**Please make sure to save/push all your code in the branch feature-java created in the previous week assignment as part of your github repo rg-assignments**

**Please share your output screenshots in the assignment document along with the github link for each question. Provide an explanation wherever possible as part of your response :-)**

1. Given:

public class TaxUtil {

double rate = 0.15;

public double calculateTax(double amount) {

return amount \* rate;

}

}

Would you consider the method calculateTax() a 'pure function'? Why or why not?

If you claim the method is NOT a pure function, please suggest a way to make it pure.

**Ans.**

No, calculateTax() is not a pure function because it uses an instance variable rate which can be changed from outside. A pure function's output should only depend on its inputs and not on external or mutable state.

**Making it pure –**

public class TaxUtil {

public double calculateTax(double amount, double rate) {

return amount \* rate;

}

}

Now calculateTax() depends only on its arguments — it's pure.

1. What will be the output for following code?

**Ans.**

class Super {

    static void show() {

        System.out.println("super class show method");

    }

    static class StaticMethods {

        void show() {

            System.out.println("sub class show method");

        }

    }

    public static void main(String[] args) {

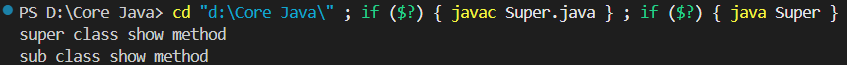
        Super.show();

        new Super.StaticMethods().show();

    }

}

**Output –**

****

1. What will be the output for the following code?

class q3 {

    int num = 20;

    public void display() {

        System.out.println("super class method");

    }

}

public class ThisUse extends q3 {

    int num;

    public ThisUse(int num) {

        this.num = num;

    }

    public void display() {

        System.out.println("display method");

    }

    public void Show() {

        this.display();

        display();

        System.out.println(this.num);

        System.out.println(num);

    }

    public static void main(String[] args) {

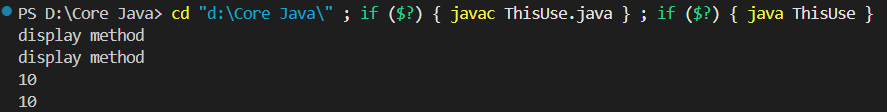
        ThisUse o = new ThisUse(10);

        o.Show();

    }

}

**Output -**



1. What is the singleton design pattern? Explain with a coding example.

**Ans.** A **singleton** ensures that only one object of a class is created during runtime.

Code:

public class Singleton {

private static Singleton instance;

private Singleton() {

// private constructor

}

public static Singleton getInstance() {

if (instance == null) {

instance = new Singleton(); // lazy initialization

}

return instance;

}

}

Use:

public class Main {

public static void main(String[] args) {

Singleton obj1 = Singleton.getInstance();

Singleton obj2 = Singleton.getInstance();

System.out.println(obj1 == obj2); // true

}

}

1. How do we make sure a class is encapsulated? Explain with a coding example.

**Ans. Encapsulation** means hiding internal data and only exposing it via getters and setters.

Code:

public class Student {

private int id;

private String name;

// Getters and Setters

public int getId() {

return id;

}

public void setId(int id) {

if (id > 0) this.id = id;

}

public String getName() {

return name;

}

public void setName(String name) {

if (!name.isEmpty()) this.name = name;

}

}

1. Perform CRUD operation using ArrayList collection in an EmployeeCRUD class for the below Employee

class Employee{

private int id;

private String name;

private String department;

}

**Ans**.

import java.util.\*;

class Employee {

    private int id;

    private String name;

    private String department;

    public Employee(int id, String name, String department) {

        this.id = id;

        this.name = name;

        this.department = department;

    }

    public int getId() { return id; }

    public String getName() { return name; }

    public String getDepartment() { return department; }

    public void setName(String name) { this.name = name; }

    public void setDepartment(String department) { this.department = department; }

    public String toString() {

        return id + " - " + name + " - " + department;

    }

}

public class EmployeeCRUD {

    List<Employee> employees = new ArrayList<>();

    public void create(Employee e) {

        employees.add(e);

    }

    public void read() {

        employees.forEach(System.out::println);

    }

    public void update(int id, String name, String dept) {

        for (Employee e : employees) {

            if (e.getId() == id) {

                e.setName(name);

                e.setDepartment(dept);

            }

        }

    }

    public void delete(int id) {

        employees.removeIf(e -> e.getId() == id);

    }

    public static void main(String[] args) {

        EmployeeCRUD crud = new EmployeeCRUD();

        crud.create(new Employee(1, "Alice", "HR"));

        crud.create(new Employee(2, "Bob", "IT"));

        crud.read();

        crud.update(2, "Bobby", "Engineering");

        crud.read();

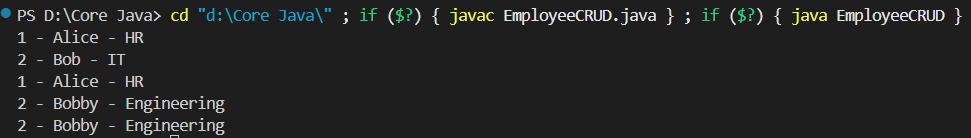
        crud.delete(1);

        crud.read();

    }

}

**Output –**



1. Perform CRUD operation using JDBC in an EmployeeJDBC class for the below Employee

class Employee{

private int id;

private String name;

private String department;

}

**Ans:**

**Code-**  
import java.sql.\*;

public class EmployeeJDBC {

    static final String URL = "jdbc:mysql://localhost:3306/testdb";

    static final String USER = "root";

    static final String PASS = "password";

    public void create(int id, String name, String dept) throws Exception {

        Connection con = DriverManager.getConnection(URL, USER, PASS);

        PreparedStatement ps = con.prepareStatement("INSERT INTO employees VALUES (?, ?, ?)");

        ps.setInt(1, id);

        ps.setString(2, name);

        ps.setString(3, dept);

        ps.executeUpdate();

        con.close();

    }

    public void read() throws Exception {

        Connection con = DriverManager.getConnection(URL, USER, PASS);

        Statement st = con.createStatement();

        ResultSet rs = st.executeQuery("SELECT \* FROM employees");

        while (rs.next()) {

            System.out.println(rs.getInt(1) + " - " + rs.getString(2) + " - " + rs.getString(3));

        }

        con.close();

    }

    public void update(int id, String name) throws Exception {

        Connection con = DriverManager.getConnection(URL, USER, PASS);

        PreparedStatement ps = con.prepareStatement("UPDATE employees SET name=? WHERE id=?");

        ps.setString(1, name);

        ps.setInt(2, id);

        ps.executeUpdate();

        con.close();

    }

    public void delete(int id) throws Exception {

        Connection con = DriverManager.getConnection(URL, USER, PASS);

        PreparedStatement ps = con.prepareStatement("DELETE FROM employees WHERE id=?");

        ps.setInt(1, id);

        ps.executeUpdate();

        con.close();

    }

    public static void main(String[] args) throws Exception {

        EmployeeJDBC db = new EmployeeJDBC();

        db.create(1, "Alice", "HR");

        db.create(2, "Bob", "IT");

        db.read();

        db.update(2, "Bobby");

        db.read();

        db.delete(1);

        db.read();

    }

}