Experiment 5

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Subject Name: PROJECT BASED LEARNING IN JAVA WITH LAB **Subject Code: 22CSH-352**

1. **Aim: Develop Java programs using autoboxing, serialization, file handling, and efficient data processing and management.**

(a) Easy Level: Write a Java program to calculate the sum of a list of integers using autoboxing and unboxing. Include methods to parse strings into their respective wrapper classes (e.g., Integer.parseInt()).

(b) Medium Level: Create a Java program to serialize and deserialize a Student object. The program should: Serialize a Student object (containing id, name, and GP and save it to a file. Deserialize the object from the file and display the student details. Handle FileNotFoundException, IOException, and ClassNotFoundException using exception handling.

(c) Hard Level: Create a menu-based Java application with the following options. 1. Add an Employee 2. Display All 3. Exit If option 1 is selected, the application should gather employee details like employee name, employee id, designation and salary and store it in a file. If option 2 is selected, the application should display all the employee details. If option 3 is selected the application should exit.

2. **Objective:** To design and implement the Sum of integers using autoboxing and unboxing, Serialization and deserialization of a Student object and Employee Management System with file handling and menu options

3. **Implementation/Code:**

```
import java.io.*;
import java.util.*;
class Employee implements Serializable {
   private static final long serialVersionUID = 1L;
```

```
    private int empId;
    private String name;
    private String designation;
    private double salary;
    public Employee(int empId, String name, String designation, double salary) {
        this.empId = empId;
        this.name = name;
        this.designation = designation;
        this.salary = salary;
    }
    public void display() {
        System.out.println("ID: " + empId + ", Name: " + name + ", Designation: " +
designation + ", Salary: " + salary);
    }
}
class EmployeeManager {
    private static final String FILE_NAME = "employees.dat";
    public static void addEmployee() {
        Scanner sc = new Scanner(System.in);
        int id = 0;
        String name, designation;
        double salary = 0.0;
        try {
            System.out.print("Enter Employee ID (Integer): ");
            id = sc.nextInt(); // Fixes the InputMismatchException issue
            sc.nextLine(); // Consume newline
            System.out.print("Enter Employee Name: ");
            name = sc.nextLine();
            System.out.print("Enter Designation: ");
            designation = sc.nextLine();
            System.out.print("Enter Salary: ");
            salary = sc.nextDouble();
            Employee emp = new Employee(id, name, designation, salary);
            // Append new employee data properly
            writeEmployee(emp);
            System.out.println("Employee added successfully!");
        } catch (InputMismatchException e) {
            System.out.println("Invalid input! Please enter the correct data type.");
            sc.nextLine(); // Clear the scanner buffer
        }
    }
    private static void writeEmployee(Employee emp) {
```

```
        List<Employee> employees = readEmployees();
        employees.add(emp);

        try (ObjectOutputStream oos = new ObjectOutputStream(new
FileOutputStream(FILE_NAME))) {
            for (Employee e : employees) {
                oos.writeObject(e);
            }
        } catch (IOException e) {
            System.out.println("Error writing to file: " + e.getMessage());
        }
    }
    private static List<Employee> readEmployees() {
        List<Employee> employees = new ArrayList<>();

        try (ObjectInputStream ois = new ObjectInputStream(new
FileInputStream(FILE_NAME))) {
            while (true) {
                try {
                    employees.add((Employee) ois.readObject());
                } catch (EOFException e) {
                    break;
                }
            }
        } catch (FileNotFoundException e) {
            System.out.println("No existing employee records found.");
        } catch (IOException | ClassNotFoundException e) {
            System.out.println("Error reading file: " + e.getMessage());
        }
        return employees;
    }
    public static void displayEmployees() {
        List<Employee> employees = readEmployees();

        if (employees.isEmpty()) {
            System.out.println("No employees found.");
            return;
        }
        System.out.println("Employee List:");
        for (Employee emp : employees) {
            emp.display();
        }
```

```
    }
    public static void run() {
        Scanner sc = new Scanner(System.in);
        while (true) {
            System.out.println("\nMenu:");
            System.out.println("1. Add Employee");
            System.out.println("2. Display All Employees");
            System.out.println("3. Exit");
            System.out.print("Choose an option: ");
            int choice = sc.nextInt();
            switch (choice) {
                case 1:
                    addEmployee();
                    break;
                case 2:
                    displayEmployees();
                    break;
                case 3:
                    System.out.println("Exiting...");
                    return;
                default:
                    System.out.println("Invalid option. Try again.");
            }
```

4. Output:

```
P:\exp 4 java>cd "p:\exp 4 java\" && javac Main.java && java Main
Picked up JAVA_TOOL_OPTIONS: -Dstdout.encoding=UTF-8 -Dstderr.encoding=UTF-8
Picked up JAVA_TOOL_OPTIONS: -Dstdout.encoding=UTF-8 -Dstderr.encoding=UTF-8

Main Menu:
1. Sum With Autoboxing
2. Student Serialization
3. Employee Manager
4. Exit
Choose an option: 1
Sum of numbers: 60

Main Menu:
1. Sum With Autoboxing
2. Student Serialization
3. Employee Manager
4. Exit
Choose an option: 2
Student data saved.
Deserialized Student:
ID: 101, Name: Alice, GPA: 3.9

Main Menu:
1. Sum With Autoboxing
2. Student Serialization
3. Employee Manager
4. Exit
Choose an option: 3

Menu:
1. Add Employee
2. Display All Employees
3. Exit
Choose an option: 1
Enter Employee ID (Integer): 111
Enter Employee Name: amit
Enter Designation: software enginner
Enter Salary: 5000
Employee added successfully!

Menu:
1. Add Employee
2. Display All Employees
3. Exit
Choose an option: 1
Enter Employee ID (Integer): 112
Enter Employee Name: shivam
Enter Designation: software engineer
Enter Salary: 4000
Employee added successfully!

Menu:
1. Add Employee
2. Display All Employees
3. Exit
Choose an option: 2
Employee List:
ID: 111, Name: shivam, Designation: sd, Salary: 50000.0
ID: 111, Name: amit, Designation: software enginner, Salary: 5000.0
ID: 112, Name: shivam, Designation: software engineer, Salary: 4000.0
```

5. **Learning Outcome:**

- Learn how to use the graphics.h library for drawing basic shapes and setting up a graphical environment in Dev-C++.
- Gain hands-on experience with two different methods: the Circle Generator Algorithm (direct computation) and the Midpoint Circle Algorithm.
- Understood the concept of coordinating system.
- Learn about various command that is used in drawing a circle.