



## Experiment 5

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**Subject Name:** Project Based Learning  
in Java with Lab

**Subject Code:** 22CSH-359

### **Problem-1**

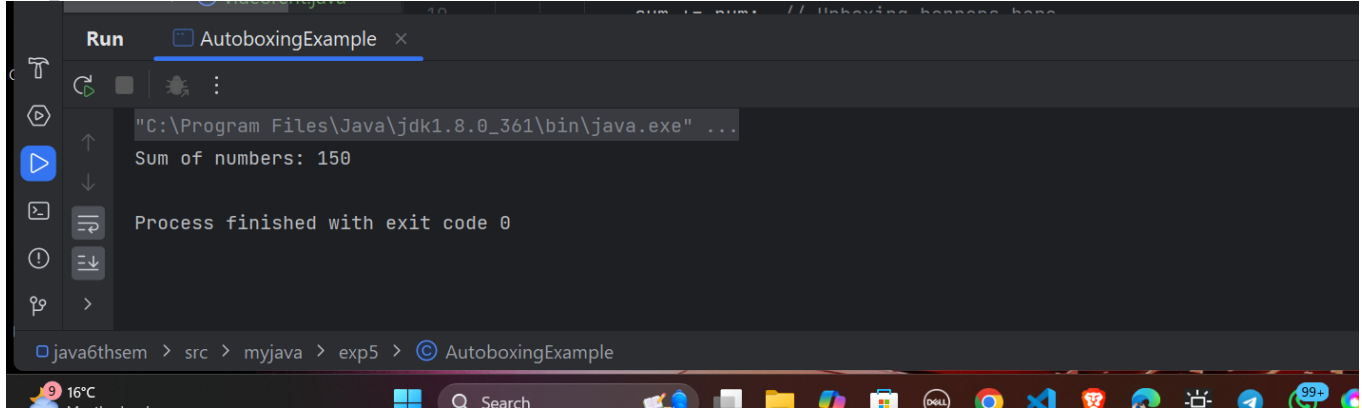
1. **Aim** Develop a Java program to calculate the sum of a list of integers using autoboxing and unboxing. The program should also include methods to parse strings into their respective wrapper classes.
2. **Objective:**  
This program demonstrates autoboxing and unboxing in Java by automatically converting primitive types into wrapper objects and vice versa. It also showcases the usage of wrapper class methods such as Integer.parseInt().

3. **Implementation/Code:**

```
package myjava.exp5;
import java.util.ArrayList;
import java.util.List;
public class AutoboxingExample {
    public static void main(String[] args) {
        List<Integer> numbers = new ArrayList<>();
        String[] strNumbers = {"10", "20", "30", "40", "50"};

        for (String str : strNumbers) {
            numbers.add(Integer.parseInt(str));
        }
        int sum = 0;
        for (Integer num : numbers) {
            sum += num;
        }
        System.out.println("Sum of numbers: " + sum);
    }
}
```

## 4. Output:



```
Run AutoboxingExample x
"C:\Program Files\Java\jdk1.8.0_361\bin\java.exe" ...
Sum of numbers: 150
Process finished with exit code 0
java6thsem > src > myjava > exp5 > AutoboxingExample
```

## 5. Learning Outcomes:

- Understanding autoboxing and unboxing in Java.
- Converting strings to wrapper class objects using Integer.parseInt().
- Performing arithmetic operations on wrapper objects.

## Problem-2

1. **Aim** Develop a Java program to serialize a Student object (containing ID, name, and GPA) and save it to a file. Deserialize the object and display student details while handling exceptions.
2. **Objective:**  
This program demonstrates object serialization and deserialization in Java. It highlights handling file operations using `ObjectOutputStream` and `ObjectInputStream` while managing exceptions like `FileNotFoundException`, `IOException`, and `ClassNotFoundException`.

