Experiment 5

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Branch: CSE **Section/Group:640-B**
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Subject Name: Java with Lab **Subject Code: 22CSH-359**

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

2. **Objective:** To implement and analyze wrapper classes in Java- Integer, Character, Long, Boolean. Autoboxing and Unboxing. Byte stream, Character stream, Object serialization, cloning. Introduce lambda syntax, functional interfaces, method references, stream operations, sorting, filtering, mapping, reducing.

3. **Implementation/Code:**

a.
```
import java.util.ArrayList;
import java.util.List;
public class SumCalculator{
   public static Integer parseStringToInteger(String str) {
      return Integer.parseInt(str);
   }
   public static int calculateSum(List<Integer> numbers) {
      int sum = 0;
      for (Integer num : numbers) {
         sum += num;
      }
      return sum;
   }
   public static void main(String[] args) {
      String[] numberStrings = { "10", "20", "30", "40", "50" };
      List<Integer> numbers = new ArrayList<>();
      for (String numStr : numberStrings) {
         numbers.add(parseStringToInteger(numStr));
      }
      int sum = calculateSum(numbers);
      System.out.println("Sum of numbers: " + sum);
   }
}
```

b.
```
import java.io.*;
class Student implements Serializable {
    private static final long serialVersionUID = 1L;
    private int id;
    private String name;
    private double gpa;
    public Student(int id, String name, double gpa) {
        this.id = id;
        this.name = name;
        this.gpa = gpa;
    }
    public void display() {
        System.out.println("Student ID: " + id);
        System.out.println("Name: " + name);
        System.out.println("GPA: " + gpa);
    }
}
public class StudentSerialization {
    private static final String FILE_NAME = "student.ser";
    public static void main(String[] args) {
        Student student = new Student(3111, "Vinay Dhankar", 8.2);
        serializeStudent(student);
        deserializeStudent();
    }
    private static void serializeStudent(Student student) {
        try (ObjectOutputStream oos = new ObjectOutputStream(new FileOutputStream(FILE_NAME))) {
            oos.writeObject(student);
            System.out.println("Student object serialized successfully.");
        } catch (IOException e) {
            System.out.println("Error during serialization: " + e.getMessage());
        }
    }
    private static void deserializeStudent() {
        try (ObjectInputStream ois = new ObjectInputStream(new FileInputStream(FILE_NAME))) {
            Student student = (Student) ois.readObject();
            System.out.println("Student object deserialized successfully.");
            student.display();
```

```
        } catch (FileNotFoundException e) {
            System.out.println("File not found: " + e.getMessage());
        } catch (IOException e) {
            System.out.println("Error during deserialization: " + e.getMessage());
        } catch (ClassNotFoundException e) {
            System.out.println("Class not found: " + e.getMessage());
        }
    }
}       string combined = s + s;
        return combined.find(goal) != string::npos;
    }
    int missingNumber(vector<int>& nums) {
        int n = nums.size();
        int expected_sum = n * (n + 1) / 2;
        int actual_sum = accumulate(nums.begin(), nums.end(), 0);
        return expected_sum - actual_sum;

}
```

c.

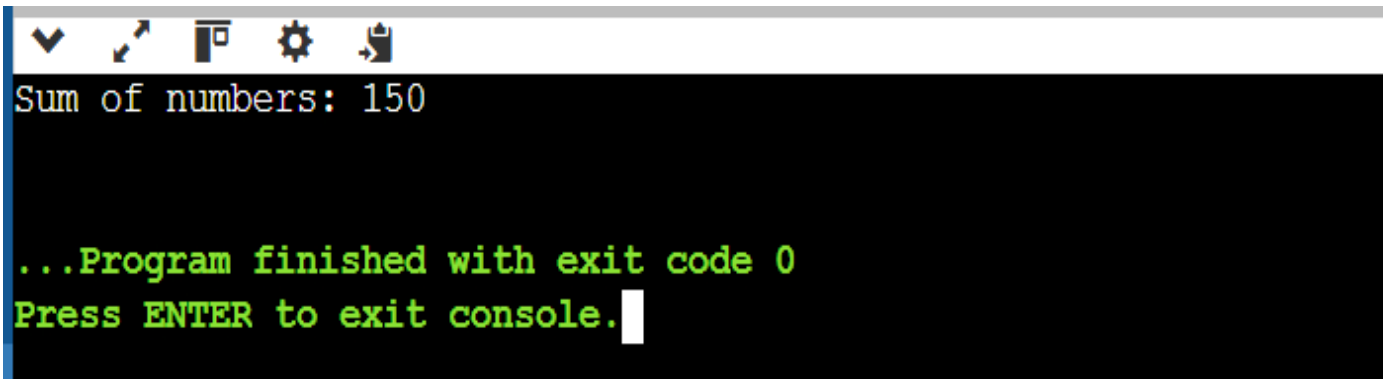
```
import java.io.*;
import java.util.ArrayList;
import java.util.List;
import java.util.Scanner;
class Employee implements Serializable {
    private static final long serialVersionUID = 1L;
    private int id;
    private String name;
    private String designation;
    private double salary;
    public Employee(int id, String name, String designation, double salary) {
        this.id = id;
        this.name = name;
        this.designation = designation;
        this.salary = salary;
    }
    public void display() {
```

