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Computer Programming Java

MOODLE LAB TASK 5

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Slot: L3+L4+L29+L30

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Inheritance Questions

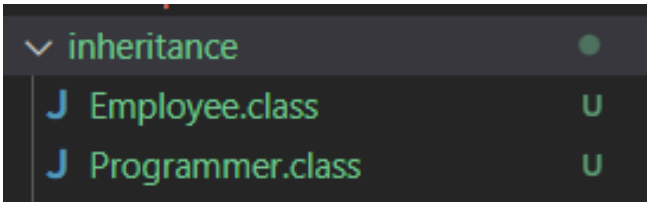
Q1. Write a Java program to display the salary and bonus of a Programmer class, where Programmer extends an Employee class. The Employee class has a salary attribute, and the Programmer class has an additional bonus attribute. The program should print the salary and bonus of a Programmer instance.

CODE:

```
class Employee {
    float salary = 40000;
}


class Programmer extends Employee {
    int bonus = 10000;


    public static void main(String[] args) {
        Programmer p = new Programmer();
        System.out.println("Programmer salary is: " + p.salary);
        System.out.println("Bonus of Programmer is: " + p.bonus);
    }
}
```

OUTPUT:

```
Programmer.java > Programmer > main(String[])
1   class Employee {
2       float salary = 40000;
3   }
4
5   class Programmer extends Employee {
6       int bonus = 10000;
7
        Run | Debug
8       public static void main(String[] args) {
9           Programmer p = new Programmer();
10          System.out.println("Programmer salary is: " + p.salary);
11          System.out.println("Bonus of Programmer is: " + p.bonus);
12      }
13  }
14

PROBLEMS 7   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS

PS C:\Users\Soumyojyoti Saha\OneDrive - vit.ac.in\Desktop\java sem 7> cd "c:\Users\Soumyojyoti
 } ; if ($?) { java Programmer }
Programmer salary is: 40000.0
Bonus of Programmer is: 10000
PS C:\Users\Soumyojyoti Saha\OneDrive - vit.ac.in\Desktop\java sem 7>
```



Classes Created after compilation

Q2. Write a Java program to demonstrate inheritance where:

1. **An Animal class has a method eat() that prints "eating...".**
2. **A Dog class extends the Animal class and adds a method bark() that prints "barking...".**
3. **In the TestInheritance class, create an instance of Dog and call both bark() and eat() methods on it. The program should print the outputs of both methods.**

CODE:

```
class Animal {
    void eat() {
        System.out.println("eating...");
    }
}

class Dog extends Animal {
    void bark() {
        System.out.println("barking...");
    }
}

class TestInheritance {
    public static void main(String[] args) {
        Dog d = new Dog();
        d.bark();
        d.eat();
    }
}
```

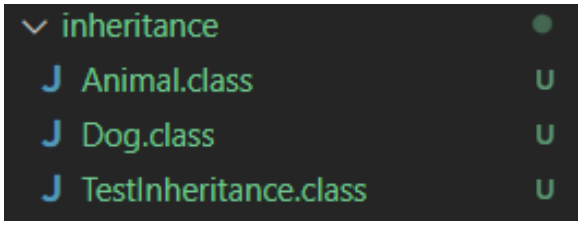
OUTPUT:

TestInheritance.java > ...

```java
class Animal {
    void eat() {
        System.out.println(x:"eating...");
    }
}

class Dog extends Animal {
    void bark() {
        System.out.println(x:"barking...");
    }
}

class TestInheritance {
    Run | Debug
    public static void main(String[] args) {
        Dog d = new Dog();
        d.bark();
        d.eat();
    }
}
```

