

JAVA Assignment

Set-3

①

Name:- M. Givajothi Regd No:- 19BQA0503 Date:- 20/09/20

1. What is data abstraction? Differentiate data and procedural abstractions. Write inheritance hierarchy for the super class Quadrilateral, parallelogram, square and Rectangle, calculate area of square, rectangle and parallelogram.

A:- Data abstraction:- Abstraction refers to the act of representing essential features without including the background details or explanations. classes use the concept of abstraction.

Ex:- A car is viewed as a car rather than its individual components.

Data Abstraction may also be defined as the process of identifying only the required or identifying only the required characteristics of an object ignoring the irrelevant details. The properties and behaviours of an object differentiate it from other objects of similar type and also help in classifying/grouping the objects.

procedural abstractions are normally characterized in a programming language as "function/sub-function" or "procedure abstraction. Data abstraction, instead of just focusing on operations, we focus on data first and then operations that manipulate the data.

In procedural Abstraction, methods are used to capture the procedural patterns, abstracting over behaviour.

for example, in java, you could write something like.

→ → principles of oop:— The following are the 3 principles of oop

1. Encapsulation

2. Inheritance

3. polymorphism.

1. Encapsulation:— Wrapping up of the data and methods into a single unit is known as Encapsulation. Encapsulation is the mechanism that binds together code and the data it manipulates, and keeps both safe from outside interference and misuse.

In java the basis of encapsulation is the class. A class defines the structure and behaviour that will be shared by a set of objects. Thus, a class is a logical construct, an object has physical reality.

2. Inheritance:— Inheritance is the process by which objects of one class acquire the properties of objects of another class. A class inherits state and behavior from its superclass. Inheritance provides a powerful and natural mechanism for organizing and structuring software programs.

Reusability is main advantage in inheritance by which we can add additional features to an existing class without modifying it.

3. Polymorphism: - polymorphism means the ability to take more than one form. For example, an operation may exhibit different behavior in different instances. The behavior depends upon the types of data used in the operation. For example, consider the operation of addition. For two numbers, the operation will generate a sum. If the operands are strings, then the operation would produce a third string by concatenation.

program: -

```
public class QuadrilateralTest { public static void main
    (String[] args) }
```

// NOTE: All coordinates are assumed to form the proper shapes.

// A quadrilateral is a four-sided polygon

```
Quadrilateral quadrilateral = new Quadrilateral(1.1, 1.2, 6.6,
    2.8, 6.2, 9.9, 2.2, 7.4);
```

// A parallelogram is a quadrilateral with opposite sides parallel

```
parallelogram(5.0, 5.0, 11.0, 5.0, 12.0, 20.0, 6.0, 20.0);
```

⇒ // A rectangle is an equiangular parallelogram

```
Rectangle rectangle = new Rectangle(17.0, 14.0, 30.0, 14.0,
    30.0, 28.0, 17.0, 28.0);
```

// A square is an equiangular and equilateral parallelogram

```
square square = new square(4.0, 0.0, 8.0, 0.0, 8.0, 4.0,
    4.0, 4.0);
```



```
System.out.printf("%s %s %s %s\n", quadrilateral, parallelo  
gram, rectangle, square);
```

```
}
```

```
}
```

2. What is the importance of constructor? Write a java program constructor overloading. Describe the usage of static members and nesting members with suitable example in java programs.

A:- Importance of constructor:-

The purpose of constructor is to initialize the object of a class while the purpose of a method is to perform a task by executing java code. Constructors cannot be abstract, final, static and synchronised while methods can be. Constructors do not have return types while methods do. In short constructor and method are different (more on this at the end of this guide). People often refer constructor as special type of method in Java.

Write java program constructor overloading:-

To note while overloading a constructor is: When we don't implement any constructor, the java compiler inserts the default constructor into our code during compilation, however if we implement any constructor then compiler doesn't do it. See the example below.

```
=> public class Demo  
    {  
        private int rollNum;
```


// We are not defining a no-arg constructor here

```
demo(int rnum)
```

```
{
```

```
    rollNum = rollnum + rnum;
```

```
}
```

// Getter and setter methods

```
public static void main(String args[])
```

```
{
```

// This statement would invoke no-arg constructor

```
    Demo obj = new Demo();
```

```
}
```

```
}
```

output:-

Exception in thread "main" java.lang.Error: unresolved compilation

problem:- The constructor Demo() is undefined.

static members and nesting members:-

A static class i.e. created inside a class is called static nested class in java. It cannot access non-static data members and methods. It can be accessed by outer class name.

