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ASSIGNMENT—4

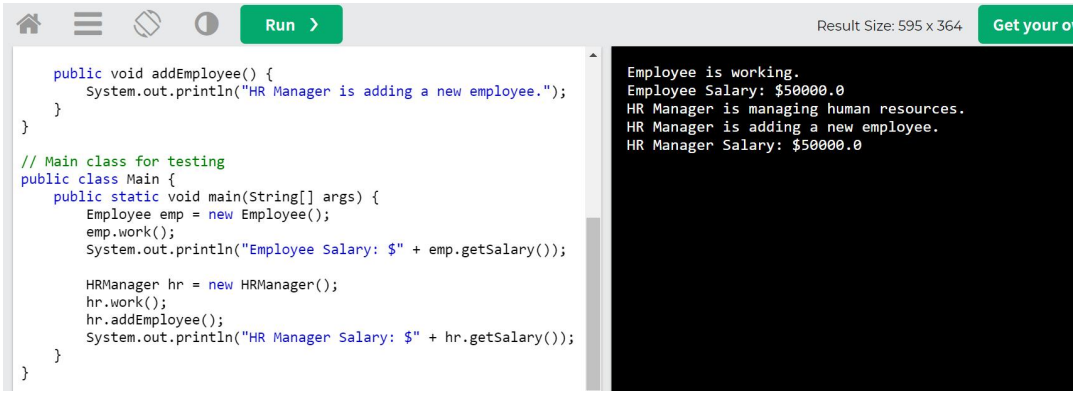
1.Write a Java program to create a class called Employee with methods called work() and getSalary(). Create a subclass called HRManager that overrides the work() method and adds a new method called addEmployee().

CODE:

```
// Employee class
class Employee {
    public void work() {
        System.out.println("Employee is working.");
    }

    public double getSalary() {
        return 50000.0; // Sample salary for demonstration
    }
}

// HRManager subclass
class HRManager extends Employee {
    @Override
    public void work() {
        System.out.println("HR Manager is managing human resources.");
    }

    public void addEmployee() {
        System.out.println("HR Manager is adding a new employee.");
```

```
    }
}

// Main class for testing
public class Main {
    public static void main(String[] args) {
        Employee emp = new Employee();
        emp.work();
        System.out.println("Employee Salary: $" + emp.getSalary());

        HRManager hr = new HRManager();
        hr.work();
        hr.addEmployee();
        System.out.println("HR Manager Salary: $" + hr.getSalary());
    }
}
```

OUTPUT:



2.Write a Java program to create a vehicle class hierarchy. The base class should be Vehicle, with subclasses Truck, Car and Motorcycle. Each subclass should have properties such as make, model, year, and fuel type. Implement methods for calculating fuel efficiency, distance traveled, and maximum speed.

```
class Vehicle {
    String make;
    String model;
    int year;
    String fuelType;

    public Vehicle(String make, String model, int year, String fuelType) {
        this.make = make;
        this.model = model;
        this.year = year;
        this.fuelType = fuelType;
    }

    public void calculateFuelEfficiency() {
        // Add logic to calculate fuel efficiency
    }

    public void calculateDistanceTraveled() {
        // Add logic to calculate distance traveled
    }

    public void calculateMaxSpeed() {
        // Add logic to calculate maximum speed
    }
}

class Truck extends Vehicle {
    public Truck(String make, String model, int year, String fuelType) {
        super(make, model, year, fuelType);
    }
    // Additional Truck-specific properties and methods
```

```
}

class Car extends Vehicle {
    public Car(String make, String model, int year, String fuelType) {
        super(make, model, year, fuelType);
    }
    // Additional Car-specific properties and methods
}

class Motorcycle extends Vehicle {
    public Motorcycle(String make, String model, int year, String fuelType) {
        super(make, model, year, fuelType);
    }
    // Additional Motorcycle-specific properties and methods
}
```

<u>OUTPUT</u>:

Main.java | Share | Run | Output

```
abstract class Vehicle {
    String make;
    String model;
    int year;
    String fuelType;

    public Vehicle(String make, String model, int year, String fuelType) {
        this.make = make;
        this.model = model;
        this.year = year;
        this.fuelType = fuelType;
    }

    public abstract void calculateFuelEfficiency();
    public abstract void calculateDistanceTraveled();
    public abstract void calculateMaxSpeed();

    public static void main(String[] args) {
        // Create instances of Truck, Car, and Motorcycle
        Vehicle truck = new Truck("Ford", "F-150", 2020, "Diesel");
        Vehicle car = new Car("Toyota", "Camry", 2021, "Gasoline");
        Vehicle motorcycle = new Motorcycle("Harley-Davidson", "Street 750", 2019,
            "Gasoline");

        // Perform calculations (logic needs to be implemented in each method)
        truck.calculateFuelEfficiency();
        truck.calculateDistanceTraveled();
        truck.calculateMaxSpeed();
```

```
java -cp /tmp/VBA2F2rREt/Vehicle
Truck: Ford F-150 2020 Diesel
Car: Toyota Camry 2021 Gasoline
Motorcycle: Harley-Davidson Street 750 2019 Gasoline

=== Code Execution Successful ===
```