PROBLEMS 7 OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
PS C:\Users\Soumyojyoti Saha\OneDrive - vit.ac.in\Desktop\java sem 7> cd "c:\Users\Soumyojyoti
.java } ; if ($?) { java TestInheritance }
barking...
eating...
PS C:\Users\Soumyojyoti Saha\OneDrive - vit.ac.in\Desktop\java sem 7>
```



Classes Created after compilation

Q3. Write a Java program to demonstrate multilevel inheritance where:

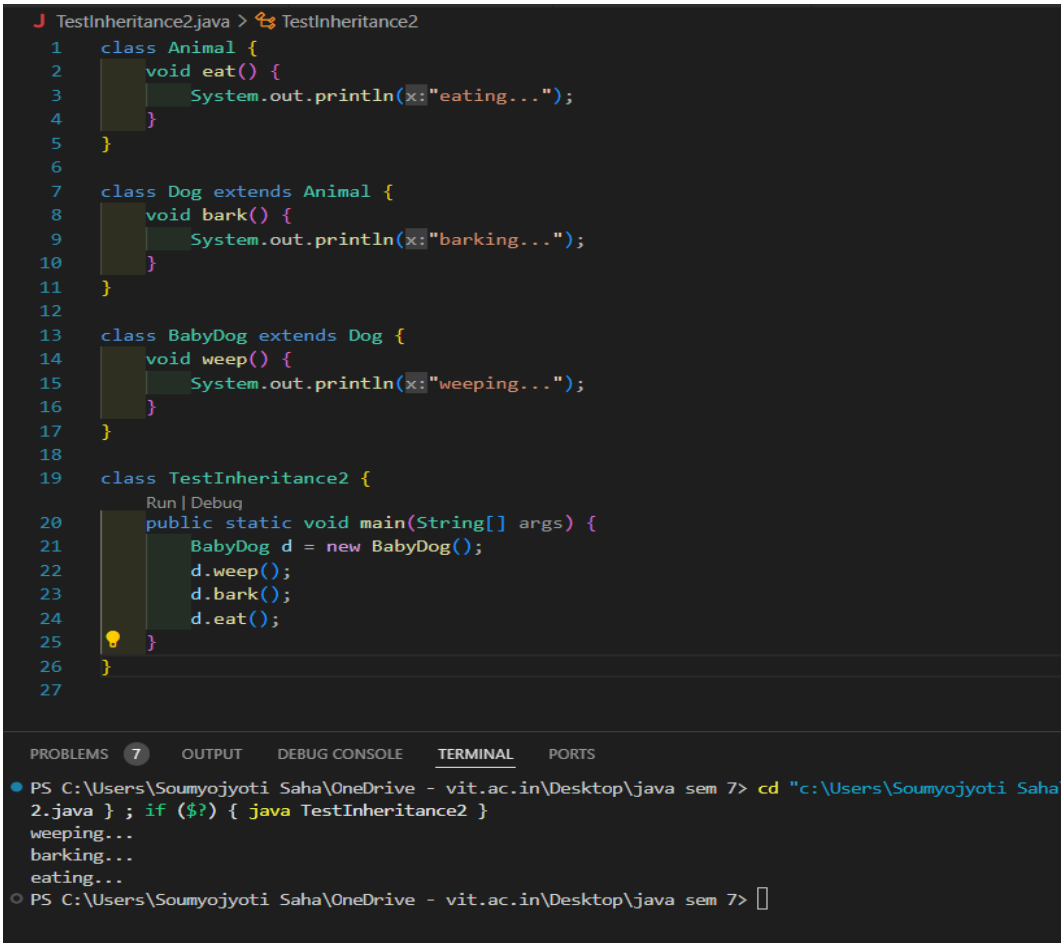
1. **An Animal class has a method eat() that prints "eating...".**
2. **A Dog class extends the Animal class and adds a method bark() that prints "barking...".**
3. **A BabyDog class extends the Dog class and adds a method weep() that prints "weeping...".**
4. **In the TestInheritance2 class, create an instance of BabyDog and call the weep(), bark(), and eat() methods on it. The program should print the outputs of all three methods.**

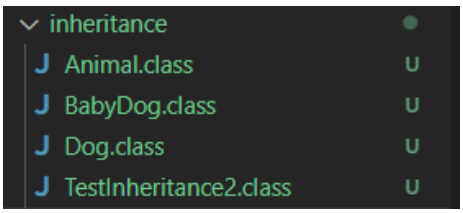
CODE:

```
class Animal {
    void eat() {
        System.out.println("eating...");
    }
}

class Dog extends Animal {
    void bark() {
        System.out.println("barking...");
    }
}

class BabyDog extends Dog {
    void weep() {
        System.out.println("weeping...");
    }
}
```

```
class TestInheritance2 {
    public static void main(String[] args) {
        BabyDog d = new BabyDog();
        d.weep();
        d.bark();
        d.eat();
    }
}
```

OUTPUT:





Classes Created after compilation

Q4. Write a Java program to demonstrate multiple inheritance where:

1. **An Animal class has a method eat() that prints "eating...".**
2. **A Dog class extends the Animal class and adds a method bark() that prints "barking...".**
3. **A Cat class extends the Animal class and adds a method meow() that prints "meowing...".**
4. **In the TestInheritance3 class, create an instance of Cat and call the meow() and eat() methods on it. The program should print the outputs of both methods. Uncommenting the line c.bark(); should result in a compile-time error.**

CODE:

```
class Animal {
    void eat() {
        System.out.println("eating...");
    }
}
class Dog extends Animal {
    void bark() {
        System.out.println("barking...");
    }
}
class Cat extends Animal {
    void meow() {
        System.out.println("meowing...");
    }
}
class TestInheritance3 {
    public static void main(String[] args) {
```

```
        Cat c = new Cat();
        c.meow();
        c.eat();
        // c.bark(); // Uncommenting this line will cause a compile-time error
    }
}
```

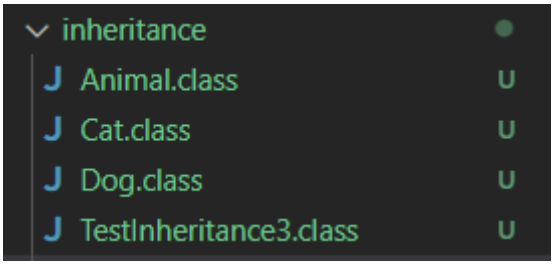
OUTPUT:

TestInheritance3.java > Cat > meow()