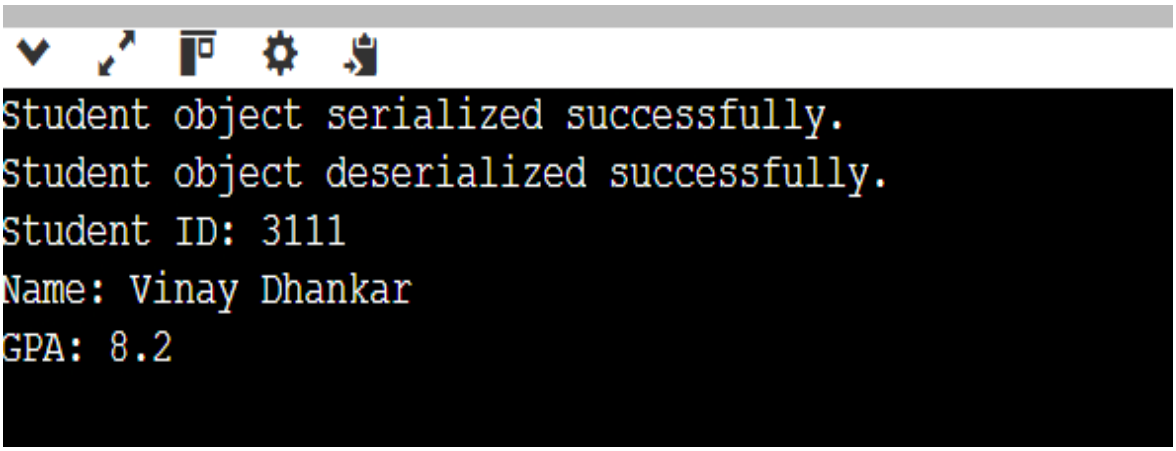
```
        System.out.println("ID: " + id + ", Name: " + name + ", Designation: " + designation + ", Salary: " +
salary);
    }
}
public class EmployeeManagement {
    private static final String FILE_NAME = "employees.ser";
    private static Scanner scanner = new Scanner(System.in);
    public static void main(String[] args) {
        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("Enter your choice: ");
            int choice = scanner.nextInt();
            scanner.nextLine();
            switch (choice) {
                case 1:
                    addEmployee();
                    break;
                case 2:
                    displayEmployees();
                    break;
                case 3:
                    System.out.println("Exiting program.");
                    return;
                default:
                    System.out.println("Invalid choice! Please try again.");
            }
        }
    }
    private static void addEmployee() {
        System.out.print("Enter Employee ID: ");
        int id = scanner.nextInt();
        scanner.nextLine();
        System.out.print("Enter Employee Name: ");
        String name = scanner.nextLine();
```

