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Department of Computer Applications

Course Code: 23CAT606

Course Name: Java Programming

General informations





Introduction

What is Data?

Unprocessed or Raw fact



What is information?

Meaningful processed or collection of data





Introduction

What is Data?

1 Raj 100



What is information?

S.No	Name	Mark
1	Raj	100



Programming

Programming is a way to “instruct the computer to perform various tasks”.

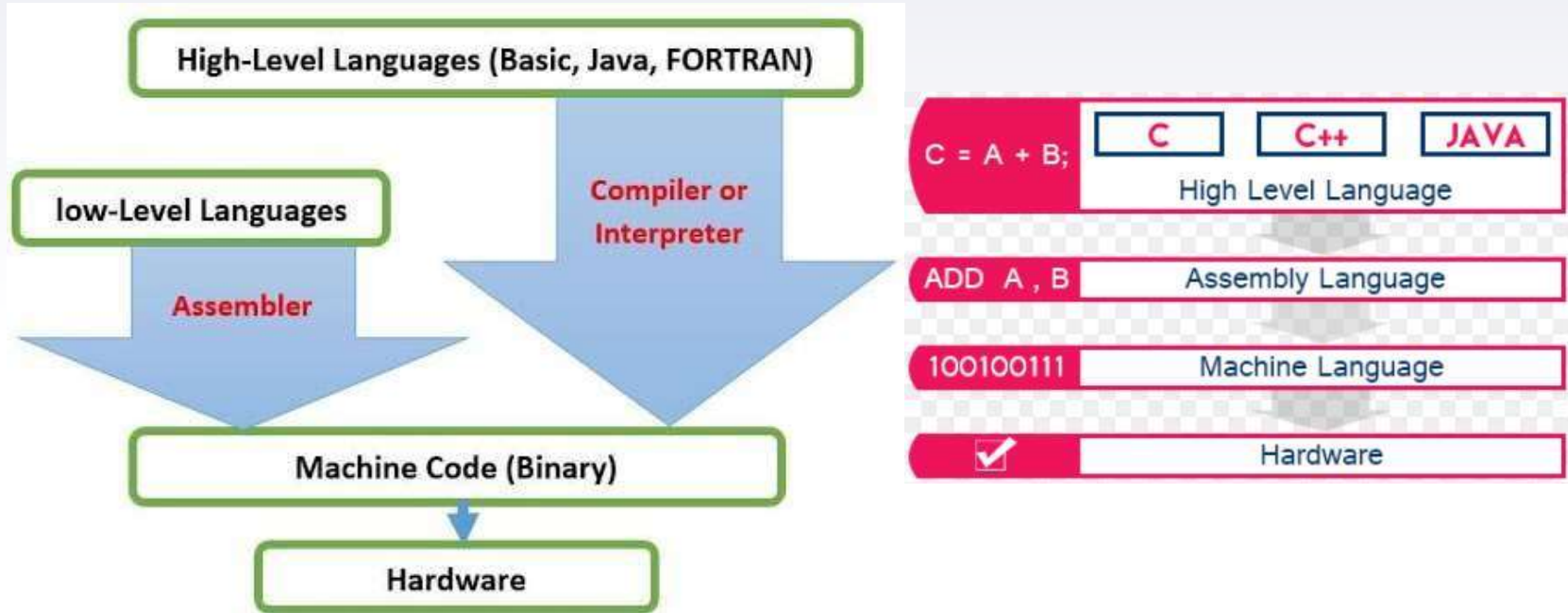
Programming Language

A programming language is the set of instructions through which humans interact with computers





Types of Languages





High level Vs Low level

```
Var1 = 0.5  
if var1 > 1.3 or var1 < 0.9:
```

```
1010010101001010101010101  
0101010101001010101010100
```

High-level language

Low-level language

Easy for humans to read, write and modify

Hard for humans to read, write and modify

Programs run slower as they make worse use of the CPU and are not very memory efficient

Direct control over the CPU means memory use is more efficient and programs run faster

No understanding of how hardware components work is needed

Good understanding of how the different hardware components work is needed

Examples are python, java, C#, C++ etc.

