Experiment 5

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Semester: **DOP:25/01/25**
Subject: PBLJ **Subject Code:22CSH-359**

Code 1:

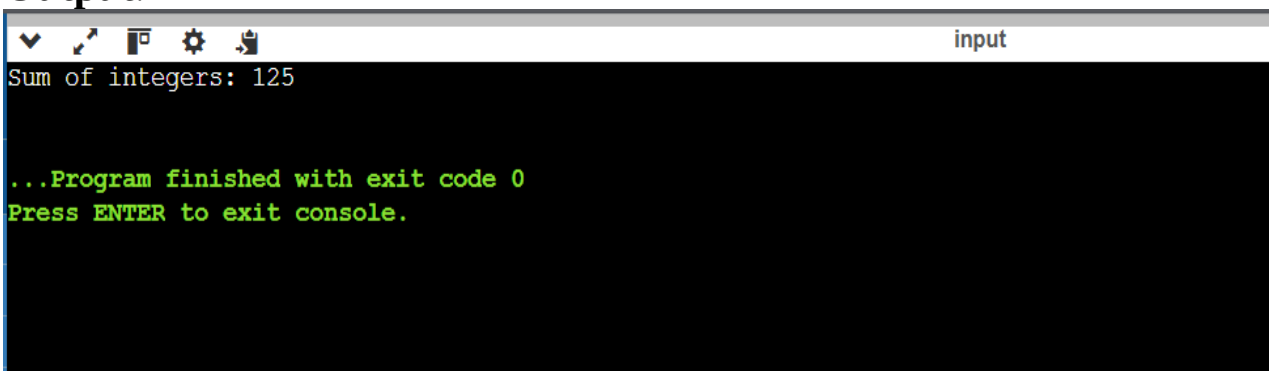
1. **Aim:** Write a Java program to calculate the sum of a list of integers using autoboxing and unboxing. Include methods to parse strings into their respective wrapper classes (e.g., Integer.parseInt()).

2. **Objective:** Demonstrate **autoboxing** and **unboxing** in Java by converting string numbers into Integer objects, storing them in a list, and computing their sum.

3. **Code:**

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

public class SumOfIntegersDifferent {

public static void main(String[] args) {
List<String> stringNumbers = new ArrayList<>();
stringNumbers.add("5");
stringNumbers.add("15");
stringNumbers.add("25");
stringNumbers.add("35");
stringNumbers.add("45");

int sum = calculateSum(stringNumbers);

System.out.println("Sum of integers: " + sum);
}
private static int calculateSum(List<String> stringNumbers) {
int sum = 0;
for (String number : stringNumbers) {
sum += Integer.parseInt(number);
    }
return sum;
}
}
```

4. **Output**:



5. **Learning Outcomes:**

- Understand the concept of **autoboxing and unboxing** in Java and how primitive types are automatically converted to their wrapper classes and vice versa.
- Learn how to **convert string values into Integer objects** using Integer.parseInt() and store them in a list.
- Gain experience in **working with ArrayLists** to store and manipulate a collection of numbers dynamically.
- Develop proficiency in **iterating through collections** and performing arithmetic operations like summation.

Code 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.

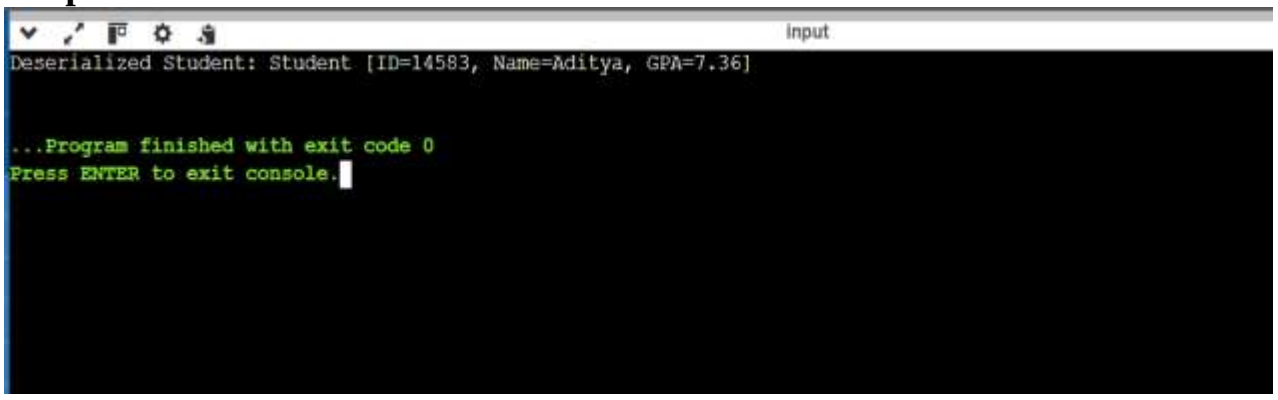
2. **Objective:** The objective is to serialize and deserialize a Student object, store and retrieve its id, name, and GPA from a file, and handle exceptions like FileNotFoundException, IOException, and ClassNotFoundException.

3. **Code:**

```
import java.io.*;

class Student implements Serializable {
    int id;
    String name;
    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 SerializeDeserializeExample {

    public static void main(String[] args) {
        Student student = new Student(14583, "Aditya", 7.36);
        String filename = "student.ser";

        serializeStudent(student, filename);
        Student deserializedStudent = deserializeStudent(filename);
```

```
        if (deserializedStudent != null) {
            System.out.println("Deserialized Student: " + deserializedStudent);
        }
    }

    private static void serializeStudent(Student student, String filename) {
        try (ObjectOutputStream oos = new ObjectOutputStream(new
FileOutputStream(filename))) {
            oos.writeObject(student);
        } catch (IOException e) {
            e.printStackTrace();
        }
    }

    private static Student deserializeStudent(String filename) {
        try (ObjectInputStream ois = new ObjectInputStream(new FileInputStream(filename))) {
            return (Student) ois.readObject();
        } catch (IOException | ClassNotFoundException e) {
            e.printStackTrace();
        }
        return null;
    }
}
```

4. **Output:**



5. **Learning Outcomes:**

- Understand object serialization and deserialization in Java.
- Learn how to use ObjectOutputStream and ObjectInputStream for file operations.
- Implement exception handling for FileNotFoundException, IOException, and ClassNotFoundException.
- Gain hands-on experience in storing and retrieving objects from a file.
- Develop skills in data persistence and file management using Java.

Code 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.

2. **Objective:** The objective is to develop a menu-based Java application that allows users to **add employee details**, **store them in a file**, and **display all stored employee records**, with an option to exit the program.

3. **Code:**

```
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.");
                }
        }
    }
}
```

4. 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
```

5. Learning Outcomes:

- Understand file handling and serialization in Java to store and retrieve objects persistently.
- Learn how to implement a menu-driven console application using loops and conditional statements.
- Gain experience in object-oriented programming (OOP) by defining and managing Employee objects.
- Practice exception handling to manage file-related errors like FileNotFoundException and IOException.
- Develop skills in list manipulation and user input handling using ArrayList and Scanner.