

## Assignment - 04

Title → Dynamic Binding

Aim → Design a base class shape with two double type values and member functions to input the data and compute area() for calculating area of shape. Derive two classes triangle and rectangle. Make ~~compute~~ compute-area() an abstract function and redefine this function in the derived class to suit their requirements. Write a program that accepts dimensions of triangle and rectangle and display calculated area. Implement dynamic binding for given case study.

Objectives →

- 1) To understand the concept of Dynamic binding.
- 2) To implement run time polymorphism.
- 3) To implement Abstraction.

Theory →

→ What is Dynamic Binding ?

- 1) When compiler is not able to resolve the call or binding at compile time such binding is known as Dynamic Binding.
- 2) Dynamic binding is also known as late Binding.
- 3) Method overriding is a perfect example of dynamic



binding as in overriding both parent and child class method and in this case the type of object determines which method is to be executed.

- 4) The type of object is determined at the runtime so this is known as dynamic binding.

→ Dynamic Binding Example →

```
import java.util.*
```

```
class Shape {  
    public void shape-side () { }  
}
```

```
class quad extends shape {  
    public void shape-side () {  
        System.out.println ("This is quadrilateral");  
    }  
}
```

```
class Traingle extends shape {  
    public void shape-side () {  
        System.out.print ("This is Traingle");  
    }  
}
```

```
class dynamic {  
    public static void main (String [] args) {  
        shape s;  
        int sides = 0; Scanner sc = new Scanner (System.in);  
        Sides = sc.nextInt ();  
    }  
}
```

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```
if (sides == 3) {  
    s = new triangle();  
    s.shape-side();  
}
```

```
if (sides == 4) {  
    s = new quad();  
    s.shape-side();  
}
```

```
}
```

### → Static Binding vs Dynamic Binding →

- 1) Static binding occurs at compile time while dynamic binding occurs at runtime.
- 2) The binding of overloaded method is static binding and that of overridden methods is dynamic binding.
- 3) private, final and static methods and variables use static binding and bonded by compiler while virtual methods use dynamic binding and bonded during runtime based upon runtime object.
- 4) Static binding is called early binding while dynamic binding is called late binding.
- 5) The execution speed is high in case of static binding while it is low in dynamic binding.



## → Advantages of dynamic binding →

- 1) It makes the code more flexible
- 2) Use of dynamic binding provides better utilization of memory.

## → Abstract class →

- 1) A class which is declared with the abstract keyword is known as an abstract class in Java.
- 2) An abstract class can have abstract methods and non-abstract methods.
- 3) An abstract method is declared using abstract keyword and does not have a body. The implementation of such method can be given in derived class.
- 4) An abstract cannot be instantiated and needs to be extended and its methods implemented

## 5) Example →

```

abstract class vehicle { // abstract class
    abstract void ride(); // abstract method
}
class bike extends vehicle { // subclass
    void ride() {
        System.out.println("Bike is a vehicle");
    }
}
    
