JAVA OOPS CONCEPT

Procedural Programming:

- Procedural Programming can be defined as a programming model which is derived from structured programming, based upon the concept of calling procedure.
- There is **no access specifier** in procedural programming i.e Visibility mode.
- **Adding new data and function is not easy**.
- Procedural programming does not have any proper way for hiding data so it is ***less secure***.
- Examples: C, FORTRAN, Pascal, Basic etc.

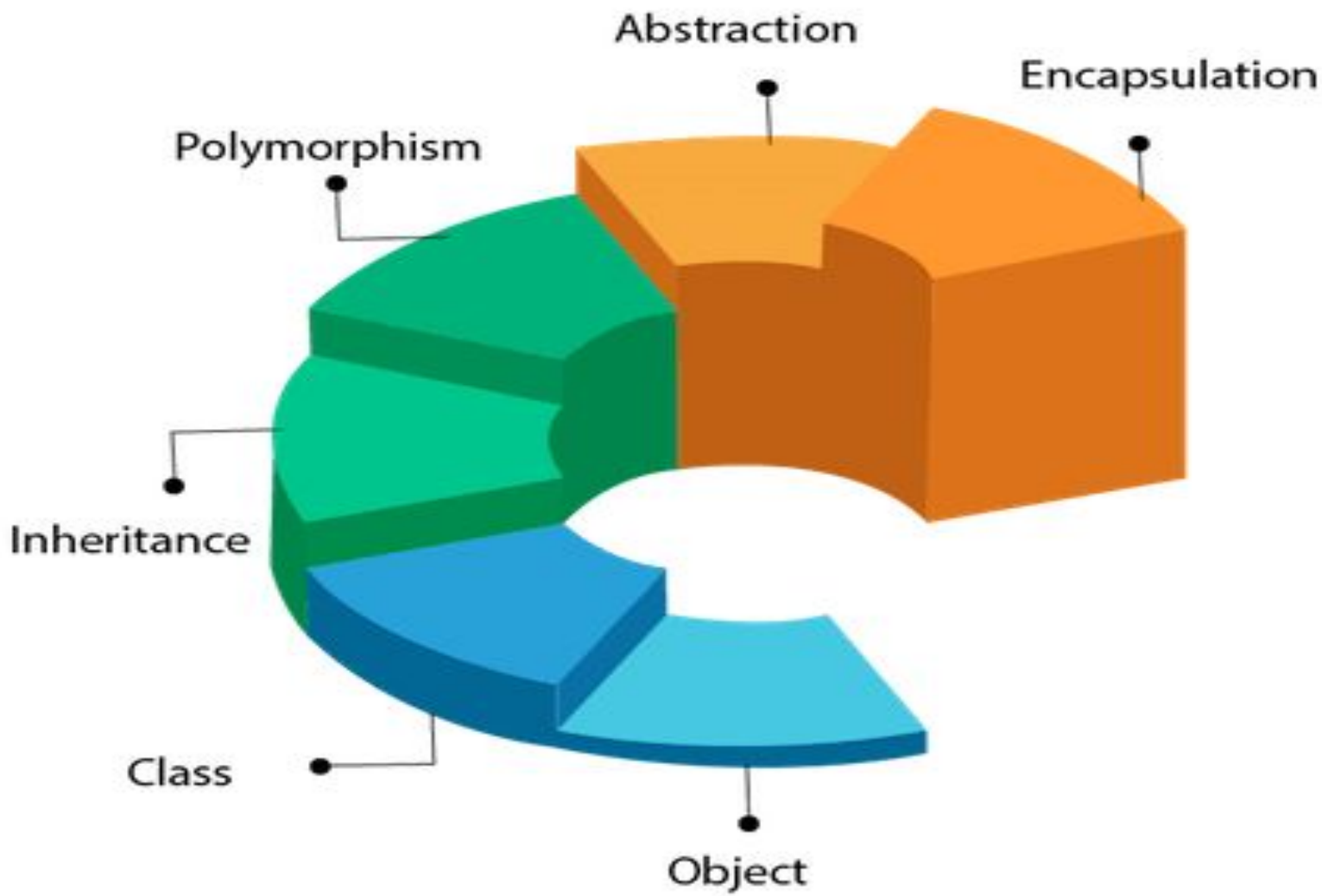
Object Oriented Programming:

- Object oriented programming can be defined as a programming model which is based upon the **concept of objects**. Objects contain data in the form of **attributes(variables)** and code in the form of **methods(functions)**.
- Object oriented programming **have access specifiers** like private, public, protected etc.
- **Adding new data and function is easy**.
- Object oriented programming provides data hiding so it is ***more secure***.
- Examples: C++, Java, Python, C# etc.

