

Title of the Experiment: Implementation of class and its member methods**Experiment No.4****Date:** 25/10/2020**Problem Statement:**

A company has two types of employees – FullTime and Parttime. The company records for each employee his/her name, age, address, salary and gender. Given the basic salary of the FullTime employee the components of his/her gross salary are: Dearness allowance – 75% of basic salary, HRA – 7.5% of basic salary, IT – 10% of basic. The salary of a Parttime employee is dependent on the qualification, experience, number of working hours and the rate per hour, as below:

	Qualification		
Experience		Tech	Non-Tech
0-5 years	1000 Rs.	1500 Rs.	1000 Rs.
6-10 years	1500 Rs.	2000 Rs.	1500 Rs.
11-15 years	2000 Rs.	2500 Rs.	2000 Rs.

Model this as a problem of hierarchical inheritance by:

- 1) Identifying the super class with its data members and member functions.
- 2) Identify the sub-class/sub-classes and their associated data members and member functions.

Test the program by creating objects of the classes that are so identified.

Objectives of the Experiment:

1. Learn how inheritance works in Java
2. Learn how to create base and derived classes
3. Understand the use of extends keyword
4. Understand the use of inheritance in a real-life application
5. Learn how to base class constructors in derived class
6. Learn about abstract classes and method overriding
7. Learn to Display the result in a readable/proper format

Program Source Code:

```
abstract class Employee
{
    String name;
    int age;
    String address;
    char gender;
    double salary;
    Employee(String name,int age,String address, char gender)
    {
        this.name = name;
        this.age = age;
        this.address = address;
        this.gender = gender;
    }
    void showDetails()
    {
        System.out.println("Name : "+name);
        System.out.println("Age : "+age);
        System.out.println("Address : "+address);
        System.out.println("Gender : "+gender);
        System.out.println("Salary : "+salary);
    }
    abstract void computeSalary();
}
class FTEmployee extends Employee
{
    double basic;
    FTEmployee(String name,int age,String address, char gender,double basic)
    {
        super(name,age,address,gender);
        this.basic = basic;
    }
    @Override
    void computeSalary()
    {
        double da,hra,tax;
        da = basic * 0.75;
        hra = basic * 0.075;
        tax = basic * 0.1;
        salary = basic + da + hra - tax;
    }
}
```

```

class PTEmployee extends Employee
{
    String qual;
    int exp,hrsWorked;
    PTEmployee(String name,int age,String address, char gender,String qual,int exp,int hrsWork
ed)
    {
        super(name,age,address,gender);
        this.qual = qual;
        this.exp = exp;
        this.hrsWorked = hrsWorked;
    }
    @Override
    void computeSalary()
    {
        switch(qual)
        {
            case "BE":
                if(exp>=1 && exp<=5)
                    salary = hrsWorked * 300;
                else if(exp<=10)
                    salary = hrsWorked * 400;
                else
                    salary = hrsWorked * 500;
                break;
            case "Mtech":
                if(exp>=1 && exp<=5)
                    salary = hrsWorked * 500;
                else if(exp<=10)
                    salary = hrsWorked * 700;
                else
                    salary = hrsWorked * 1000;
                break;
            case "phD":
                if(exp>=1 && exp<=5)
                    salary = hrsWorked * 800;
                else if(exp<=10)
                    salary = hrsWorked * 1200;
                else
                    salary = hrsWorked * 1500;
                break;
        }
    }
}

```

```

public class app {
    public static void main(String[] args) {
        FTEmployee f1 = new FTEmployee("Rohit M Borse",007,"Bhagya Nagar, Belagavi",'M',59003)
        ;
        PTEmployee p1 = new PTEmployee("Sanket M Mungarwadi",23,"Mahantesh Nagar",'M',"BE",12,
1000);
        f1.computeSalary();
        f1.showDetails();
        p1.computeSalary();
        p1.showDetails();
    }
}

```

OUTPUT:

Name : Rohit M Borse	Name : Venkatesh G Dhongadi
Age :7	Age :23
Address :Bhagya Nagar, Belagavi	Address :Bhagya Nagar, Belagavi
Gender : M	Gender : M
Salary :101780.175	Salary :101780.175
Name : Sanket M Mungarwadi	Name : Ajay P Betagiri
Age :23	Age :46
Address :Mahantesh Nagar	Address :Tilak Nagar
Gender : M	Gender : M
Salary :500000.0	Salary :40000.0
	PS D:\Programming\JAVA\Java\jdk\bin>