Examples are machine code and assembly language



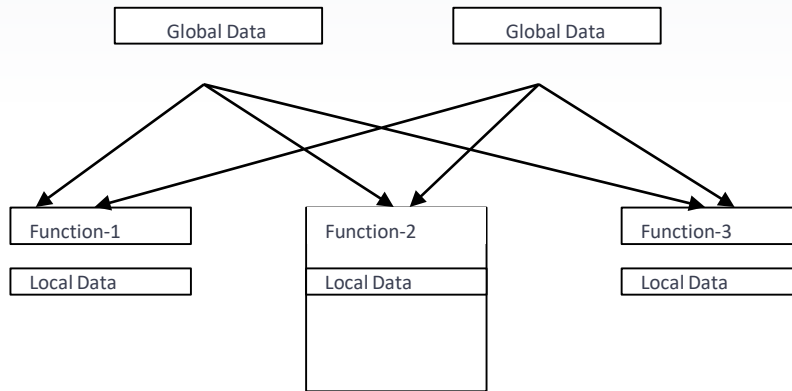
High level: Categorized

1. Procedural Oriented Programming: C, FORTRAN, Pascal, Basic
2. Object Oriented Programming: C++, Java, Python....

S.N	POP	OOP
1	Programs are divided into functions.	Programs are divided into objects.
2	It follows top-to bottom approach.	It follows bottom to top approach.
3	Data is not secure. It does not provide access specifiers like private, public or protected.	Data is secure. It provide access specifiers like private, public or protected.
4	Reusability of code is not possible using Inheritance.	Reusability of code is possible using Inheritance.
5	Addition of new code, modification ,testing of code is complicated.	Addition of new code, modification ,testing of code is easier due to modular programming.



Procedural oriented language



Disadvantages:

1. No security of data.
2. No better memory management.
3. No code reusability
4. Slow performance as length of the program increase.
5. Code maintenance and enhancement are difficult.



Object Oriented Programming Paradigm



Development of a software system is through the use of data abstraction. It is classified into two categories.

1. Object based programming language.
 2. Object oriented programming language.
-

Object Based Programming Language:

It supports encapsulation and object identity without supporting important features like polymorphism, inheritance and message based communication.

Object Oriented Programming Language:

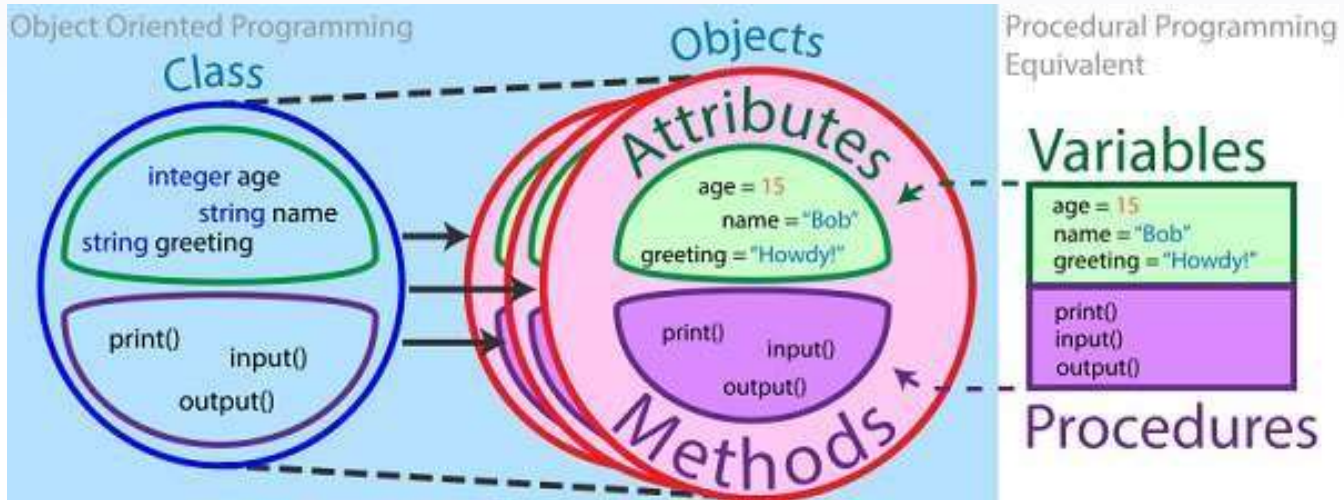
Incorporate all the features of object based along with inheritance and polymorphism.

