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Experiment 8: Method Overloading and Constructor Overloading

Theory :

Method Overloading

Two or more methods may have the same name if they differ in parameters (different number of parameters, different types of parameters, or both). These methods are called overloaded methods and this feature is called method overloading. For example:

```
void func() { ... }

void func(int a) { ... }

float func(double a) { ... }

float func(int a, float b) { ... }
```

Here, the func() method is overloaded. These methods have the same name but accept different arguments.

Note: The return types of the above methods are not the same. It is because method overloading is not associated with return types. Overloaded methods may have the same or different return types, but they must differ in parameters.

Why method overloading?

Suppose, you have to perform the addition of given numbers but there can be any number of arguments (let's say either 2 or 3 arguments for simplicity).

In order to accomplish the task, you can create two methods sum2num(int, int) and sum3num(int, int, int) for two and three parameters respectively. However, other programmers, as well as you in the future may get confused as the behavior of both methods are the same but they differ by name.

The better way to accomplish this task is by overloading methods. And, depending upon the argument passed, one of the overloaded methods is called. This helps to increase the readability of the program.

Constructor Overloading

Constructor overloading in java means having more than one constructor inside one Class. in the last article we have discussed method overloading and overriding and constructor, overloading is not much different than method overloading. Just like in the case of method overloading you have multiple methods with the same name but different signatures, in Constructor overloading, you have multiple constructors with a different signature with the only difference that Constructor doesn't have a return type in Java. That constructor will be called as an overloaded constructor.Overloading is also another form of polymorphism in Java which allows having multiple constructors with a different name in one Class in java.

Why do you overload Constructors in Java?

When we talk about Constructor overloading, the first question that comes to mind is why does someone overload Constructors in Java or why do we have overloaded constructors? If you have been using a framework or API like JDK or Spring you must have seen a lot of method overloading and constructor overloading. Constructor overloading makes sense if you can Construct objects in a different way.

One of Classical example of Constructor overloading is ArrayList in Java. ArrayList has three constructors one is empty, the other takes a collection object and one takes initial Capacity. these overloaded constructors allow flexibility while creating an ArrayList object.

It may be possible that you don't know the size of ArrayList during creation then you can simply use default no-argument constructor but if you know size then it's best to use overloaded Constructor which takes capacity.

Since ArrayList can also be created from another Collection, maybe from another List than having another overloaded constructor makes a lot of sense. By using an overloaded constructor you can convert your ArrayList into Set or any other collection.

A.

Aim : Calculate area of different shapes (Square, Rectangle , Circle) using method overloading and multiple class concept.

Program :

```
import java.util.Scanner;

class ans {
   static int ans1(int a) {
      return a * a;
   }

   static int ans1(int a, int b) {
      return a * b;
   }

   static double ans1(double r) {
      return (22 * r * r) / 7;
   }

   static double ans1(double a, double b, double c) {
      double s = (a + b + c) / 2;
      double w = (s * (s - a) * (s - b) * (s - c));
      double q = Math.sqrt(w);
      return q;
   }
}

class area {
   public static void main(String args[]) {
      int a, b, c, k = 1;
      double r, j;
```

```
ans g = new ans();
Scanner sc = new Scanner(System.in);
do {
   System.out.println("Main Menu");

   System.out.println("1.Find area of Square");
   System.out.println("2.Find area of Rectangle");
   System.out.println("3.Find area of Circle");
   System.out.println("4.Advance Triangle");
   System.out.println("5.Exit");
   int n = sc.nextInt();
   switch (n) {
   case 1:
      System.out.println("Enter the lenght of square");
      a = sc.nextInt();

      b = g.ans1(a);
      System.out.println("Area of square is " + b);
      break;
   case 2:
      System.out.println("Enter the lenght of rectangle");
      a = sc.nextInt();
      System.out.println("Enter the breadth of rectangle");
      b = sc.nextInt();

      c = g.ans1(a, b);
      System.out.println("Area of rectangle is " + c);
      break;
   case 3:
      System.out.println("Enter the radius of circle");
      r = sc.nextInt();

      j = g.ans1(r);
      System.out.println("Area of circle is " + j);
      break;
   case 4:
```

```
            System.out.println("Enter the lenght of side 1 of triangle");
            a = sc.nextInt();
            System.out.println("Enter the lenght of side 2 of triangle");
            b = sc.nextInt();
            System.out.println("Enter the lenght of side 3 of triangle");
            c = sc.nextInt();

            j = g.ans1(a, b, c);
            System.out.println("Area of triangle is " + j);
            break;
        case 5:
            k = 2;

        }}
 while (k != 2);
    }
}
```