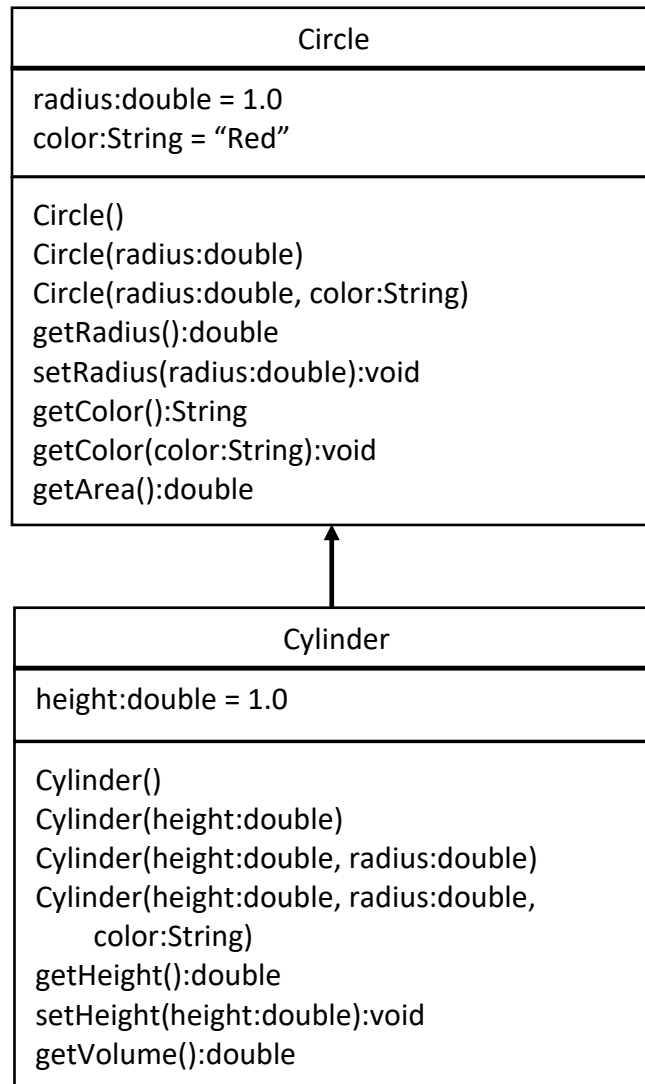
Outcomes of the Experiment: At the end of the laboratory sessions the students should be able to

1. Demonstrate the use inheritance in solving real-life problems.
2. Identify appropriate type of inheritance to use for a particular scenario
3. Creating derived classes using extends keyword
4. Learn how to call super class constructors
5. Identify how to implement inheritance in real life applications

Conclusions: From the given problem statement, we could identify the necessary methods and use the appropriate type of inheritance and the necessary program logic. We understood how to calculate the salary of different types of employees based on their qualification. The program was written in Visual Studio Code by creating a project. We understood the usage of the IDE in typing the code, debugging, running the program and observing the output. We also understood the use of the built-in class System and its method println to display the result. The program was executed for two-three sets of input and results obtained were verified to be correct and recorded.

PRACTICE PROBLEM

The class Cylinder inherits all the instance variables (radius and color) and methods (getRadius(), getArea(), among others) from its superclass Circle. It further defines a variable called height, three methods getHeight(), setHeight() and getVolume() and its own constructors. Implement the hierarchy as shown below:



Program Source Code:

```
import java.lang.*;
import java.io.*;
import java.util.*;
class Circle{
    double radius;
    String color;

    Circle(){
        radius = 1.0;
        color="Aqua";
    }
    Circle(double radius){
        this.radius=radius;
        color="Grey";
    }
    Circle(double radius, String color){
        this.radius=radius;
        this.color=color;
    }
    double getRadius() {
        return radius;
    }
    void setRadius(double radius) {
        this.radius=radius;
    }
    String getColor() {
        return color;
    }
    void setColor(String color) {
        this.color=color;
    }
    double getArea() {
        return (Math.PI*radius*radius);
    }
}
//subclass
class Cylinder extends Circle{
    double height;

    Cylinder(){
        super();
        height=1.0;
    }
}
```

```

    }
    Cylinder(double height){
        super();
        this.height=height;
    }
    Cylinder(double height, double radius){
        super(radius);
        this.height=height;
    }
    Cylinder(double height, double radius, String color){
        super(radius,color);
        this.height=height;
    }
    double getHeight() {
        return height;
    }
    void setHeight(double height) {
        this.height=height;
    }
    double getVolume() {
        return (Math.PI*radius*radius*height);
    }
}

public class app {

    public static void main(String[] args) {

        Circle c=new Circle(3.0,"Aqua");
        System.out.println("Radius of circle = "+c.getRadius()+"\nColor of Circle
= "+c.getColor());
        c.setColor("Blue");
        System.out.println("Changed Color of the cirlce : "+c.getColor()+(String.
format("\nThe Area of the circle : %.2f",c.getArea())));

        Cylinder c1=new Cylinder(3.0,4.0,"Black");
        System.out.println("Radius of the Cylinder : "+c1.getRadius()+"\nHeight o
f the Cylinder : "+c1.getHeight()+"\nColor of the Cylinder : "+c1.getColor()+Stri
ng.format("\nVolume of the Cylinder : %.2f",c1.getVolume()));
    }
}

```

OUTPUT:

```
PS D:\Programming\JAVA\Java\jdk\bin> java app
Radius of circle = 3.0
Color of Circle = Violet
Changed Color of the circle : Blue
The Area of the circle : 28.27
Radius of the Cylinder : 4.0
Height of the Cylinder : 3.0
Color of the Cylinder : Green
Volume of the Cylinder : 150.80
PS D:\Programming\JAVA\Java\jdk\bin> |
```

```
PS D:\Programming\JAVA\Java\jdk\bin> java app
Radius of circle = 3.0
Color of Circle = Aqua
Changed Color of the circle : Blue
The Area of the circle : 28.27
Radius of the Cylinder : 4.0
Height of the Cylinder : 3.0
Color of the Cylinder : Black
Volume of the Cylinder : 150.80
PS D:\Programming\JAVA\Java\jdk\bin> |
```