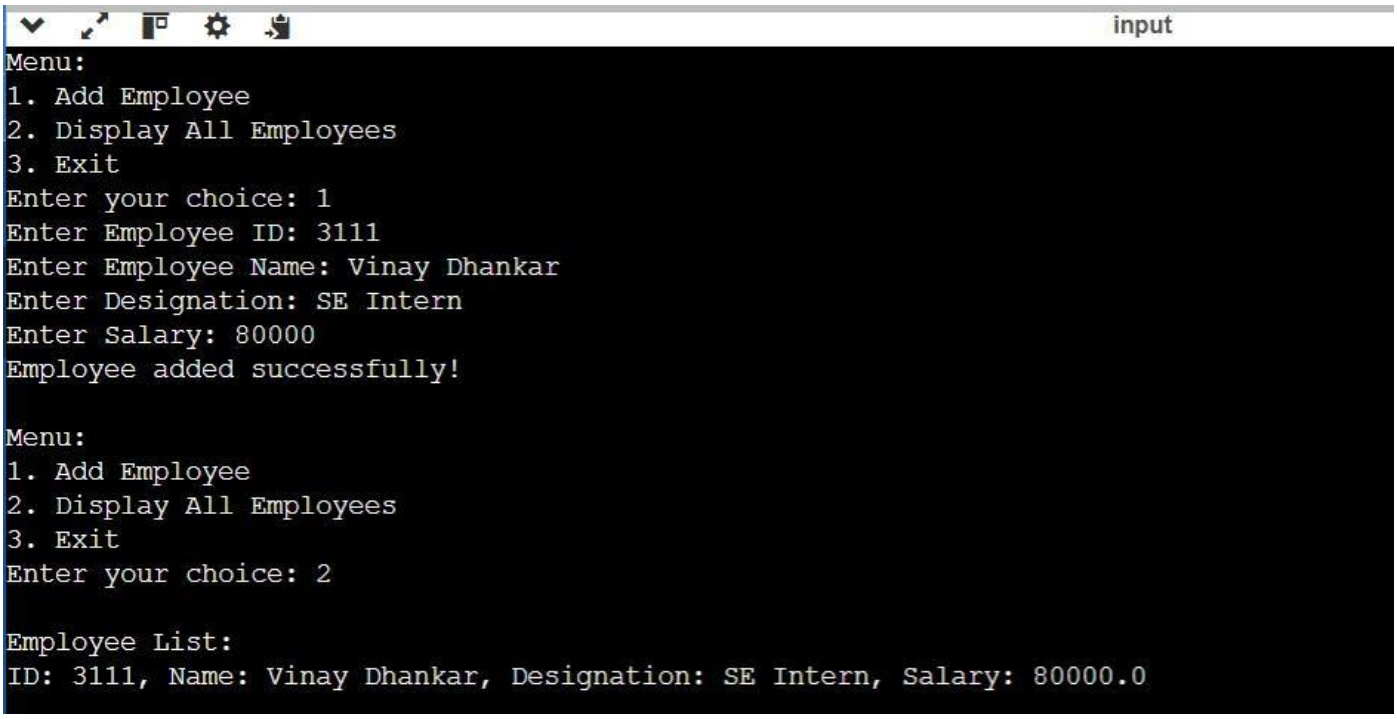
```
        System.out.print("Enter Designation: ");
        String designation = scanner.nextLine();
        System.out.print("Enter Salary: ");
        double salary = scanner.nextDouble();
        Employee employee = new Employee(id, name, designation, salary);
        List<Employee> employees = loadEmployees();
        employees.add(employee);
        saveEmployees(employees);
        System.out.println("Employee added successfully!");
    }
    private static void displayEmployees() {
        List<Employee> employees = loadEmployees();
        if (employees.isEmpty()) {
            System.out.println("No employees found.");
        } else {
            System.out.println("\nEmployee List:");
            for (Employee emp : employees) {
                emp.display();
            }
        }
    }
    @SuppressWarnings("unchecked")
    private static List<Employee> loadEmployees() {
        File file = new File(FILE_NAME);
        if (!file.exists()) {
            return new ArrayList<>();
        }
        try (ObjectInputStream ois = new ObjectInputStream(new FileInputStream(file))) {
            return (List<Employee>) ois.readObject();
        } catch (IOException | ClassNotFoundException e) {
            System.out.println("Error reading file: " + e.getMessage());
            return new ArrayList<>();
        }
    }
    private static void saveEmployees(List<Employee> employees) {
        try (ObjectOutputStream oos = new ObjectOutputStream(new FileOutputStream(FILE_NAME))) {
            oos.writeObject(employees);
```

```
        } catch (IOException e) {
            System.out.println("Error saving file: " + e.getMessage());
        }
    }
}
```

4. Output:







5. Learning Outcome:

- Learn file handling through object serialization and deserialization with exception handling.
- Develop skills in Java I/O streams for reading and writing data to files.
- Gain hands-on experience in managing structured data using serialization and deserialization.
- Explore functional programming concepts like lambda expressions, method references, and stream operations for efficient data processing.
- Build a menu-driven application for employee management using file handling and serialization.