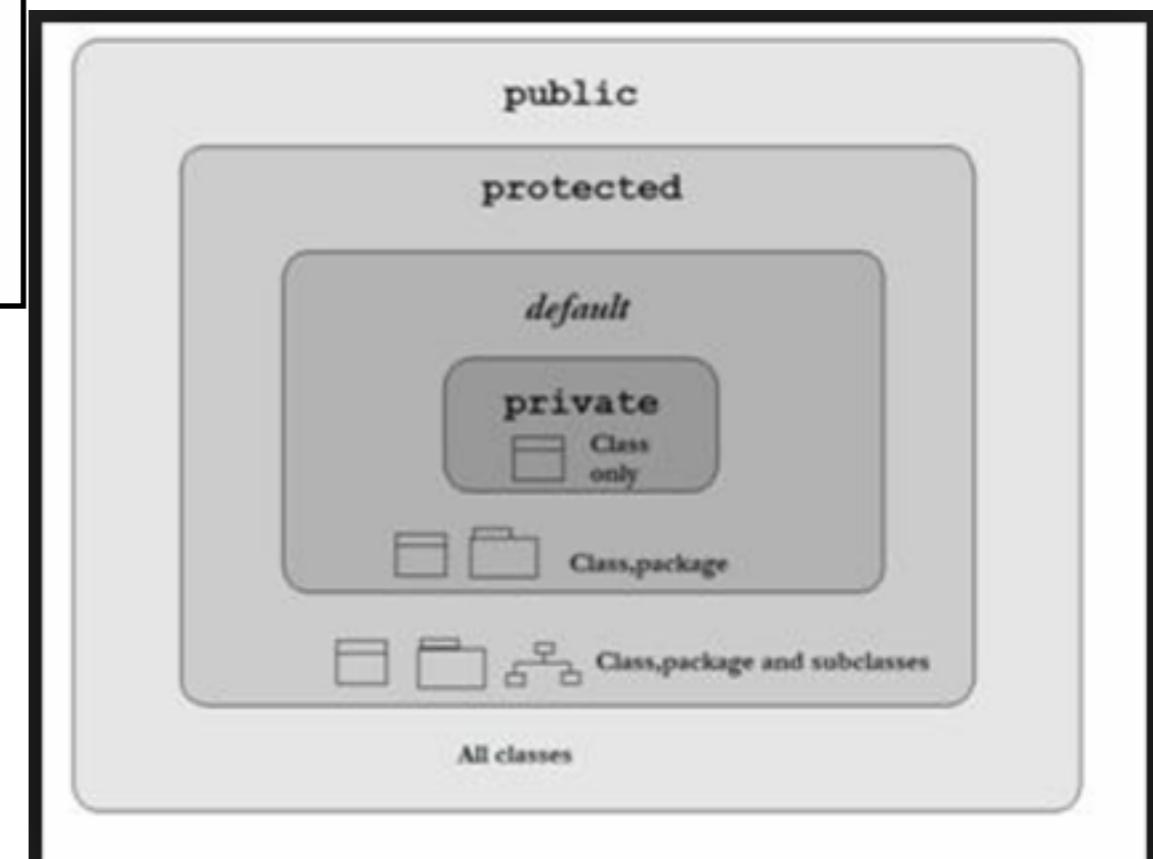
- Modifiers are keywords that you add to those definitions to change their meanings.
- Java language has a wide variety of modifiers, including the following –
 1. Java Access Modifiers
 2. Non Access Modifiers
- Java provides a number of access modifiers to set access levels for classes, variables, methods, and constructors. The four access levels are
 -
 - 1. Visible to the package, the (default). No modifiers are needed.
 - 2. Visible to the class only (private).
 - 3. Visible to the world (public).
 - 4. Visible to the package and all subclasses (protected).

ACCESS MODIFIERS



Access Modifier

- There are four access modifier in Java:
 - Visible only in the same package
 - Visible only in the same class
 - Visible only in the same class or subclass
 - Visible everywhere



NON ACCESS MODIFIERS

1. *static* :

- is used to create variables, methods that will exist independently of any instances created for the class.
- Only one copy of the static variable exists regardless of the number of instances of the class.

2. *final* :

- for finalising the implementations of classes, methods, and variables.
- A final variable can be explicitly initialised only once.
- A reference variable declared final can never be reassigned to refer to an different object.