**OOP=Object based Language
+inheritance+ polymorphism.**



High level: Categorized

1. Procedural Oriented Programming: C, FORTRAN, Pascal, Basic
2. Object Oriented Programming: C++, Java, Python....





Object Oriented Programming Language

Object-oriented programming (OOP) is a programming language model organized around "objects" rather than "actions" and data rather than logic

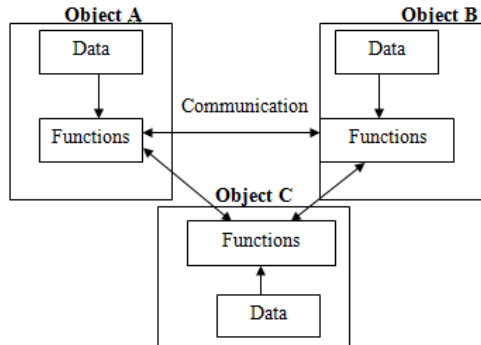


Fig: Organization of data and functions in OOP

Features





Object Oriented Programming Language



Class

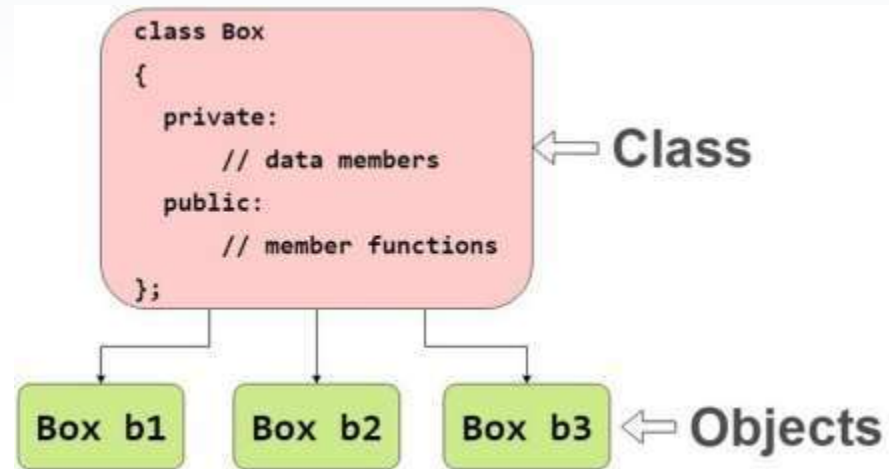
1. Classes in C++ are **user defined data types**, which hold multiple variables(**data members**) of different types and functions(**member functions**) that access & perform operations on those variables.
 2. Defined as structure or blueprint
-

Object

1. **Objects** in simple terms are **variables** of type **class**,
2. Classes can be considered as data types(user defined) of these variables(objects).
3. Objects are **instances** of class, which holds the data variables declared in class and the member functions work on these class objects.

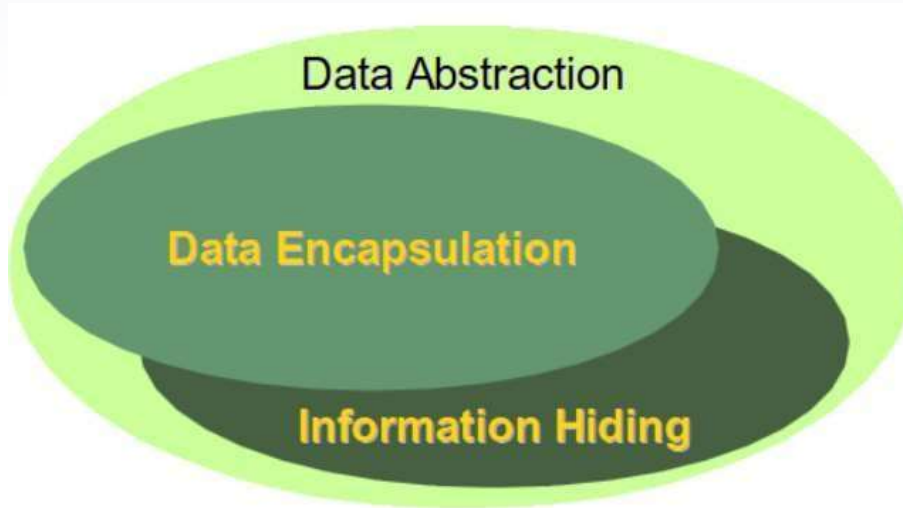
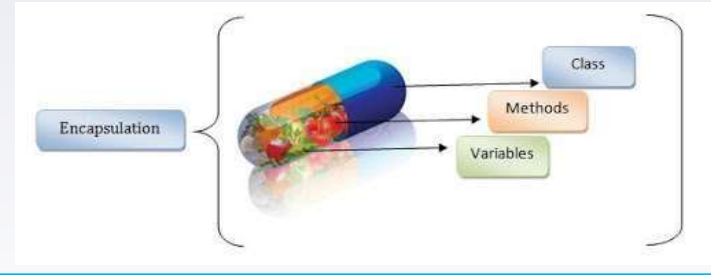


