EXPERIMENT-5.1

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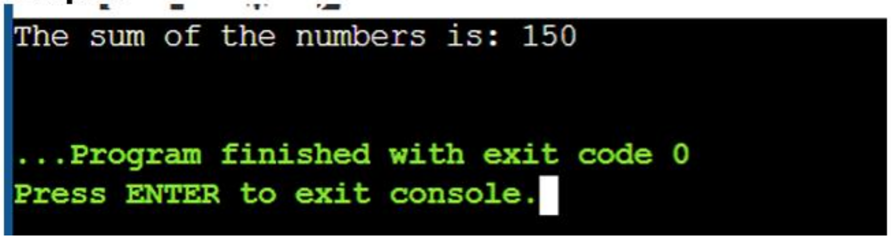
Subject Name: Project Based Learning inJavawithLab **Subject Code: 22CSH-359**

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

Code:

```
import java.util.ArrayList;
import java.util.List;

public class AutoboxingExample {
    public static void main(String[] args) {
        String[] numberStrings = {"10", "20", "30", "40", "50"};

        List<Integer> numbers = parseStringArrayToIntegers(numberStrings);

        int sum = calculateSum(numbers);

        System.out.println("The sum of the numbers is: " + sum);
    }

    public static List<Integer> parseStringArrayToIntegers(String[] strings) {
        List<Integer> integerList = new ArrayList<>();
        for (String str : strings) {
            integerList.add(Integer.parseInt(str));
        }
        return integerList;
    }

    public static int calculateSum(List<Integer> numbers) {
        int sum = 0;
        for (Integer num : numbers) {
            sum += num;
        }
        return sum;
    }
}
```

Output:


```
The sum of the numbers is: 150


...Program finished with exit code 0
Press ENTER to exit console.
```

Experiment 5.2

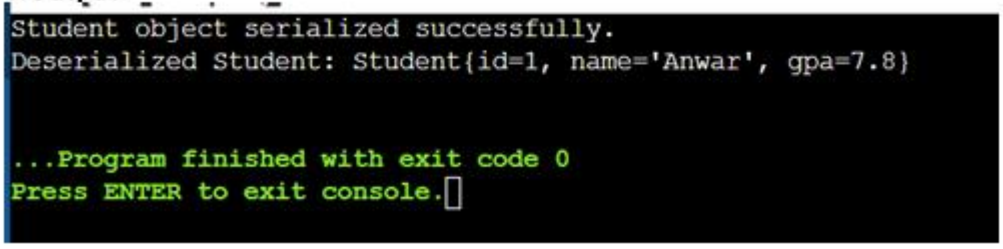
1.Aim: Create a Java program to serialize and deserialize a Student object.
The program should:

- Serialize a Student object (containing id, name, and GPA) 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.

4. Implementation Code:

```
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;
    }

    @Override
    public String toString() {
        return "Student{id=" + id + ", name='" + name + "', gpa=" + gpa + "}";
    }
}

public class StudentSerialization {
    private static final String FILE_NAME = "student.ser";

    public static void main(String[] args) {
        Student student = new Student(1, "Anwar", 7.8);
        serializeStudent(student);
        deserializeStudent();
    }

    public 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 (FileNotFoundException e) {
            System.err.println("File not found: " + e.getMessage());
        } catch (IOException e) {
            System.err.println("IOException occurred: " + e.getMessage());
        }
    }

    public static void deserializeStudent() {
        try (ObjectInputStream ois = new ObjectInputStream(new FileInputStream(FILE_NAME)))
{
            Student student = (Student) ois.readObject();
            System.out.println("Deserialized Student: " + student);
        } catch (FileNotFoundException e) {
            System.err.println("File not found: " + e.getMessage());
        } catch (IOException e) {
            System.err.println("IOException occurred: " + e.getMessage());
        } catch (ClassNotFoundException e) {
            System.err.println("Class not found: " + e.getMessage());
        }
    }
}
```

5.Output



```
Student object serialized successfully.
Deserialized Student: Student{id=1, name='Anwar', gpa=7.8}


...Program finished with exit code 0
Press ENTER to exit console.
```