(final modifier often is used with static to make the variable constant).

3. *abstract*:

- modifier for creating abstract classes and methods.
- An abstract class can never be instantiated.
- If a class is declared as abstract then the sole purpose is for the class to be extended.
- A class cannot be both abstract and final

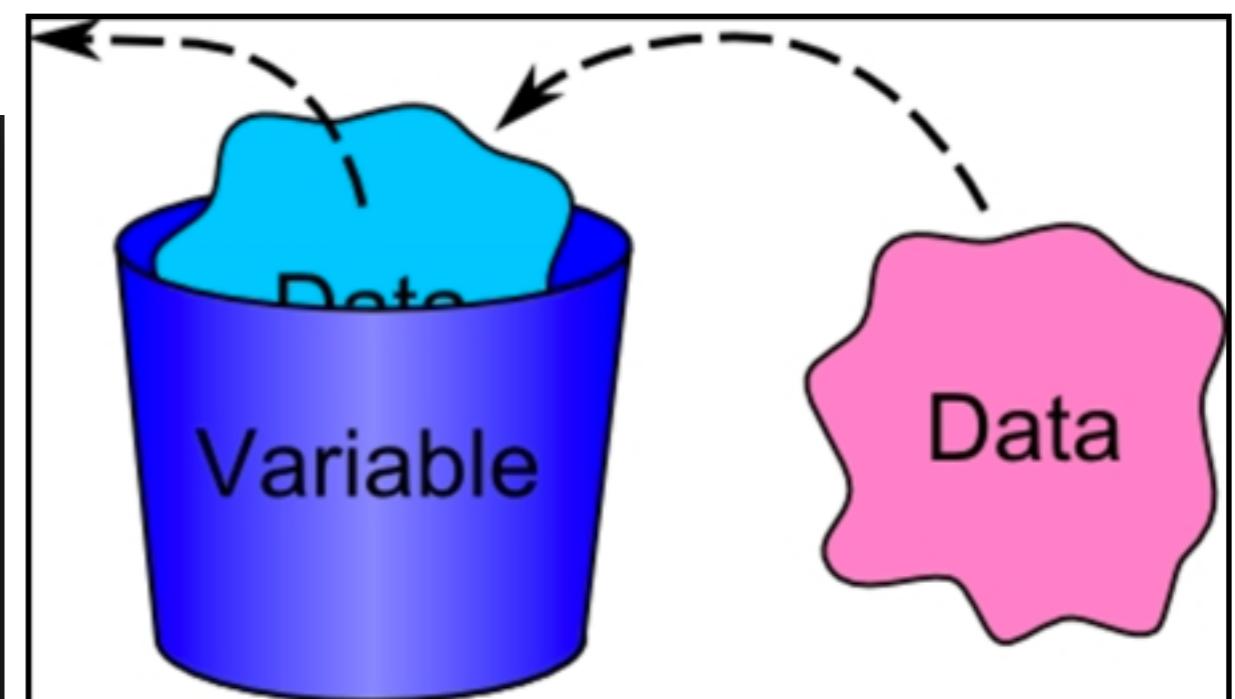
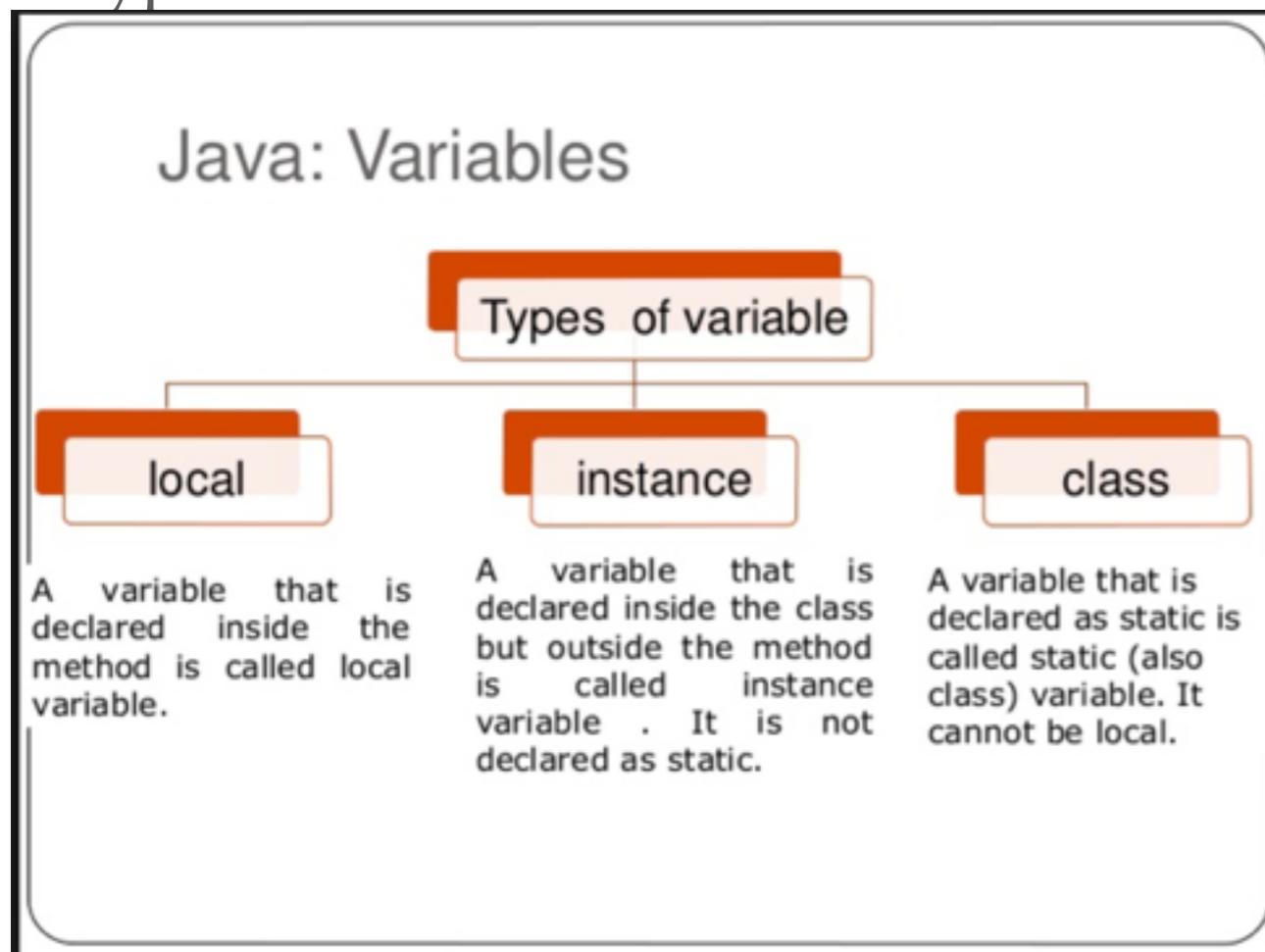