Classes & Objects





Main Features

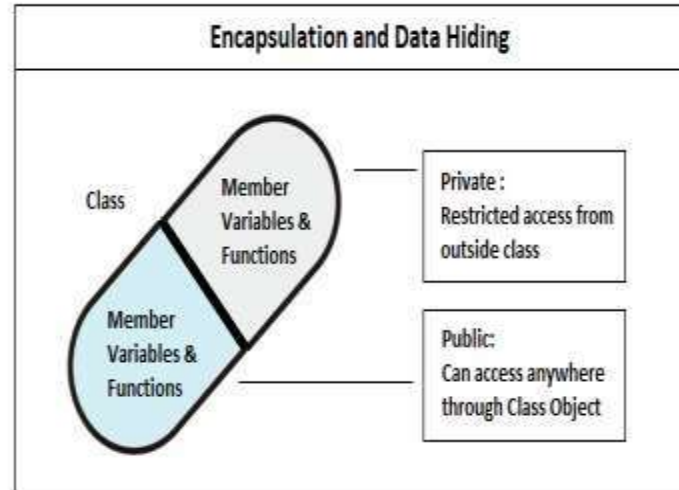
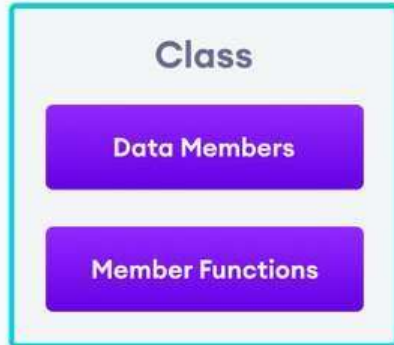




Encapsulation-Data Hiding

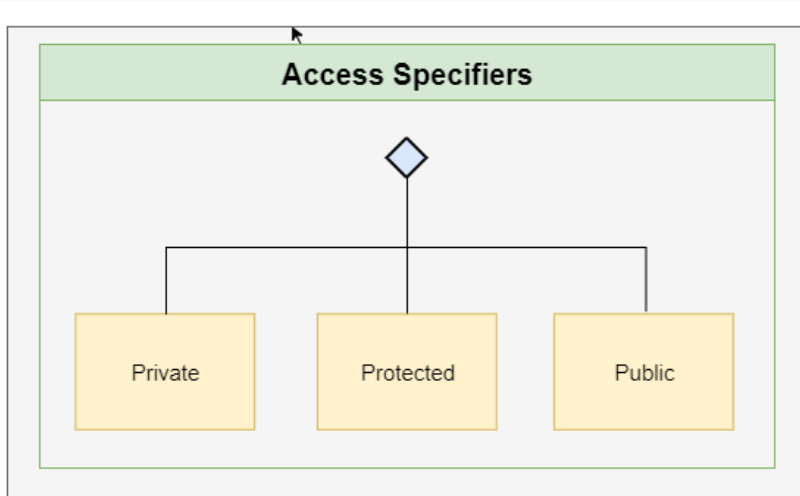
When all the data members and member functions are combined in a single unit called class, this process is called **Encapsulation**. In other words, wrapping the data together and the functions that manipulate them.

C++ Encapsulation





Access Specifier



- **Private members:** These can be accessed only from within the members of the same class.
- **Protected members:** These can be accessed only from within other members of the same class and its derived classes.
- **Public members:** These can be accessed from anywhere where the object is accessible.



Access Specifier

Access Specifier	Same Class	Derived Class	Any Other Class	Friend Function	Friend Class
Private	Yes	No	No	Yes	Yes
Protected	Yes	Yes	No	Yes	Yes
Public	Yes	Yes	Yes	Yes	Yes

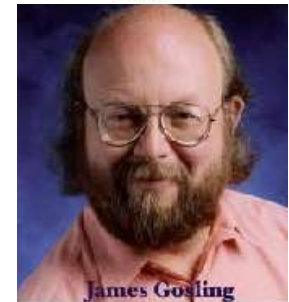


History of Java

1995: Sun formally announces Java at Sun World Netscape incorporates support for Java – Internet Explorer add support for Java



1. [James Gosling](#), **Mike Sheridan**, and **Patrick Naughton** initiated the Java language project in June 1991. The small team of sun engineers called **Green Team**.
2. Originally designed for small, embedded systems in electronic appliances like set-top boxes.
3. Firstly, it was called "**Greentalk**" by James Gosling, and file extension was .gt.
4. After that, it was called **Oak** and was developed as a part of the Green project.
5. Oak is a symbol of strength and chosen as a national tree of many countries like U.S.A., France, Germany, Romania, etc.
6. In 1995, Oak was renamed as "**Java**" because it was already a trademark by Oak Technologies.
7. Java is an island of Indonesia where first coffee was produced (called java coffee).





