Experiment 1.5

Student Name: Anamika Kumari **UID: 22BCS12113**
Branch: BE-CSE **Section/Group: 639(B)**
Semester: 6th **Date of Performance:21/02/2025**
Subject Name: Project Based Learning in 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 demonstrate autoboxing, unboxing, and collection handling in Java, along with object serialization and deserialization while implementing proper exception handling. Additionally, to implement a menu-based employee management system using collections.

3. **Implementation/Code:**

3.1. 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()). import java.util.ArrayList;
import java.util.List;

```
public class SumUsingAutoboxing { public static void main(String[] args) {
    List<Integer> numbers = new ArrayList<>(); numbers.add(parseInteger("10"));
    numbers.add(parseInteger("20")); numbers.add(parseInteger("30"));
    numbers.add(parseInteger("40")); numbers.add(parseInteger("50"));
     int sum = calculateSum(numbers); System.out.println("Sum of numbers: " + sum);
                }
                private static Integer parseInteger(String str) { return Integer.parseInt(str);
             }
             private static int calculateSum(List<Integer> numbers) { int sum = 0;
               for (Integer num : numbers) { sum += num;
                }
               return sum;
             }
          }
```

3.2. 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.

```
    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(101, "ABCD", 8.3); serializeStudent(student);
    deserializeStudent();
} private static void serializeStudent(Student student) {
try (ObjectOutputStream oos = new
    ObjectOutputStream(newFileOutputStream(FILE_NAME))) { oos.writeObject(student);
    System.out.println("Student object serialized successfully.");
          }
    catch(IOException e)
    {
    System.err.println("Error during serialization: " + e.getMessage());
    }
} private static void deserializeStudent() {
try (ObjectInputStream ois = new ObjectInputStream(newFileInputStream(FILE_NAME))) {
    Student student = (Student) ois.readObject();
    System.out.println("Deserialized Student Object:"); student.display();
          }
    catch(FileNotFoundException e)
    {
    System.err.println("File not found: " + e.getMessage());
          }
    catch(IOException e)
    {
```

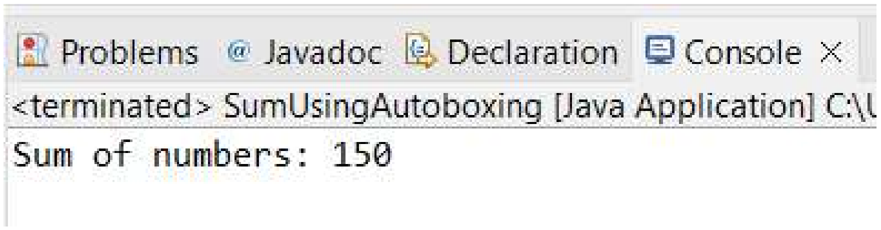
```
System.err.println("Error during deserialization: " + e.getMessage());
} catch (ClassNotFoundException e) {
System.err.println("Class not found: " + e.getMessage()); }
}
}
```

3.3 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.

```
import java.util.ArrayList; import java.util.Scanner; class Employee { int
id;
String name; String designation; 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 "ID: " + id + ", Name: " + name + ", Designation: " + designation + ", Salary: " + salary;
}
}
public class EmployeeManagement { public static void main(String[] args) {
Scanner scanner = new Scanner(System.in); ArrayList<Employee> employees = new
  ArrayList<>(); while (true) {
System.out.println("\n1. 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:
System.out.print("Enter Employee ID: "); int id = scanner.nextInt();
scanner.nextLine(); // Consume newline System.out.print("Enter Name: ");
String name = scanner.nextLine();
System.out.print("Enter Designation: ");
String designation = scanner.nextLine(); System.out.print("Enter Salary: "); double salary =
  scanner.nextDouble(); employees.add(new Employee(id, name, designation, salary));
  System.out.println("Employee added successfully."); break;

case 2: if (employees.isEmpty())
{
System.out.println("No employees found.");
} else {
System.out.println("\nEmployee List:");
for (Employee emp : employees) { System.out.println(emp);
}
} break; case 3:
System.out.println("Exiting application."); scanner.close(); System.exit(0); break;
default:
System.out.println("Invalid choice. Please try again."); }
}
}
}
```

4. Output:

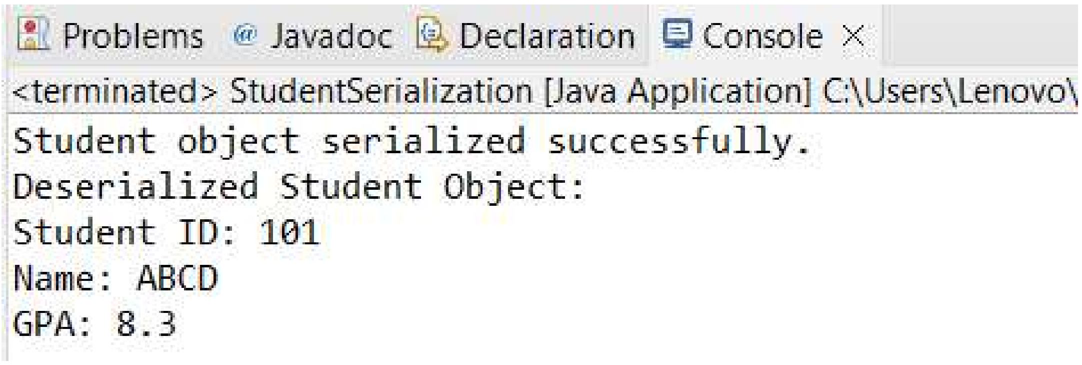
4.1.