Final Keyword

- ★ **Restrict changing value of variable**
- ★ **Restrict method overriding**
- ★ **Restrict inheritance**

JAVA VARIABLE

- Variables are nothing but reserved memory locations to store data values, by using this values we are achieving the project requirements. This can be any kind of information ranging from texts, numbers, sentences, etc.
- This means that when you create a variable you reserve some space in the memory. A variable thus has a data type.
- In simple words we can say ***variables are containers that holds the data.***
- Types of Variable:



VARIABLE DECLARATION AND INITIALISATION

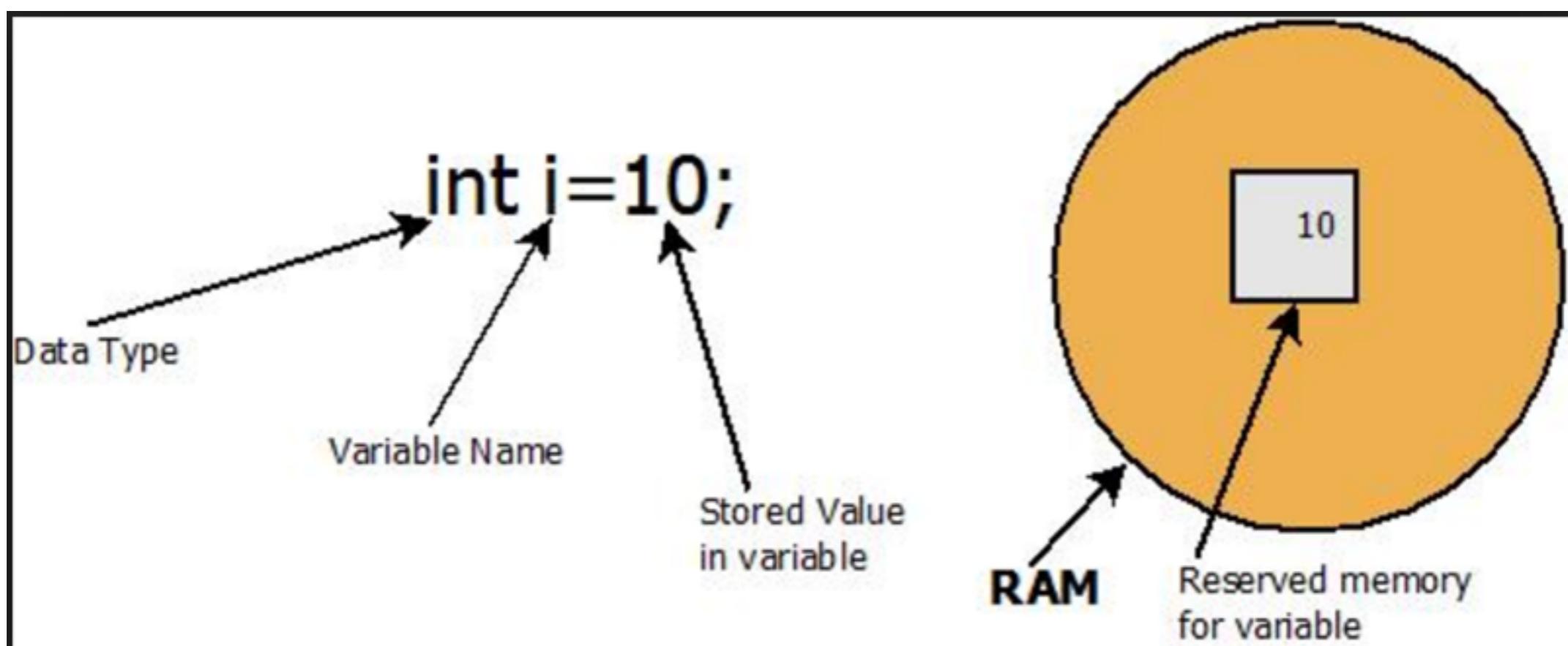
- A variable must be *declared* by specifying the variable's name and the type of information that it will hold
 - When we assign a value to variable 

```
data type / variable name
```

When a variable is referenced in a program (by variable name), its current value is used

```
data type           variable name  
↓                 ↓  
int total;  
  
int count, temp, result;
```

Multiple variables can be created in one declaration



CONSTANTS

- Constants in java refers to the fixed values, which do not change during execution of the program.
- A static final variable is effectively a constant.
- Java constants are normally declared in ALL CAPS. Words in Java constants are normally separated by underscores.
- An example of constant declaration in Java is written below:

```
public class MaxUnits {  
    public static final int MAX_UNITS = 25;  
    static final double SALES_TAX_RATE = 0.85;  
}
```