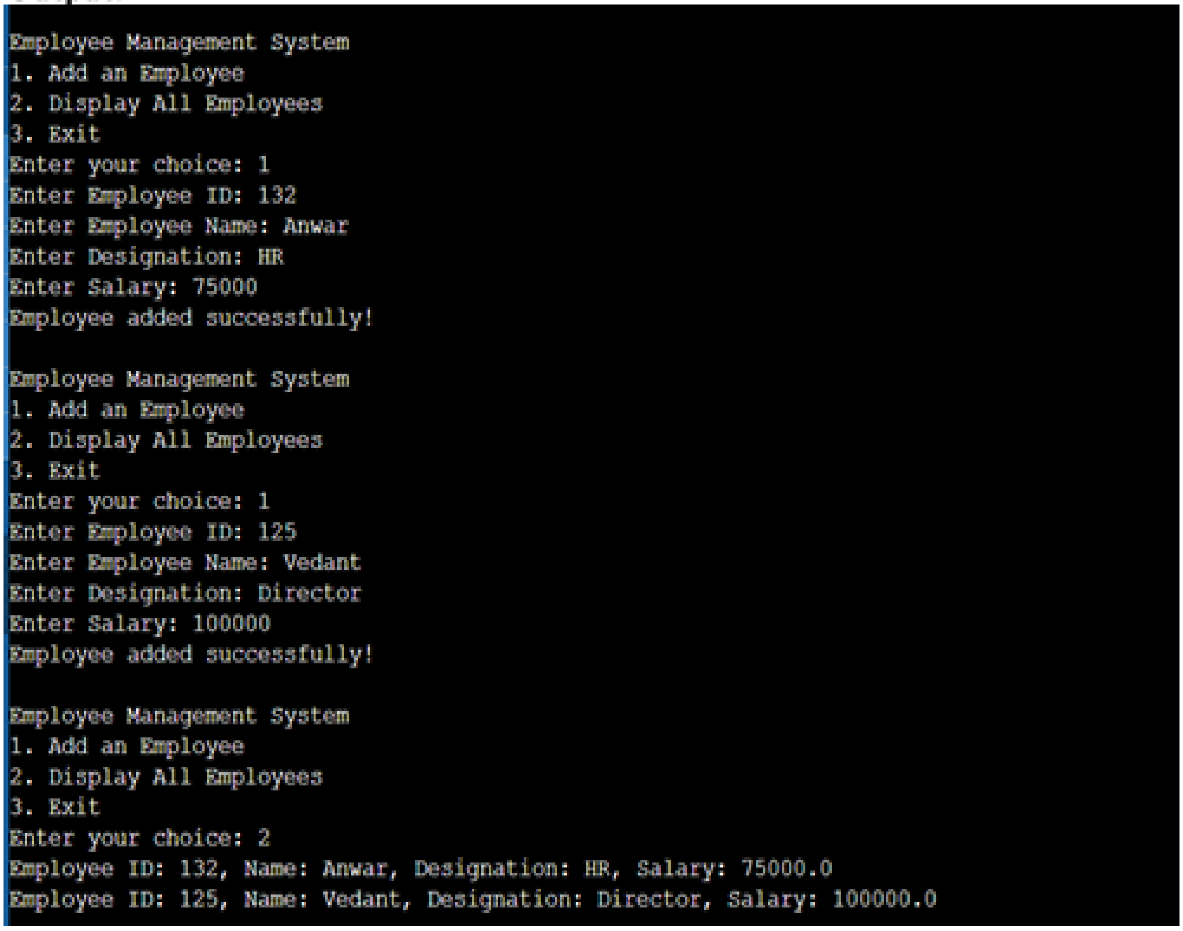
Experiment 5.3

1. **Aim:** 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 details of the employee 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.

4.Implementation Code:

```
i import java.io.*;
import java.util.*;

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;
        }

        @Override
        public String toString() {
                return "Employee ID: " + id + ", Name: " + name + ", Designation: " + designation
    + ", Salary: " + salary;
        }
    }

    public class EmployeeManagementSystem {
        private static final String FILE_NAME = "employees.ser";
        private static List<Employee> employees = new ArrayList<>();

        public static void addEmployee() {
                Scanner scanner = new Scanner(System.in);
                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);
                employees.add(employee);
                saveEmployees();
                System.out.println("Employee added successfully!");
        }

        public static void displayAllEmployees() {
                loadEmployees();
                if (employees.isEmpty()) {
                        System.out.println("No employees found.");
                } else {
                        for (Employee employee : employees) {
                                System.out.println(employee);
                        }
                }
        }
    private static void saveEmployees() {
        try (ObjectOutputStream oos = new ObjectOutputStream(new
FileOutputStream(FILE_NAME))) {
            oos.writeObject(employees);
        } catch (IOException e) {
            System.err.println("Error saving employees: " + e.getMessage());
        }
    }

    @SuppressWarnings("unchecked")
    private static void loadEmployees() {
        try (ObjectInputStream ois = new ObjectInputStream(new
FileInputStream(FILE_NAME))) {
            employees = (List<Employee>) ois.readObject();
        } catch (FileNotFoundException e) {
            employees = new ArrayList<>();
        } catch (IOException | ClassNotFoundException e) {
            System.err.println("Error loading employees: " + e.getMessage());
        }
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        while (true) {
            System.out.println("\nEmployee Management System");
            System.out.println("1. Add an 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:
                displayAllEmployees();
                break;
            case 3:
                System.out.println("Exiting...");
                return;
            default:
                System.out.println("Invalid choice! Please try again.");
            }
        }
    }
}
```

5. Output:



```
Employee Management System
1. Add an Employee
2. Display All Employees
3. Exit
Enter your choice: 1
Enter Employee ID: 132
Enter Employee Name: Anwar
Enter Designation: HR
Enter Salary: 75000
Employee added successfully!

Employee Management System
1. Add an Employee
2. Display All Employees
3. Exit
Enter your choice: 1
Enter Employee ID: 125
Enter Employee Name: Vedant
Enter Designation: Director
Enter Salary: 100000
Employee added successfully!

Employee Management System
1. Add an Employee
2. Display All Employees
3. Exit
Enter your choice: 2
Employee ID: 132, Name: Anwar, Designation: HR, Salary: 75000.0
Employee ID: 125, Name: Vedant, Designation: Director, Salary: 100000.0
```