3. **Implementation/Code:**

```
package myjava.exp5;
import java.io.*;
import java.nio.file.Files;
import java.nio.file.Paths;

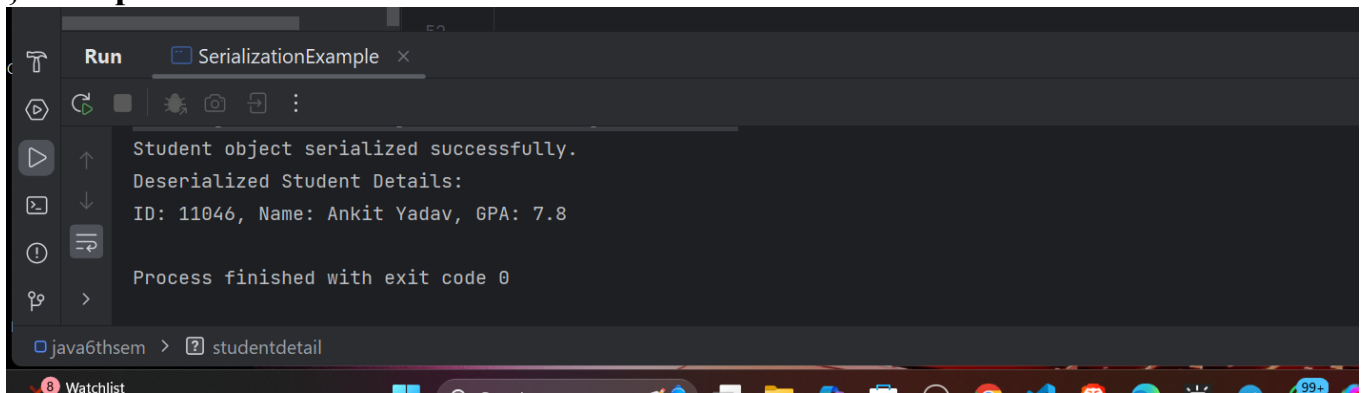
class Student implements Serializable {
    private static final long serialVersionUID = 1L;
    int id;
    String name;
    double gpa;
    public Student(int id, String name, double gpa) {
        this.id = id;
        this.name = name;
        this.gpa = gpa;
    }
    public void display() {
        System.out.println("ID: " + id + ", Name: " + name + ", GPA: " + gpa);
    }
}

public class SerializationExample {
    public static void main(String[] args) {
        Student student = new Student(11046, "Ankit Yadav", 7.8);
        String filename = "studentdetail";

        // Serialization
        try (ObjectOutputStream out = new
```

```
ObjectOutputStream(Files.newOutputStream(Paths.get(filename)))) {  
    out.writeObject(student);  
    System.out.println("Student object serialized successfully.");  
} catch (IOException e) {  
    System.out.println("IOException occurred: " + e.getMessage());  
}  
  
// Deserialization  
try (ObjectInputStream in = new ObjectInputStream(new  
FileInputStream(filename))) {  
    Student deserializedStudent = (Student) in.readObject();  
    System.out.println("Deserialized Student Details:");  
    deserializedStudent.display();  
} catch (FileNotFoundException e) {  
    System.out.println("File not found: " + e.getMessage());  
} catch (IOException e) {  
    System.out.println("IOException occurred: " + e.getMessage());  
} catch (ClassNotFoundException e) {  
    System.out.println("Class not found: " + e.getMessage());  
}  
}
```

#### 4. Output:



```
Run  SerializationExample x  
Student object serialized successfully.  
Deserialized Student Details:  
ID: 11046, Name: Ankit Yadav, GPA: 7.8  
Process finished with exit code 0  
java6thsem > studentdetail
```

#### 5. Learning Outcomes:

- Understanding Java object serialization and deserialization.
- Using ObjectOutputStream and ObjectInputStream for file handling.
- Handling exceptions in file operations.

## Problem-3

1. **Aim** Develop a menu-based Java application to manage employee records. Users can add employee details, display stored records, and exit the application.

2. **Objective:**

This program demonstrates file handling in Java by storing and retrieving employee records in a text file. It uses exception handling for robust error management and follows an interactive menu-driven approach.

3. **Implementation/Code:**

```
package myjava.exp5;
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;
    int id;
    String name, 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;
    }
```

```
    public void display() {
        System.out.println("ID: " + id + ", Name: " + name + ", Designation: "
+ designation + ", Salary: " + salary);
    }
}
```

```
public class EmployeeManagement {
    private static final String FILENAME = "employees";
```

```
private static Scanner scanner = new Scanner(System.in);

public static void addEmployee() {
    System.out.print("Enter Employee ID: ");
    while (!scanner.hasNextInt()) {
        System.out.println("Invalid input. Please enter an integer.");
        scanner.next();
    }
    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: ");
    while (!scanner.hasNextDouble()) {
        System.out.println("Invalid salary. Please enter a valid number.");
        scanner.next();
    }
    double salary = scanner.nextDouble();
    scanner.nextLine();

    Employee emp = new Employee(id, name, designation, salary);
    List<Employee> employees = loadEmployees();
    employees.add(emp);

    saveEmployees(employees);
    System.out.println("Employee added successfully.");
}

public static void displayEmployees() {
    List<Employee> employees = loadEmployees();
    if (employees.isEmpty()) {
```

```
        System.out.println("No employees found.");
        return;
    }

    System.out.println("\nEmployee Records:");
    for (Employee emp : employees) {
        emp.display();
    }
}

private static List<Employee> loadEmployees() {
    List<Employee> employees = new ArrayList<>();
    try (ObjectInputStream in = new ObjectInputStream(new
FileInputStream(FILENAME))) {
        employees = (List<Employee>) in.readObject();
    } catch (EOFException e) {
        // No employees stored yet
    } catch (IOException | ClassNotFoundException e) {
        System.out.println("Error reading employees: " + e.getMessage());
    }
    return employees;
}

private static void saveEmployees(List<Employee> employees) {
    try (ObjectOutputStream out = new ObjectOutputStream(new
FileOutputStream(FILENAME))) {
        out.writeObject(employees);
    } catch (IOException e) {
        System.out.println("Error saving employees: " + e.getMessage());
    }
}

public static void main(String[] args) {
    while (true) {
        System.out.println("\n1. Add Employee");
        System.out.println("2. Display All Employees");
```



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```
System.out.println("3. Exit");
System.out.print("Choose an option: ");