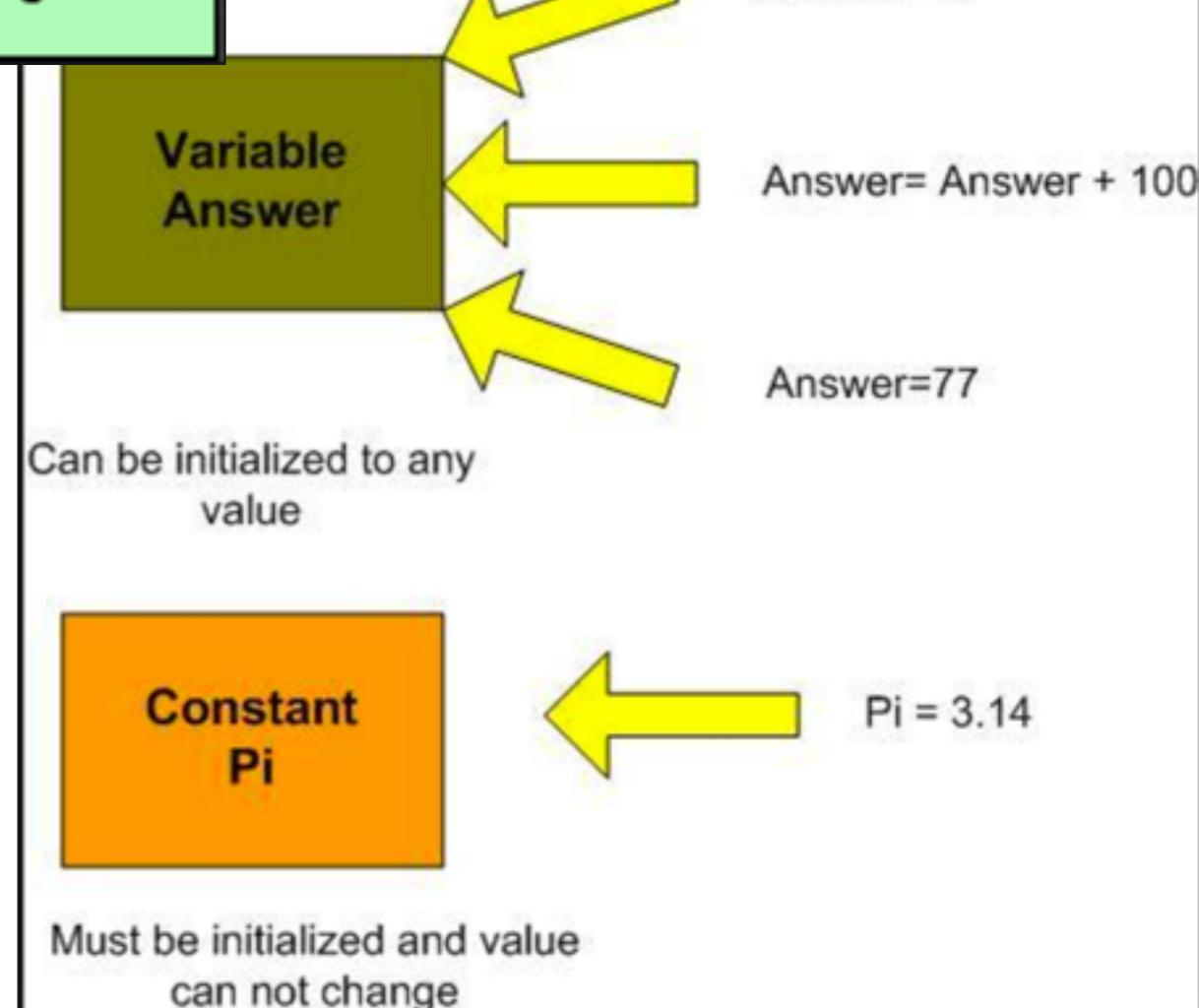
What are constants?

- Constants are a storage area where it's value can't be changed when the program is running



CONSTANTS VS VARIABLES

	Constants	Variables
Characteristics	Value is not changeable during the course of the program.	Value can be changed anytime during the course of the program.
Usage	Use constant when you want to declare something that won't be changed midway in your program execution.	Use variable to store data that may or will change during the running of the program.



IDENTIFIERS IN JAVA

- The name given to a variable, method, class or interface is known as an identifier. As the term suggests, the way the compiler knows which variables it's dealing with is through the identifier.
- There are certain rules for identifiers:
 - reserved words cannot be used.
 - they cannot start with a digit but digits can be used after the first character (e.g., name1, n2ame are valid).
 - they can start with a letter, an underscore (i.e., "_") or a dollar sign (i.e., "\$").
 - you cannot use other symbols or spaces (e.g., "%","^","&","#").
- Always give your variables meaningful identifiers. If a variable holds the price of a book, then call it something like "bookPrice".