Why Java ?

- Portable
- Independent
- Secure

OOPs (Object-Oriented Programming System)



1. Object

Any entity that has state and behavior is known as an object.

An Object can be defined as an **instance(event or element) of a class**.

Example: A dog is an object because it has states like color, name, breed, etc. as well as behaviors like wagging the tail, barking, eating, etc.

2. Class

- The class is a group of similar entities.
- A class can also be defined as a blueprint from which you can create an individual object.

3. Inheritance

- When one object acquires all the properties and behaviors of a parent object, it is known as inheritance.
- It provides code reusability.

4. Polymorphism

If one task is performed in different ways, it is known as polymorphism. For example: to convince the customer differently, to draw something, for example, shape, triangle, rectangle, etc.

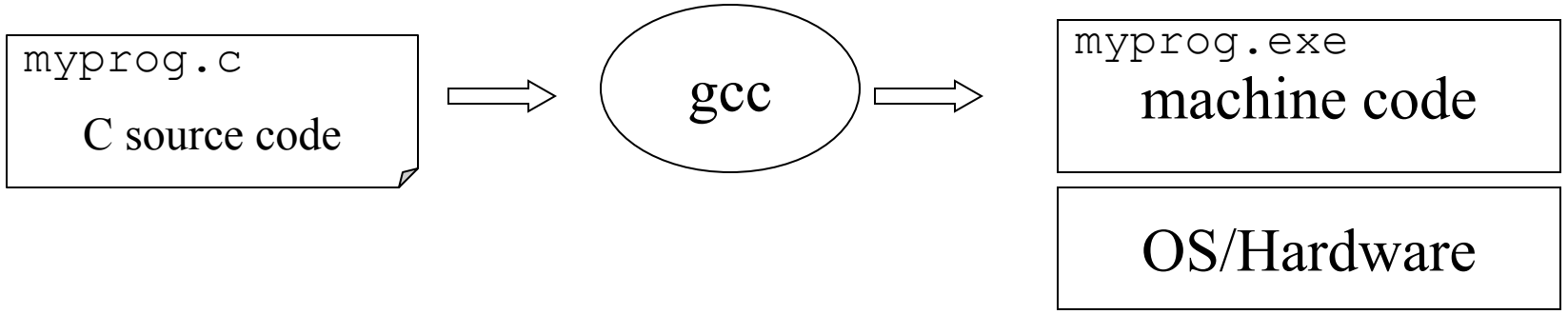
5. Abstraction

Hiding internal details and showing functionality is known as abstraction. For example phone call, we don't know the internal processing.

