UNIT 2

ASSIGMENT 4

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Assignment Title: A java program to demonstrate the concept of Class and Objects.

Aim: Write a java program to create a class Student with data name, city and age along with method addData and printData to input and display the data. Create the two objects s1, s2 to declare and access the values.

Pre-Requisites: C/C++

Objective: The objective is to impart fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.

Outcomes: After learning these concept students will be able to,

 1. Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP like encapsulation, Inheritance and Polymorphism

 2. Design and develop java programs with methods and access the methods by using instances of class i.e. objects.

3. Understand the concept of Packages.

Theory:

CLASS:
Java is an object-oriented programming language. 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 colour, and **methods**, such as drive and brake.

A class is a group of objects which have common properties. It is a template or blueprint from which objects are created. It is a logical entity. It can't be physical.

OBJECTS IN JAVA

An entity that has state and behavior is known as an object e.g., chair, bike, marker, pen, table, car, etc. It can be physical or logical (tangible and intangible). The example of an intangible object is the banking system.

An object has three characteristics:

- **State:** represents the data (value) of an object.

- **Behavior:** represents the behavior (functionality) of an object such as deposit, withdraw, etc.

- **Identity:** An object identity is typically implemented via a unique ID. The value of the ID is not visible to the external user. However, it is used internally by the JVM to identify each object uniquely.

An object is an instance of a class. A class is a template or blueprint from which objects are created. So, an object is the instance(result) of a class.

Object Definitions:
- An object is *a real-world entity*.
- An object is *a runtime entity*.
- The object is *an entity which has state and behavior*.
- The object is *an instance of a class*.

METHODS IN JAVA
In Java, a method is like a function which is used to expose the behaviour of an object.

Advantage of Method
- Code Reusability
- Code Optimization

OBJECT AND CLASS EXAMPLE: main Within the Class
In this example, we have created a Student class which has two data members id and name. We are creating the object of the Student class by new keyword and printing the object's value.

Here, we are creating a main() method inside the class.

File: Student.java
```
//Defining a Student class.
class Student
{
    //defining fields
    int id;    //field or data member or instance variable
    String name;
     public static void main(String args[])
    //creating main method inside the Student class
```

```
    {
            Student s1=new Student();//creating an object of Student
                    //Printing values of the object
            System.out.println(s1.id);//accessing member through reference variable
            System.out.println(s1.name);
    }
}
```

Packages in JAVA

A package in Java is used to group related classes. Think of it as **a folder in a file directory**. We use packages to avoid name conflicts, and to write a better maintainable code.

Packages are divided into two categories:

- Built-in Packages (packages from the Java API)
- User-defined Packages (create your own packages)

Built-in Packages

The Java API is a library of prewritten classes, that are free to use, included in the Java Development Environment.

The library contains components for managing input, database programming, and much more. The complete list can be found at Oracles website: https://docs.oracle.com/javase/8/docs/api/.

The library is divided into **packages** and **classes**. Meaning you can either import a single class (along with its methods and attributes), or a whole package that contain all the classes that belong to the specified package.

To use a class or a package from the library, you need to use the import keyword:

```
import package.name.Class; // Import a single class
import package.name.*;  // Import the whole package
```

Pre-defined packages

1. java.applet	2. java.awt	3. java.beans
4. java.io	5. java.lang	6. java.lang.ref
7. java.math	8. java.net	9. java.nio
10. java.sql	11. java.text	12. java.util
13. java.util.zip	14. javax.sql	15. javax.swing

Algorithm:

Step 1: Start

Step 2: Declare and Define Class Student with required variables and methods addData and printData.

Step 3: Define main method

Step 4: Create objects of class Student S1, S2

Step 5: Access the methods with S1, S2.

Step 6: Stop

Conclusion:

 Thus we implemented a Java program that accepts student data and display with the help of objects.

FAQ's:

1. What are the access modifiers that can be added to members of a Class?
2. What are the differences between Abstract class and Interface?
3. What are the differences between the constructors and methods?
4. What is interface in java?
5. What are the predefined packages in JAVA?

CODE: -

```java
package unit2;
import java.util.Scanner;

class Student
{
    Scanner sc=new Scanner(System.in);
    public int age;
    public  String name,city;
     public void AddData(String n,String c,int a)
      {
          System.out.println("_____Add Data_____");
          System.out.print("Enter Name::");
          n=sc.next();
          System.out.print("Enter City ::");
          c=sc.next();
          System.out.print("Enter Age::");
          a=sc.nextInt();
          this.name=n;
          this.city=c;
          this.age=a;
      }
    public void PrintData()
      {
          System.out.println("_____Print Data_____");

          System.out.println(" Name::"+name);
          System.out.println(" City ::"+city);
```

```java
            System.out.println(" Age::"+age);

        }
}


public class pc2 {

    public static void main(String[] args) {
        String n="",c="";
        int a=0;
        Student s1=new Student();
        Student s2=new Student();
        s1.AddData(n,c,a);
        s1.PrintData();
        s2.AddData(n,c,a);
        s2.PrintData();

    }

}
```

OUTPUT: -

```
_____Add Data_____
Enter Name::SCID
Enter City ::PUNE
Enter Age::19
_____Print Data_____
 Name::SCID
 City ::PUNE
 Age::19
_____Add Data_____
Enter Name::RAM
Enter City ::MUMBAI
Enter Age::19
_____Print Data_____
 Name::RAM
 City ::MUMBAI
 Age::19
```