Output :

```
C:\Users\Puru\Desktop\PRIYANSH\Development\JAVA>cd "c:\Users\Puru\Desktop\PRIYANSH\Development\JAVA\" && javac ar
ea.java && java area
Main Menu
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
1
Enter the lenght of square
2
Area of square is 4
Main Menu
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
2
Enter the lenght of rectangle
3
Enter the breadth of rectangle
4
Area of rectangle is 12
Main Menu
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
3
```

```
4
Area of rectangle is 12
Main Menu
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
3
Enter the radius of circle
4
Area of circle is 50.285714285714285
Main Menu
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
4
Enter the lenght of side 1 of triangle
2
Enter the lenght of side 2 of triangle
3
Enter the lenght of side 3 of triangle
4
Area of triangle is 2.9047375096555625
Main Menu
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
```

B.

Aim : Calculate area of different shapes (Square, Rectangle , Circle) using constructor overloading and multiple class concept.

Program :

```
import java.util.Scanner;

class ans {
   static int ans(int a) {
      return a * a;
   }

   static int ans(int a, int b) {
      return a * b;
   }

   static double ans(double r) {
      return (22 * r * r) / 7;
   }

   static double ans(double a, double b, double c) {
      double s = (a + b + c) / 2;
      double w = (s * (s - a) * (s - b) * (s - c));
      double q = Math.sqrt(w);
      return q;
   }
}

class area_con {
   public static void main(String args[]) {
      int a, b, c, k = 1;
      double r, j;
      ans g = new ans();
      Scanner sc = new Scanner(System.in);
      do {
         System.out.println("Main Menu");
```

```
System.out.println("1.Find area of Square");
System.out.println("2.Find area of Rectangle");
System.out.println("3.Find area of Circle");
System.out.println("4.Advance Triangle");
System.out.println("5.Exit");
int n = sc.nextInt();
switch (n) {
case 1:
   System.out.println("Enter the lenght of square");
   a = sc.nextInt();

   b = g.ans(a);
   System.out.println("Area of square is " + b);
   break;
case 2:
   System.out.println("Enter the lenght of rectangle");
   a = sc.nextInt();
   System.out.println("Enter the breadth of rectangle");
   b = sc.nextInt();

   c = g.ans(a, b);
   System.out.println("Area of rectangle is " + c);
   break;
case 3:
   System.out.println("Enter the radius of circle");
   r = sc.nextInt();

   j = g.ans(r);
   System.out.println("Area of circle is " + j);
   break;
case 4:
   System.out.println("Enter the lenght of side 1 of triangle");
   a = sc.nextInt();
   System.out.println("Enter the lenght of side 2 of triangle");
   b = sc.nextInt();
   System.out.println("Enter the lenght of side 3 of triangle");
```

```
            c = sc.nextInt();

            j = g.ans(a, b, c);
            System.out.println("Area of triangle is " + j);
            break;
         case 5:
            k = 2;

         }

      } while (k != 2);

   }
}
```

Output :

```
C:\Users\Puru\Desktop\PRIYANSH\Development\JAVA>cd "c:\Users\Puru\Desktop\PRIYANSH\Devel
Main Menu
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
1
Enter the lenght of square
2
Area of square is 4
Main Menu
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
2
Enter the lenght of rectangle
5
Enter the breadth of rectangle
4
Area of rectangle is 20
Main Menu
1.Find area of Square
2.Find area of Rectangle
```

```
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
3
Enter the radius of circle
5
Area of circle is 78.57142857142857
Main Menu
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
4
Enter the lenght of side 1 of triangle
3
Enter the lenght of side 2 of triangle
4
Enter the lenght of side 3 of triangle
5
Area of triangle is 6.0
Main Menu
1.Find area of Square
2.Find area of Rectangle
```

```
Enter the radius of circle
5
Area of circle is 78.57142857142857
Main Menu
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
4
Enter the lenght of side 1 of triangle
3
Enter the lenght of side 2 of triangle
4
Enter the lenght of side 3 of triangle
5
Area of triangle is 6.0
Main Menu
1.Find area of Square
2.Find area of Rectangle
3.Find area of Circle
4.Advance Triangle
5.Exit
5

C:\Users\Puru\Desktop\PRIYANSH\Development\JAVA>
```