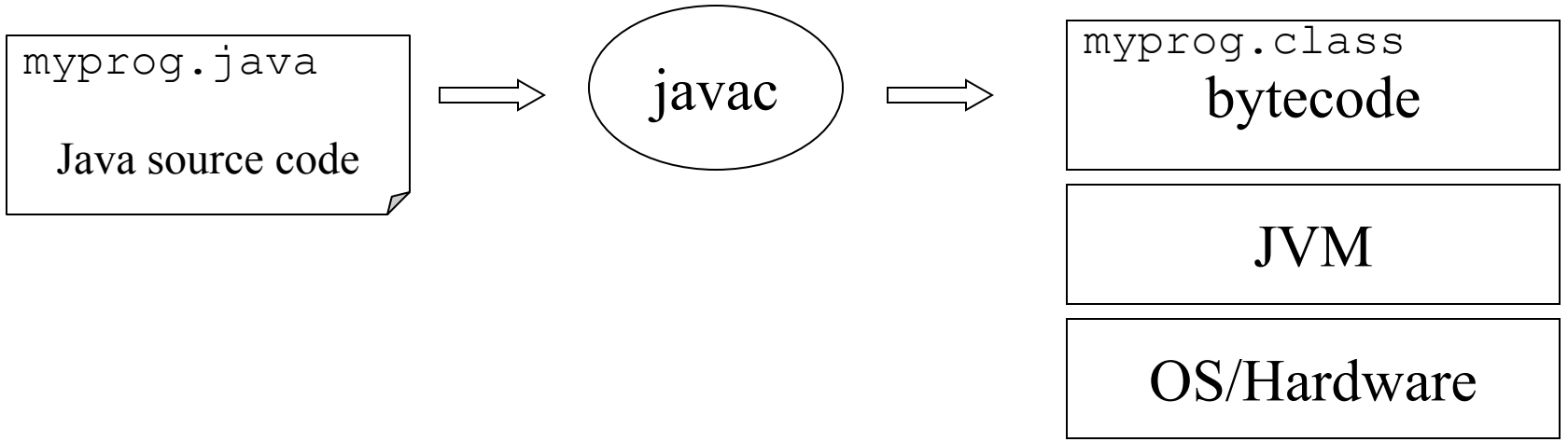
6. Encapsulation

Binding (or wrapping or hiding) code and data together into a single unit are known as encapsulation.

Platform Dependent



Platform Independent



JVM

- JVM stands for

  Java **V**irtual **M**achine

Basics of Java:

1. Variables or Data Members of class:

Used to store data or values.

2. Datatypes:

Depending on data or values datatypes where given

E.g. For integer data or values datatype int is used

Primitive types

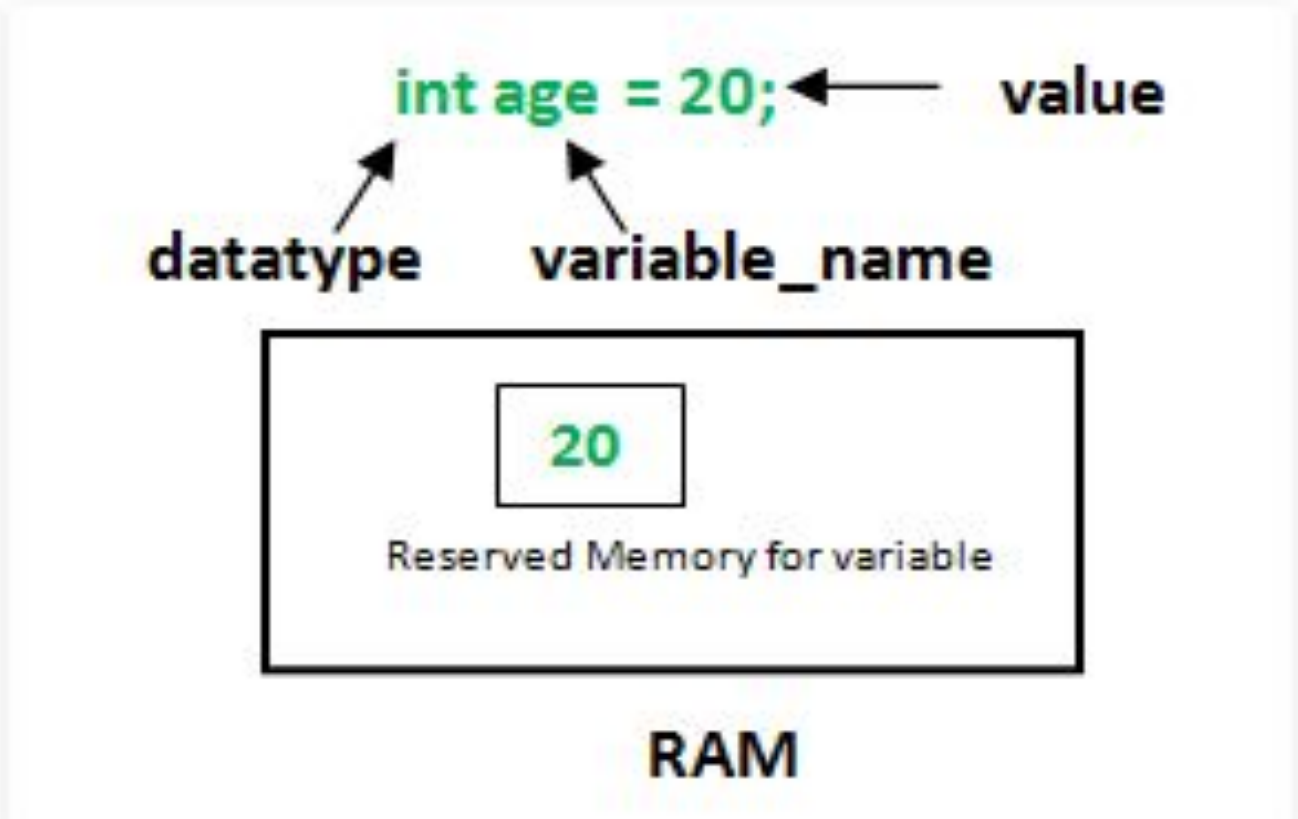
- int 4 bytes
- short 2 bytes
- long 8 bytes
- byte 1 byte
- float 4 bytes
- double 8 bytes
- char Unicode encoding (2 bytes)
- boolean {true,false}