→ It can access static data members of outer class including private.

→ static nested class cannot access non-static (instance)

data member or method.

When are static nested classes used:

⇒ When you need to write many and smaller classes.

■ Instead of creating many small program files, you make one program file with all the tiny static classes.

Java static nested class Example with static method:

If you have the static member inside static nested class, you don't need to create instance of static nested class.

```
⇒ class TestOuter {  
    static int data = 30;  
    static class inner {  
        static void msg() {  
            System.out.println("data is " + data);  
        }  
    }  
    public static void main (String args[]) {  
        TestOuter.Inner.msg(); // no need to create the instance of static nested class  
    }  
}
```

Output: —

Compiler by: java TestOuter2.java

Run by: java TestOuter2

data is 30

3. Define a class named `bookfair` with the following description:

Instance variables/data members:

String `Bname` — stores the name of the book.

double `price` — stores the price of the book.

Member Methods:—

(i) `bookfair()` — Default constructor to initialize data members.

(ii) `void Input()` — to input and store the name and the price of the book.

(iii) `void calculate()` — to calculate the price after discount. Discount is calculated based on the following criteria.

price	discount
less than or equal to Rs 1000	2 % of price
More than Rs 1000 and less than or equal to Rs 3000	10 % of price
More than Rs 3000	15 % of price.

(iv) `void display()` — to display the name and price of the book after discount.

A:- program:-

```
import java.io.*;
class bookfair
{
    // instance variables
    String bname;
    double p;
    double np;
    bookfair()
```

```
{
    bname = "";
    p = 0.00f;
    np = 0.00f;
}
void input() throws IOException
{
    BufferedReader br = new
    BufferedReader(new
    InputStreamReader(System.in));
    System.out.println("enter the book name");
    bname = br.readLine();
    System.out.println("enter the price");
    p = Double.parseDouble(br.readLine());
}
void calculate()
{
    if (p <= 1000)
    {
        np = p - (p * 0.2);
    }
    else if (p > 1000 && p <= 3000)
    {
        np = p - (p * 0.1);
    }
}
```



```
else
{
    np = p - (p * 0.15);
}
}

void display()
{
    System.out.println("book name\t" + "price\t" + "net price\t");
    System.out.println(bname + "\t" + p + "\t" + np);
}

public static void main(String[] args)
throws IOException
{
    bookfair obj = new bookfair();
    obj.input();
    obj.calculate();
    obj.display();
}
}
```

- 4) Write a main method to create an object of the class and call the above member methods.
4. special words are those words which starts and ends with the same letter.

Examples:-

EXISTENCE

COMIC

WINDOW

palindromes are special words which read the same from left to right and vice-versa.

Example:

MALAYALAM

MADAM

LEVEL

ROTATOR

CIVIC

All palindrome are special words, but all special words are not palindromes.

Write a program to accept a word check and print whether the word is a palindrome or only special word.

A:- public class palindrome

```
{  
    public static void main (String args[])
```

```
{  
    String a, b = "";
```

```
    Scanner s = new
```

```
    Scanner(System.in);
```

```
    System.out.print("Enter the string you want to check:");
```

```
    a = s.nextLine();
```

```
    int n = a.length();
```

```
    for (int i = n-1; i >= 0; i--)
```

```
{  
        b = b + a.charAt(i);
```

```
}
```

```
    if (a.equalsIgnoreCase(b))
```



```

{
    system.out.println("It is only special word.");
}
system.out
{
    system.out.println("It is only not special word.");
}
}
}

```

Resources:-

- 1) <https://www.homeworklib.com/questions/1386405/java-quadrilateral-inheritance-hierarchy-write-an#:~:text=Quadrilateral%20Inheritance%20Hierarchy-,write%20an%20inheritance%20hierarchy%20for%20classes%20Quadrilateral%2c%20parallelogram%2c%20rectangle%2c,i.e.%20more%20than%20two%20levels.>
- 2) pdf java material
- 3) <https://javalearners1.blogspot.com/2016/10/book-fair-program.html>
- 4) <https://www.santfoundry.com/java-program-check-whether-string-palindrome/>