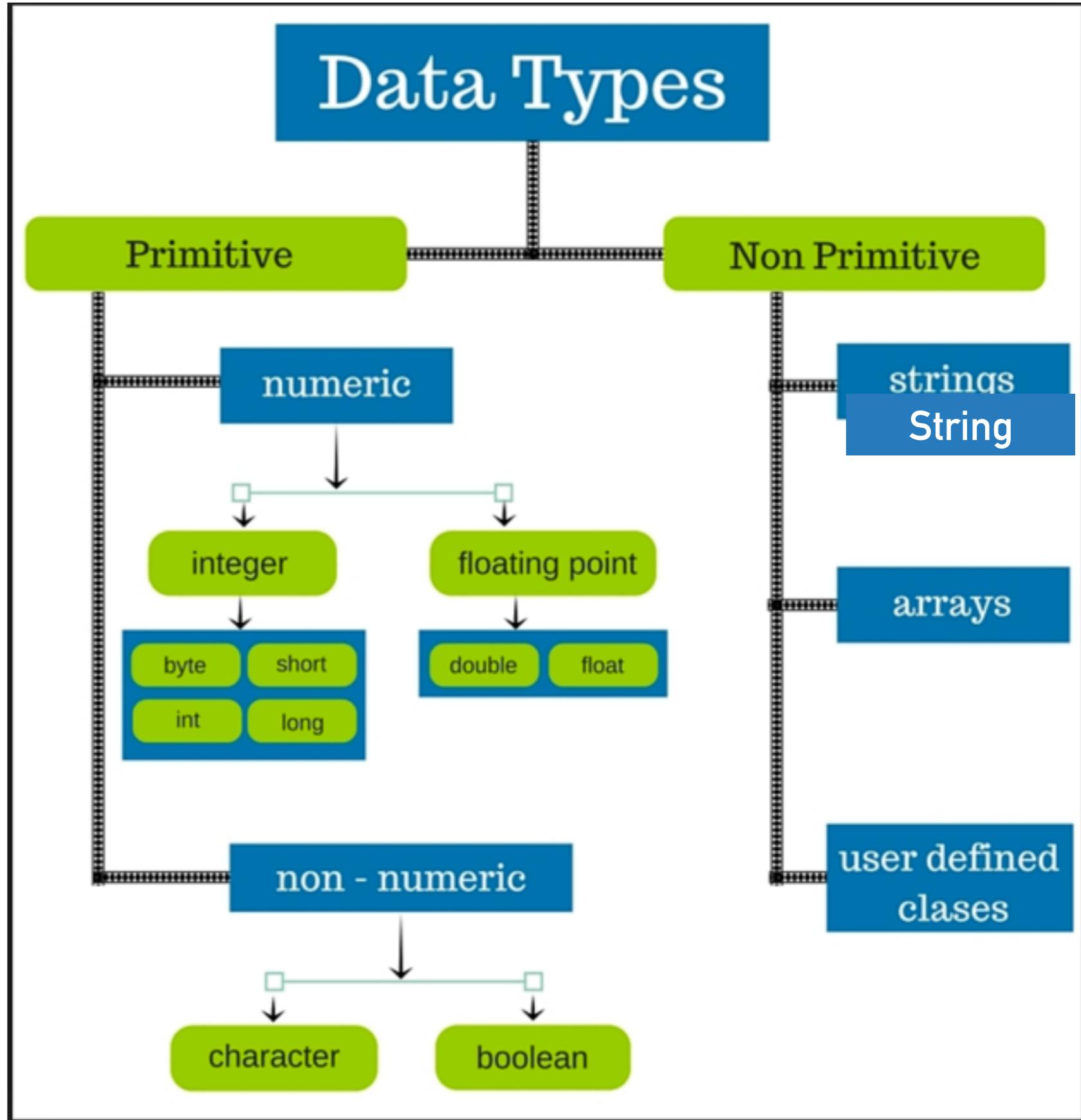
RESERVED WORDS

- In the Java programming language, a keyword is one of 50 reserved words that have a **predefined meaning** in the language; because of this, **programmers cannot use keywords as names** for variables, methods, classes, or as any other identifier

abstract	assert	boolean	break
byte	case	catch	char
class	const	continue	default
do	double	else	enum
extends	final	finally	float
for	goto	if	implements
import	instanceof	int	interface
long	native	new	package
private	protected	public	return
short	static	strictfp	super
switch	synchronized	this	throw
throws	transient	try	void
volatile	while		