Behaviors is exactly as in C++

Note:
Primitive type always begin with lower-case

How to declare variables?

We can declare variables in java as follows:

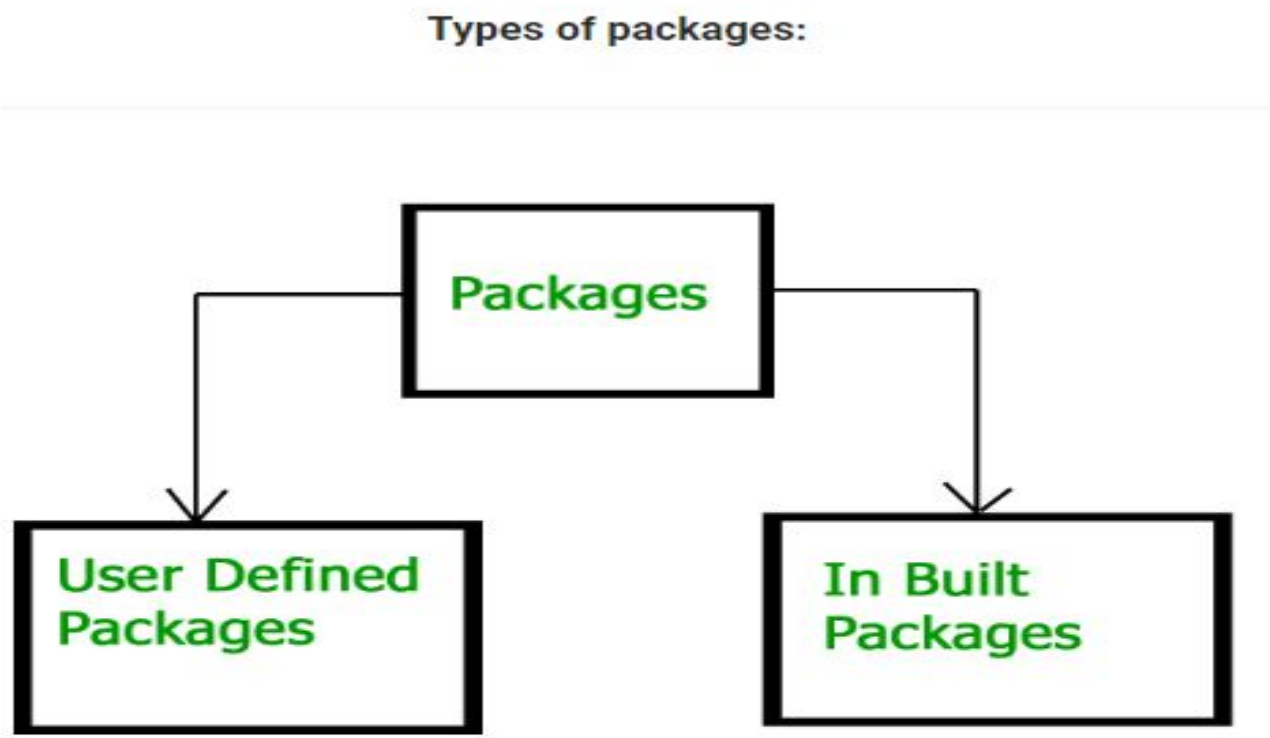


Packages In Java

Package in Java is a mechanism to encapsulate a group of classes, sub packages and interfaces.