What is Java

Java Technology consists of:

1. Java Language
2. Java Platform
3. Java Tools



-
1. Java is a **programming language** and a **platform**.

Java is a high level, robust, object-oriented and secure programming language.

2. **Platform:** Any hardware or software environment in which a program runs, is known as a platform. Since Java has a runtime environment (JRE) and API, it is called a platform.

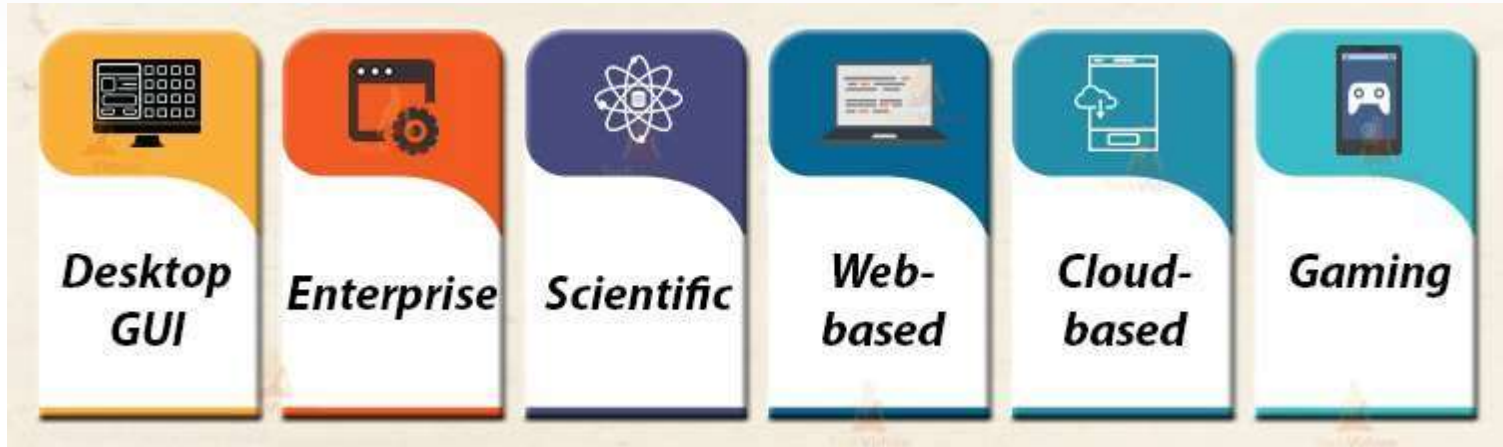
Example

```
1. class Simple{
2.     public static void main(String args[]){
3.         System.out.println("Hello Java");
4.     }
5. }
```



Applications

1. Desktop Applications, Web Applications
2. Enterprise Applications such as banking applications, Mobile
3. Embedded System, Smart Card
4. Robotics, Games, etc.





Assessment



Which of the following is not an OOPS concept?

- 1.Encapsulation
- 2.Polymorphism
- 3.Exception
- 4.Abstraction

What is the extra feature in classes which was not in the structures?

- 1.Member functions
- 2.Data members
- 3.Public access specifier
- 4.Static Data allowed

Which among the following feature is not in the general definition of OOPS?

- 1.Modularity
- 2.Efficient Code
- 3.Code reusability
- 4.Duplicate or Redundant Data

Which two features of object-oriented programming are the same?

- 1.Abstraction and Polymorphism features are the same
- 2.Inheritance and Encapsulation features are the same
- 3.Encapsulation and Polymorphism features are the same
- 4.Encapsulation and Abstraction

What is the size of a class?

- 1.Sum of the size of all inherited variables along with the variables of the same class
- 2.The size of the class is the largest size of the variable of the same class
- 3.Classes in the programming languages do not have any size
- 4.Sum of the size of all the variables within a class.



Assessment

Which among the following feature does not come under the concept of OOPS?

- 1.Data binding
- 2.Data hiding
- 3.Platform independent
- 4.Message passing

The object cannot be _____?

- 1.passed by copy
- 2.passed as function
- 3.passed by value
- 4.passed by reference

Which definition best defines the concept of abstraction?

- 1.Hides the important data
- 2.Hides the implementation and showing only the features
- 3.Hiding the implementation
- 4.Showing the important data



References

1. “The Complete Reference – Java 2”, 8th Edition
Tata McGraw Hill, Herbert Schildt
2. w3schools.com
3. “Java Programming form the group up”, Tata
McGraw Hill, Ralph Bravaco, Shai Simonson

