Experiment 5

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Semester: 6th **DOP:25/02/25**
Subject: PBLJ **Subject Code:22CSH-359**

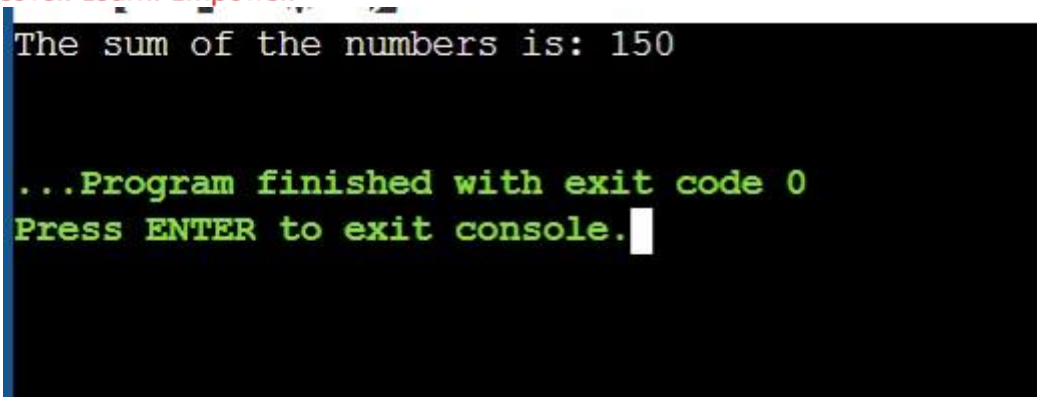
1.Aim: Write a Java program to calculate the sum of a list of integers using autoboxing and unboxing. Include methods to parse strings into their respective wrapper classes (e.g., Integer.parseInt()).

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 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;
  }
 }
```

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.

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.

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 {
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());
   }
   }
   }
```

4.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.

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.