Example :

```
// import all the classes from util package
import java.util.*;
```



In-Built Packages

1. **java.io:** Contains classed for supporting input / output operations.
2. **java.util:** Contains utility classes which implement data structures like Linked List, Dictionary and support ; for Date / Time operations or Scanner class.

Java Classes/Objects

Everything in Java is associated with classes and objects, along with its attributes and methods. For example: in real life, a car is an object. The car has **attributes**, such as weight and color, and **methods**, such as drive and brake.

Create a Class or Define a Class
To create a class, use the **keyword class:**

MyClass.java (Save file named as .java)
//Create a class called "MyClass"
Syntax:
public class MyClass
{
}

Access Control

- ***public*** member (function/data)
  - Can be called/modified/ instantiated from outside.
- ***protected***
  - Can be called/modified from derived classes
- ***private***
  - Can be called/modified only from the current class
- ***default (if no access modifier stated)***
  - Can be called/modified/instantiated from the same package.

Hello World

Hello.java

```
import java.io.*;
class Hello {
   public static void main(String[] args) {
      System.out.println("Hello World !!!"); }
}
```

C:\javac Hello.java *(compilation creates Hello.class)*

C:\java Hello *(Execution on the local JVM)*

Compiling/running first java program

- Create source code file (call it for example MyFirstProgram.java).
- To compile:

  prompt >> javac MyFirstProgram.java
- This produces byte code file named

  MyFirstProgram.class
- To run:

  prompt >> java MyFirstProgram

Java Methods

- A method is a block of code that performs a specific task.
- Suppose you need to create a program to create a circle and color it. You can create two methods to solve this problem:
  - a method to draw the circle
  - a method to color the circle
- In Java, there are two types of methods:
  - **User-defined Methods**: We can create our own method based on our requirements.
  - **Standard Library Methods**: These are built-in methods in Java that are available to use.

- Declaring a Java Method
- The syntax to declare a method is:

```
Access_specifier returnType methodName() {
  // method body
}
```

Example 1: Java Methods

```
class Main {
  // create a method
  public int addNumbers(int a, int b) {
    int sum = a + b;
    // return value
    return sum;
  }
  public static void main(String[] args) {
     int num1 = 25;
    int num2 = 15;
// create an object of Main
    Main obj = new Main();
    // calling method
    int result = obj.addNumbers(num1, num2);
    System.out.println("Sum is: " + result);
  }
}
```

Programs

Write program to find area of a square by creating without function

Write program to find area of a square by creating function

Java User Input(Scanner Class)

The Scanner class is used to get user input, and it is found in the java.util package.

To use the Scanner class, create an object of the class and use any of the available methods found in the Scanner class documentation.

Method	Description
`nextBoolean()`	Reads a `boolean` value from the user
`nextByte()`	Reads a `byte` value from the user
`nextDouble()`	Reads a `double` value from the user
`nextFloat()`	Reads a `float` value from the user
`nextInt()`	Reads a `int` value from the user
`nextLine()`	Reads a `String` value from the user
`nextLong()`	Reads a `long` value from the user
`nextShort()`	Reads a `short` value from the user

Example

```
import java.util.Scanner;  // Import the Scanner class

class Main {
  public static void main(String[] args) {
    Scanner myObj = new Scanner(System.in);  // Create a Scanner object
    System.out.println("Enter username");

    String userName = myObj.nextLine();  // Read user input
Float f=myObj.nextFloat();
    System.out.println("Username is: " + userName);  // Output user input
  }
}
```

THANK YOU