Problems @ Javadoc Declaration Console

```
<terminated> SumUsingAutoboxing [Java Application] C:\
Sum of numbers: 150
```

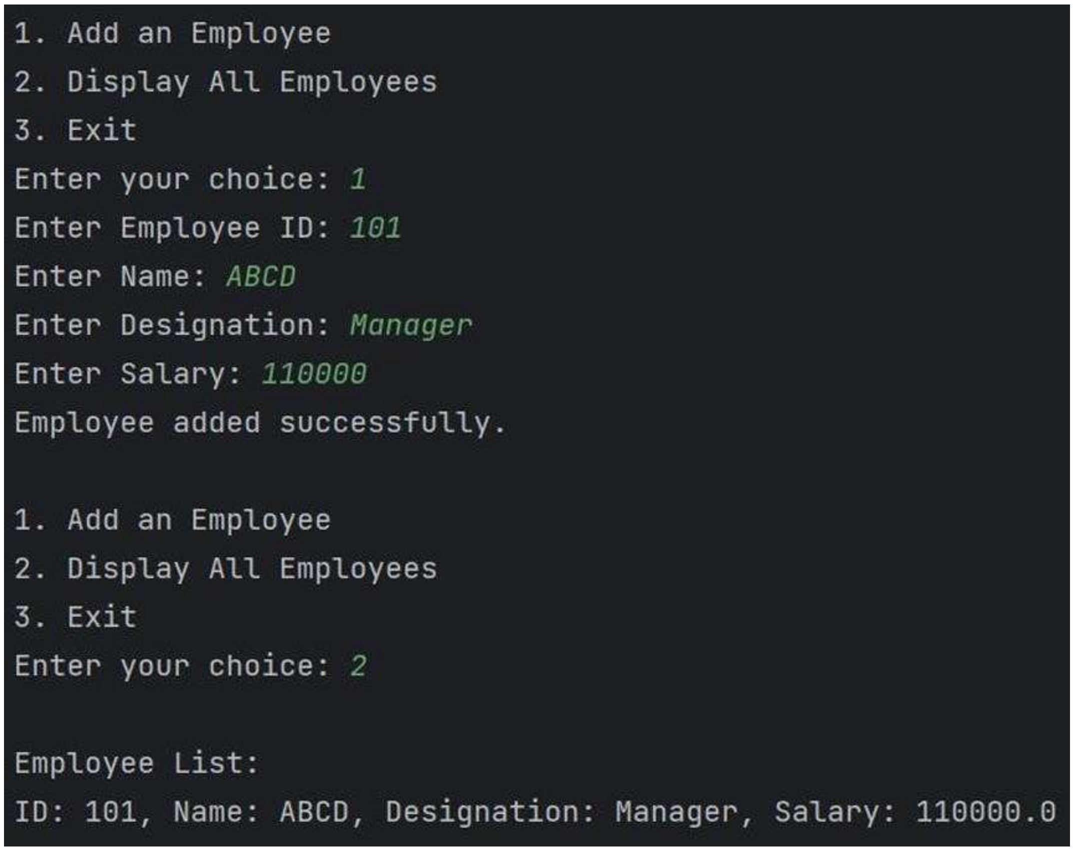
4.2.



Problems @ Javadoc Declaration Console

```
<terminated> StudentSerialization [Java Application] C:\Users\Lenovo\
Student object serialized successfully.
Deserialized Student Object:
Student ID: 101
Name: ABCD
GPA: 8.3
```

4.3.



```
1. Add an Employee
2. Display All Employees
3. Exit
Enter your choice: 1
Enter Employee ID: 101
Enter Name: ABCD
Enter Designation: Manager
Enter Salary: 110000
Employee added successfully.

1. Add an Employee
2. Display All Employees
3. Exit
Enter your choice: 2

Employee List:
ID: 101, Name: ABCD, Designation: Manager, Salary: 110000.0
```

5. Learning Outcomes:

- Understand autoboxing and unboxing in Java.
- Learn object serialization and deserialization using streams.
- Handle exceptions like IOException and ClassNotFoundException.
- Work with collections and perform arithmetic operations.
- Use try-with-resources for efficient file handling.
- Implement a menu-driven employee management system using collections.