UNIT 3

ASSIGMENT 6

Name:-Sciddhanto Sinha
Roll No:-2213111
Division:- SY2

Assignment Title: Use of Abstract class

Aim: Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape

Pre-Requisites: C/C++

Objective:

To learn how to write abstract class and use of abstract class along with the understanding of the types of classes present in java.

Outcomes:

Students are able to Understand and Apply abstract class concepts in java.

Theory:

The class is a blueprint from which we can create an individual object. Java provides a keyword named class by which we can declare a class. Inside the class, we define class members and functions. It is not possible to create Java programs without class. We can also refer to a class as a user-defined data typebecause an object-oriented paradigm allows us to model real-world objects.

Abstraction:

Abstraction is a process of hiding the implementation details and showing only functionality to the user.

Another way, it shows only essential things to the user and hides the internal details, for example, sending SMS where you type the text and send the message. You don't know the internal processing about the message delivery.

There are two ways to achieve abstraction in java

1. Abstract class
2. Interface

Abstract Class:

A class which is declared as abstract is known as an abstract class. It can haveabstract and non-abstract methods. It needs to be extended and its method implemented. It cannot be instantiated.

Points to Remember:

1. An abstract class must be declared with an abstract keyword.
2. It can have abstract and non-abstract methods.
3. It cannot be instantiated.
4. It can have constructors and static methods also.
5. It can have final methods which will force the subclass not to change thebody of the method.

Abstract class syntax:

```
abstract class Animal

{
}
```

Abstract Method in Java:

```
abstract void printData();//no method body and abstract
```

Example:

```
package bbatchsy1;

abstract class Animal
{
     abstract void drinking();
     static void walking()
     {
          System.out.println("Animal walking");
     }
     final void sleeping()
     {
          System.out.println("Animal Sleeping");
     }

}

class Dog extends Animal
{

     @Override
     void drinking() {
          System.out.println("Dog drinking");

     }
     /*Can not override final method
     void sleeping()
     {
               System.out.println("Dog sleeping");
     }
     can not override static method
     void walking ()
     {
```

```
        System.out.println("Dog walking");
    }*/


}

public class Calling {

    public static void main(String[] args) {
        Dog d=new Dog();
        d.drinking();
        d.sleeping();
       // d.walking();  Wrong
        Animal.walking();

    }

}
```

Output:

```
Dog drinking
Animal Sleeping
Animal walking
```

Algorithm/Steps:

1. Create an abstract class Shape.
2. Declare two members of type integer.
3. Declare method name as printArea()
4. Declare three classes Rectangle, Triangle and Circle who extends Superclass Shape.
5. In SubClasses override the method printArea() which calculates the areaof a given shape.
6. Ask the user to enter the shape to calculate the area, and use the switchcase for choice.

7. Print area for given shape.

Conclusion:

Hence, we studied Abstract class in java.

Frequently Asked Questions:

1. What is the difference between abstract class and concrete class?
2. Explain Abstraction and Encapsulation?
3. What is the difference between static and instance variable?
4. Write a java program to create a vehicle having two abstract methods getData() and printData(). Write two classes Two wheeler and four wheelerwhich extends the class vehicle having its own attributes color and price. Get choice from the user and accordingly get and print data for two wheeler and four wheeler.
5. What is the advantage of Abstract class in Java?

CODE: -

```
package unit3;
 abstract class Shape {
     int a, b;

      abstract void printArea();
 }
 class Rectangle extends Shape{

     void printArea(){
        int length=5,breadth=4;

        System.out.println("AREA of Rectangle= "+length*breadth);


    }
}
 class Triangle extends Shape{
     void printArea(){
        double base=4, height=2;
        System.out.println("AREA of Triangle= "+(base*height)/2);


    }

}
```

```
 class Circle extends Shape{
     void printArea(){
        double radius=5;
        System.out.println("AREA of Circle= "+3.14*(radius*radius));


    }
}
public class pc2 {
    public static void main(String[] args) {
         Shape s;

        s=new Rectangle();
        s.printArea();
        s=new Triangle();
        s.printArea();
        s=new Circle();
        s.printArea();









    }
}
```

OUTPUT: -

```
pc2
C:\Users\LENOVO\.jdks\openjdk-19.0.1\bin\j
AREA of Rectangle= 20
AREA of Triangle= 4.0
AREA of Circle= 78.5

Process finished with exit code 0
```