```

```
class test-abstract {  
    public void static main (String [] args) {  
        vehicle obj = new bike();  
        obj.ride ();  
    }  
}
```

### 6) Rules for Java abstract class →

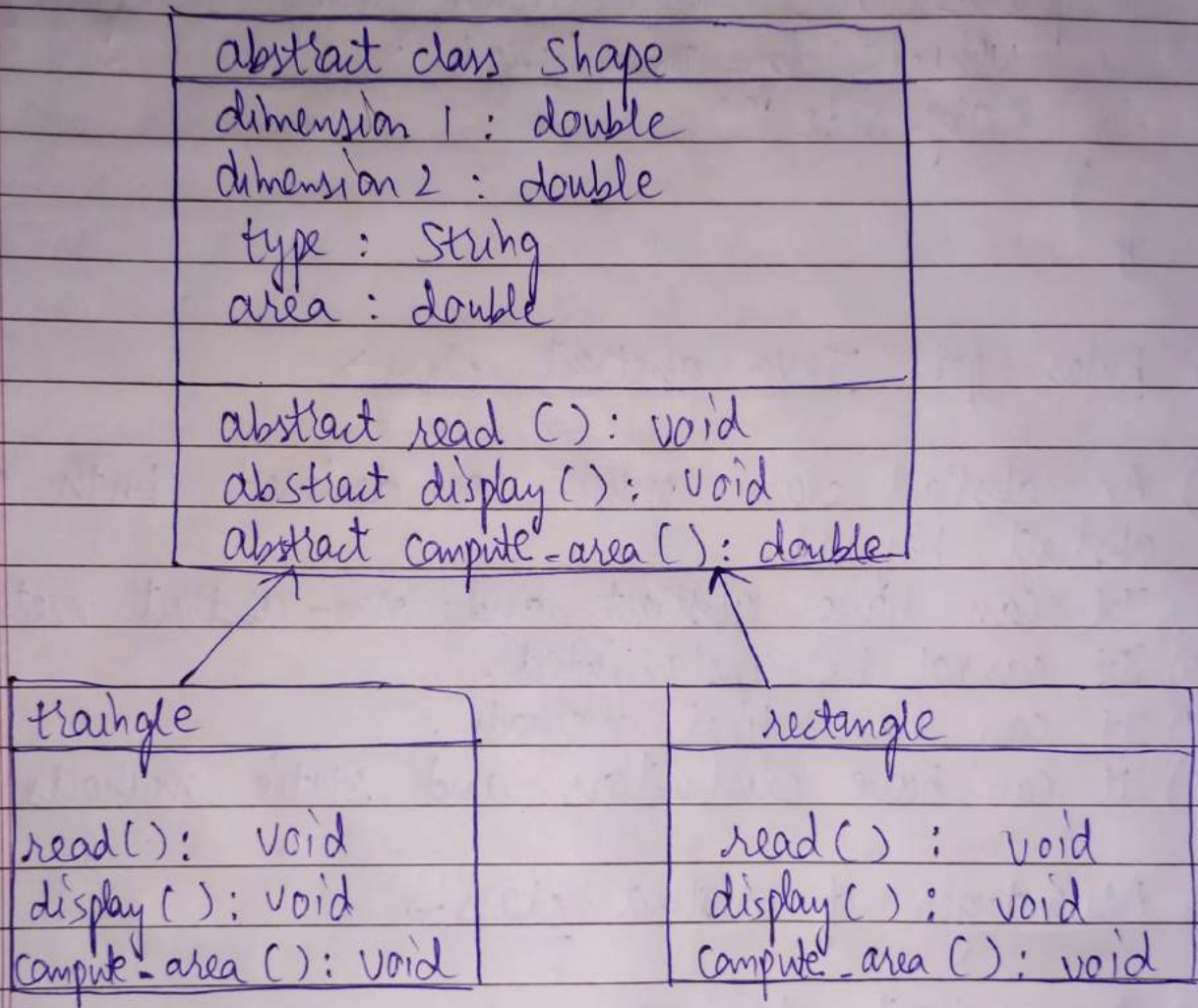
- 1) An abstract class must be declared with an abstract keyword.
- 2) It can have abstract and non-abstract methods.
- 3) It cannot be instantiated.
- 4) It can have final methods.
- 5) It can have constructors and static methods also.

### 7) Advantages of Abstract class →

- 1) An abstract class uses less memory space for the application.
- 2) It requires less execution time.



## Class Diagram →



## Input →

Dimensions of triangle and rectangle are to be given as input.

## Example →

For triangle →

Enter base : 4 (in cm)

Enter height : 6 (in cm)

For rectangle :

Enter length : 10 (in cm)

Enter breadth : 8 (in cm)

Output →

The menu is displayed for choice of shape

- 1) Triangle
- 2) Rectangle

choice : 1 (Triangle)

Considering above input following output is displayed

The base of triangle : 4.0 cm

The height of triangle : 6.0 cm

The area of triangle : 12.0 sq.cm

choice : 2 (Rectangle)

Considering above input following output is displayed

The length of rectangle : 10.0 cm

The base of rectangle : 8.0 cm

The area of rectangle : 80.0 sq.cm

→ Validation →

- 1) Proper units of dimensions (cm) and area (sq cm) are displayed.
- 2) Constructors are used to initialize the dimensions.

→ Test Cases →

The test case include diff. values of dimensions for triangle and rectangle. The test cases are implemented and pasted in the soft copy.



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→ Conclusion →

Through this assignment we learned how to apply dynamic binding in a ~~pro~~ java, and learnt what is run time polymorphism and also Abstraction.