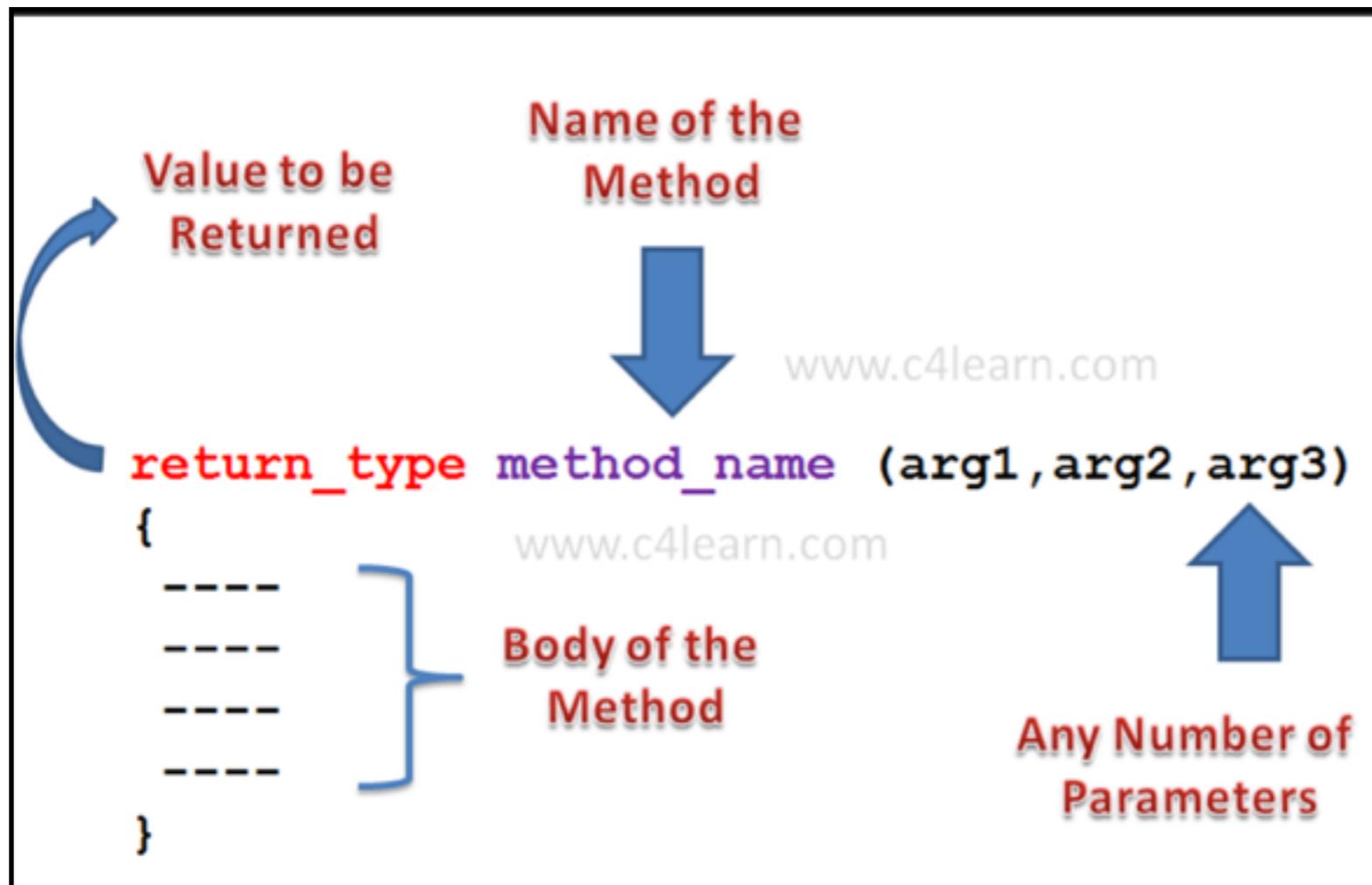
JAVA DATA TYPES

- Based on Datatype of the variable, OS will allocate space to the variable and decide what can be stored in that space/memory
- A data type has
 - Name (java key word, like int, String, boolean, etc)
 - Size (how much memory is used)
 - Default value
- There are two data types available in Java
 - Primitive Data Types
 - Non Primitive Data Type (Reference/Object Data Types)



WHAT IS METHOD?

- Methods operate on internal state of an object and object to object communication is done by methods.
- Method is a collection of statements which are grouped together to perform an action/operation.
- Method can be invoked in program at any time just by calling its name.
- Method can be:
 - Predefined : which is already defined by java, stored in java library. For e.g. System.out.println()
 - User defined: which is defined by you/programmer



1. With Return type With Parameters
2. With Return type, No Parameters
3. No Return type, With Parameters
4. No Return type, No Parameters