**TUTORIAL NO:3**

**AIM**: Extend calculator application for

1. geometric calculator
2. statistic calculator
3. matrix calculator
4. basic callculator

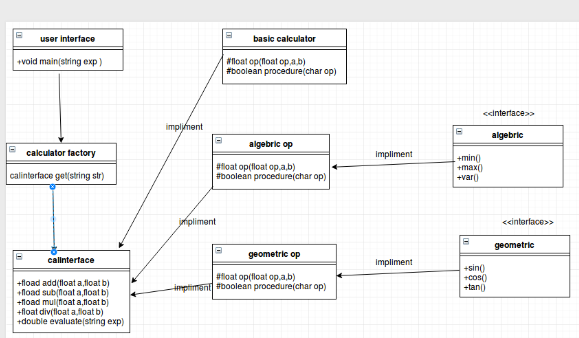
using factory method design pattern

**THEORY :**

**Intent**

* Define an interface for creating an object, but let subclasses decide which class to instantiate. Factory Method lets a class defer instantiation to subclasses.
* Defining a "virtual" constructor.
* The new operator considered harmful.

**class diagram :**



**basic.java**

|  |
| --- |
| import java.util.Scanner; |
|  | public class basic extends calculator { |
|  | public void getcontent() |
|  | { |
|  | int num1; |
|  | int num2; |
|  | String operation; |
|  |  |
|  |  |
|  | Scanner input = new Scanner(System.in); |
|  |  |
|  | System.out.println("please enter the first number"); |
|  | num1 = input.nextInt(); |
|  |  |
|  | System.out.println("please enter the second number"); |
|  | num2 = input.nextInt(); |
|  |  |
|  | Scanner op = new Scanner(System.in); |
|  |  |
|  | System.out.println("Please enter operation"); |
|  | operation = op.next(); |
|  |  |
|  | if (operation == "+"); |
|  | { |
|  | System.out.println("your answer is" + (num1 + num2)); |
|  | } |
|  | if (operation == "-"); |
|  | { |
|  | System.out.println("your answer is" + (num1 - num2)); |
|  | } |
|  |  |
|  | if (operation == "/"); |
|  | { |
|  | System.out.println("your answer is" + (num1 / num2)); |
|  | } |
|  | if (operation == "\*") |
|  | { |
|  | System.out.println("your answer is" + (num1 \* num2)); |
|  | } |
|  |  |
|  |  |
|  | } |
|  |  |
|  | } |

**algebric.java**

|  |
| --- |
| import java.util.Scanner; |
|  | public class algebric extends calculator{ |
|  | public void getcontent() |
|  | { |
|  | int min, max; |
|  |  |
|  | Scanner s = new Scanner(System.in); |
|  | System.out.print("Enter a Value: "); |
|  | int val = s.nextInt(); |
|  | min = max = val; |
|  |  |
|  | while (val != 0) { |
|  | System.out.print("Enter a Value: "); |
|  | val = s.nextInt(); |
|  | if (val < min) { |
|  | min = val; |
|  | } |
|  | if (val > max) { |
|  | max = val; |
|  | } |
|  | }; |
|  | System.out.println("Min: " + min); |
|  | System.out.println("Max: " + max); |
|  | } |
|  | }  Geomtric.java   |  | | --- | | import java.util.Scanner; | |  | public class geometric extends calculator{ | |  | public void getcontent() { | |  |  | |  | // Create a Scanner object which will read | |  | // values from the console which user enters | |  | Scanner scanner = new Scanner(System.in); | |  |  | |  | // Getting input from user from the console | |  | System.out.println("Enter value of angle in degrees "); | |  |  | |  | // Calling nextDouble method of scanner for | |  | // taking a double value from user and storing | |  | // it in degrees variable | |  | double degrees = scanner.nextDouble(); | |  |  | |  | System.out.println("Lets calculate the sine, cosine and tan of angle ..."); | |  | // In order to calculate sine , cosine and tan of angle we | |  | // use the Math class three static methods by name as : | |  | // 1. Math.sin(a) -- Sine of a | |  | // 2. Math.cos(a) -- Cosine of a | |  | // 3. Math.tan(a) -- Tangent of a | |  |  | |  | double sineOfAngle = Math.sin(degrees); | |  | double cosOfAngle = Math.cos(degrees); | |  | double tanOfAngle = Math.tan(degrees); | |  |  | |  | System.out.println(); | |  | System.out.println("The Sine of " + degrees + " degrees is : " | |  | + sineOfAngle); | |  | System.out.println("The Cosine of " + degrees + " degrees is : " | |  | + cosOfAngle); | |  | System.out.println("The Tangent of " + degrees + " degrees is : " | |  | + tanOfAngle); | |  |  | |  | System.out.println(); | |  | System.out.println("Lets calculate the sec, cosec and cot of angle ..."); | |  | // In order to calculate sec, cosec and cot of angle we | |  | // just inverse the value of sin , cos and tan calculated above : | |  | // 4. Sec of a -- 1 / Sine of a | |  | // 5. Cosec of a -- 1/ Cosine of a | |  | // 6. Cot of a -- 1 / Tangent of a | |  |  | |  | double secOfAngle = 1 / Math.sin(degrees); | |  | double cosecOfAngle = 1 / Math.cos(degrees); | |  | double cotOfAngle = 1 / Math.tan(degrees); | |  |  | |  | System.out.println("\nThe Sec of " + degrees + " degrees is : " | |  | + secOfAngle); | |  | System.out.println("The Cosec of " + degrees + " degrees is : " | |  | + cosecOfAngle); | |  | System.out.println("The Cotangent of " + degrees + " degrees is : " | |  | + cotOfAngle); | |  |  | |  |  | |  | } | |  |  | |  | } |   **Calculator.java**   |  | | --- | | abstract class calculator { | |  | protected int number; | |  | abstract void getcontent(); | |  | public void calculateresult(int number){ | |  |  | |  | } | |  | } |   **Factory.java**   |  | | --- | | public class factory { | |  | //use getPlan method to get object of type Plan | |  | public calculator getcalculator(String calculationType){ | |  | if(calculationType == null){ | |  | return null; | |  | } | |  | if(calculationType.equalsIgnoreCase("BASIC")) { | |  | return new basic(); | |  | } | |  | else if(calculationType.equalsIgnoreCase("ALGEBRIC")){ | |  | return new algebric(); | |  | } | |  | else if(calculationType.equalsIgnoreCase("GEOMETRIC")) { | |  | return new geometric(); | |  | } | |  | return null; | |  | } | |  | } |   **Result.java**   |  | | --- | | import java.io.\*; | |  | public class result { | |  | public static void main(String args[])throws IOException{ | |  | factory ffactory = new factory(); | |  |  | |  | System.out.print("Enter the name of calculationtype for which the result will be generated: "); | |  | BufferedReader br=new BufferedReader(new InputStreamReader(System.in)); | |  |  | |  | String calculation=br.readLine(); | |  | System.out.print("Enter the number: "); | |  | int number=Integer.parseInt(br.readLine()); | |  | calculator c = ffactory.getcalculator(calculation); | |  | System.out.print("calculation is:"); | |  | c.getcontent(); | |  | c.calculateresult(number); | |  | } | |  | } | |