```
1   class Animal {
2       void eat() {
3           System.out.println(x:"eating...");
4       }
5   }
6
7   class Dog extends Animal {
8       void bark() {
9           System.out.println(x:"barking...");
10      }
11  }
12
13  class Cat extends Animal {
14      void meow() {
15          System.out.println(x:"meowing...");
16      }
17  }
18
19  class TestInheritance3 {
        Run | Debug
20      public static void main(String[] args) {
21          Cat c = new Cat();
22          c.meow();
23          c.eat();
24          // c.bark(); // Uncommenting this line will cause a compile-time error
25      }
26  }
27
```

PROBLEMS 7 OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
PS C:\Users\Soumyojyoti Saha\OneDrive - vit.ac.in\Desktop\java sem 7> cd "c:\Users\Soumyojyoti
3.java } ; if ($?) { java TestInheritance3 }
meowing...
eating...
PS C:\Users\Soumyojyoti Saha\OneDrive - vit.ac.in\Desktop\java sem 7>
```



Classes Created after compilation

Q5. Write a Java program to demonstrate inheritance and method overriding where:

1. **A Bicycle class has two fields: gear and speed, and a constructor to initialize these fields. It includes methods to applyBrake(int decrement), speedUp(int increment), and an overridden toString() method to print information about the bicycle.**
2. **A MountainBike class extends Bicycle and adds an additional field seatHeight. It has a constructor to initialize the seatHeight along with gear and speed, a method setHeight(int newValue) to modify the seatHeight, and an overridden toString() method to include seatHeight information along with the inherited information.**
3. **In the Test class, create an instance of MountainBike, initialize it with appropriate values, and print its information using the toString() method.**

CODE:

```
class Bicycle {
    // the Bicycle class has two fields
    public int gear;
    public int speed;

    // the Bicycle class has one constructor
    public Bicycle(int gear, int speed) {
        this.gear = gear;
        this.speed = speed;
    }

    // the Bicycle class has three methods
    public void applyBrake(int decrement) {
        speed -= decrement;
```

```
    }

    public void speedUp(int increment) {
        speed += increment;
    }

    // toString() method to print info of Bicycle
    @Override
    public String toString() {
        return ("No of gears are " + gear + "\n"
                + "speed of bicycle is " + speed);
    }
}

// derived class
class MountainBike extends Bicycle {
    // the MountainBike subclass adds one more field
    public int seatHeight;

    // the MountainBike subclass has one constructor
    public MountainBike(int gear, int speed, int startHeight) {
        // invoking base-class(Bicycle) constructor
        super(gear, speed);
        seatHeight = startHeight;
    }

    // the MountainBike subclass adds one more method
```

```
    public void setHeight(int newValue) {
        seatHeight = newValue;
    }

    // overriding toString() method of Bicycle to print more info
    @Override
    public String toString() {
        return (super.toString() + "\nseat height is " + seatHeight);
    }
}

// driver class
public class Test {
    public static void main(String[] args) {
        MountainBike mb = new MountainBike(3, 100, 25);
        System.out.println(mb.toString());
    }
}
```

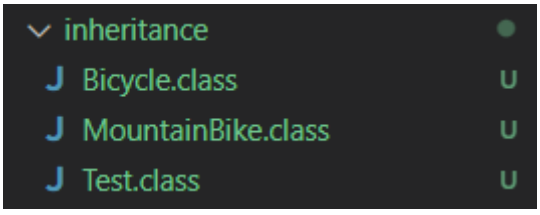
OUTPUT:

Test.java > Bicycle > Bicycle(int, int)

```java
class Bicycle {
    // the Bicycle class has two fields
    public int gear;
    public int speed;

    // the Bicycle class has one constructor
    public Bicycle(int gear, int speed) {
        this.gear = gear;
        this.speed = speed;
    }

    // the Bicycle class has three methods
    public void applyBrake(int decrement) {
        speed -= decrement;
    }

    public void speedUp(int increment) {
        speed += increment;
    }

    // toString() method to print info of Bicycle
    @Override
    public String toString() {
        return ("No of gears are " + gear + "\n"
                + "speed of bicycle is " + speed);
    }
}

// derived class
class MountainBike extends Bicycle {
    // the MountainBike subclass adds one more field
    public int seatHeight;
```

PROBLEMS 7 OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
PS C:\Users\Soumyojyoti Saha\OneDrive - vit.ac.in\Desktop\java sem 7> cd "c:\Users\Soumyojyoti S
f ($?) { java Test }
No of gears are 3
speed of bicycle is 100
seat height is 25
PS C:\Users\Soumyojyoti Saha\OneDrive - vit.ac.in\Desktop\java sem 7>
```



Classes Created after compilation

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