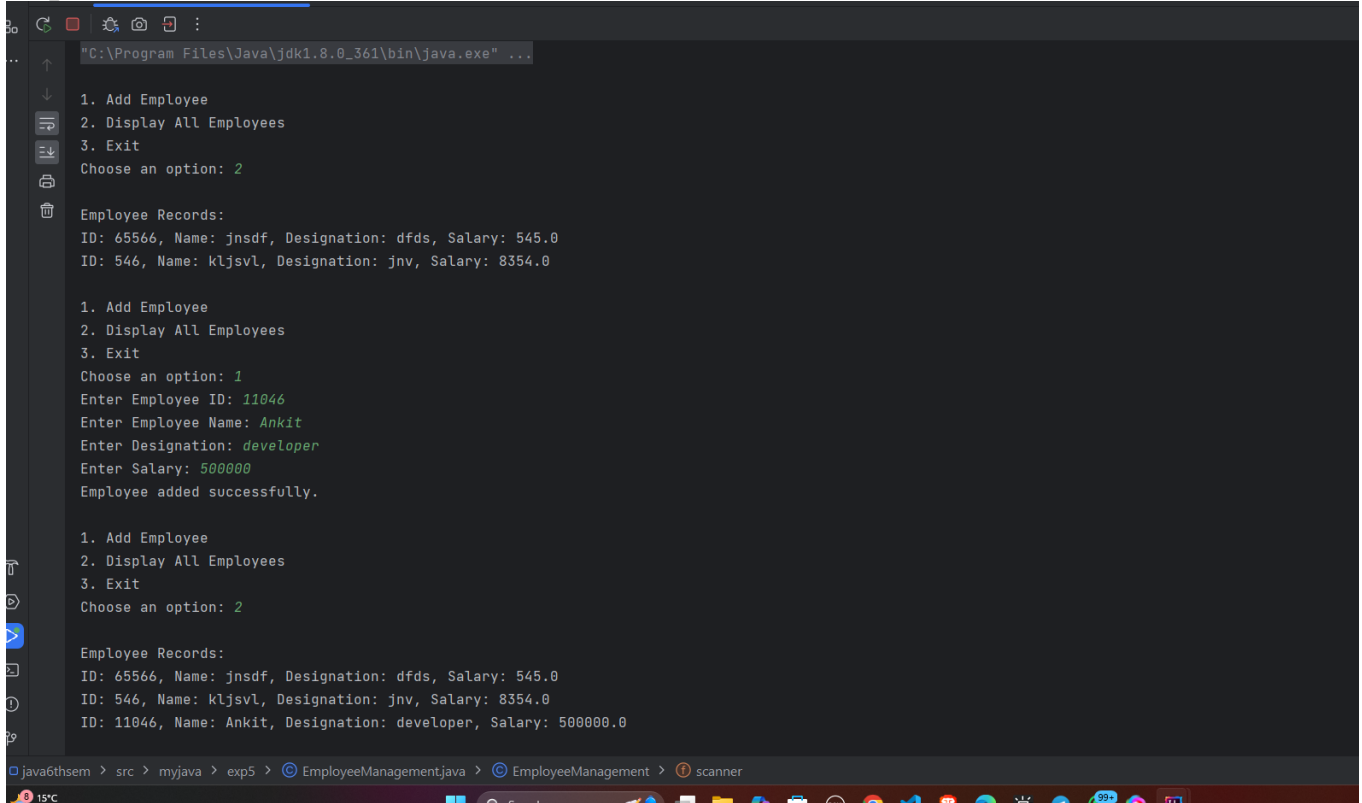
if (!scanner.hasNextInt()) {
    System.out.println("Invalid choice. Please enter a number.");
    scanner.next();
    continue;
}

int choice = scanner.nextInt();
scanner.nextLine();

switch (choice) {
    case 1:
        addEmployee();
        break;
    case 2:
        displayEmployees();
        break;
    case 3:
        System.out.println("Exiting application.");
        scanner.close();
        return;
    default:
        System.out.println("Invalid choice. Try again.");
}
}
}
```



## 4. Output:



```
"C:\Program Files\Java\jdk1.8.0_361\bin\java.exe" ...

1. Add Employee
2. Display All Employees
3. Exit
Choose an option: 2

Employee Records:
ID: 65566, Name: jnsdf, Designation: dfds, Salary: 545.0
ID: 546, Name: kljsvl, Designation: jnv, Salary: 8354.0

1. Add Employee
2. Display All Employees
3. Exit
Choose an option: 1
Enter Employee ID: 11046
Enter Employee Name: Ankit
Enter Designation: developer
Enter Salary: 500000
Employee added successfully.

1. Add Employee
2. Display All Employees
3. Exit
Choose an option: 2

Employee Records:
ID: 65566, Name: jnsdf, Designation: dfds, Salary: 545.0
ID: 546, Name: kljsvl, Designation: jnv, Salary: 8354.0
ID: 11046, Name: Ankit, Designation: developer, Salary: 500000.0
```

## 5. Learning Outcomes:

- implementing a menu-driven application in Java.
- Storing and retrieving objects using serialization.
- Handling user input and file operations effectively.