3.Write a Java program that creates a class hierarchy for employees of a company. The base class should be Employee, with subclasses Manager, Developer, and Programmer. Each subclass should have properties such as name, address, salary,

and job title. Implement methods for calculating bonuses, generating performance reports, and managing projects.

```
class Employee {
    String name;
    String address;
    double salary;
    String jobTitle;

    public Employee(String name, String address, double salary, String jobTitle) {
        this.name = name;
        this.address = address;
        this.salary = salary;
        this.jobTitle = jobTitle;
    }

    public double calculateBonus() {
        // Bonus calculation logic
        return 0.0;
    }

    public void generatePerformanceReport() {
        // Performance report generation logic
    }

    public void manageProject() {
        // Project management logic
    }
}

class Manager extends Employee {
    // Additional properties and methods specific to Manager
```

}

class Developer extends Employee {

// Additional properties and methods specific to Developer

}

class Programmer extends Employee {

// Additional properties and methods specific to Programmer

}

OUTPUT:

Main.java | Share | Run | Output

```java
class Employee {
    String name;
    String address;
    double salary;
    String jobTitle;

    public Employee(String name, String address, double salary, String jobTitle) {
        this.name = name;
        this.address = address;
        this.salary = salary;
        this.jobTitle = jobTitle;
    }

    public double calculateBonus() {
        // Bonus calculation logic
        return salary * 0.10; // Example: 10% bonus
    }

    public void generatePerformanceReport() {
        // Performance report generation logic
        System.out.println("Generating performance report for " + name);
    }

    public void manageProject() {
        // Project management logic
        System.out.println(name + " is managing a project.");
    }
}
```

```
java -cp /tmp/xQMDgJ6wgj/Main
Alice is managing a team of employees.
Generating performance report for Bob
Bob is writing code.
Charlie is debugging code.
Manager Bonus: 8000.0
Developer Bonus: 6000.0
Programmer Bonus: 5500.0

=== Code Execution Successful ===
```

4.Write a Java program to create an abstract class Shape with abstract methods calculateArea() and calculatePerimeter(). Create subclasses Circle and Triangle that extend the Shape class and implement the respective methods to calculate the area and perimeter of each shape

// Abstract class Shape

abstract class Shape {

```
    public abstract double calculateArea();
    public abstract double calculatePerimeter();
}

// Subclass Circle
class Circle extends Shape {
    private double radius;

    public Circle(double radius) {
        this.radius = radius;
    }

    @Override
    public double calculateArea() {
        return Math.PI * radius * radius;
    }

    @Override
    public double calculatePerimeter() {
        return 2 * Math.PI * radius;
    }
}

// Subclass Triangle
class Triangle extends Shape {
    private double side1, side2, side3;

    public Triangle(double side1, double side2, double side3) {
        this.side1 = side1;
        this.side2 = side2;
        this.side3 = side3;
```

```
    }

    @Override
    public double calculateArea() {
        double s = (side1 + side2 + side3) / 2;
        return Math.sqrt(s * (s - side1) * (s - side2) * (s - side3));
    }

    @Override
    public double calculatePerimeter() {
        return side1 + side2 + side3;
    }
}
```

OUTPUT:

Main.java

```
// Abstract class Shape
abstract class Shape {
    public abstract double calculateArea();
    public abstract double calculatePerimeter();
}

// Subclass Circle
class Circle extends Shape {
    private double radius;

    public Circle(double radius) {
        this.radius = radius;
    }

    @Override
    public double calculateArea() {
        return Math.PI * radius * radius;
    }

    @Override
    public double calculatePerimeter() {
        return 2 * Math.PI * radius;
    }
}

// Subclass Triangle
class Triangle extends Shape {
    private double side1, side2, side3;
```

Output

```
java -cp /tmp/35t8G3Euwy/Main
Circle Area: 78.53981633974483
Circle Perimeter: 31.41592653589793
Triangle Area: 6.0
Triangle Perimeter: 12.0

=== Code Execution Successful ===
```