

Experiment 5

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Branch: BE/CSE

Semester: 6th

Subject Name: Project Based
Learning in JAVA with Lab

UID: 22BCS10110

Section/Group: 22BCS_IOT-618/A

Date of Performance: 21/01/25

Subject Code: 22CSH-359

- 1. Aim:** This program aims to demonstrate the use of autoboxing and unboxing in Java while calculating the sum of a list of integers. It also ensures efficient parsing of string values into integers, handling invalid inputs gracefully.
- 2. Objective:** The objective is to create a program that takes a mix of integer values and numeric strings, converts them into Integer objects, and calculates their sum using unboxing. It also handles exceptions for invalid numeric strings without interrupting execution.

3. Implementation/Code:

```
import java.util.*;

public class IntegerSumCalculator {
    public static void main(String[] args) {
        List<Integer> numbers = new ArrayList<>();
        String[] inputs = {"10", "20", "30", "40", "50", "invalid"};

        for (String input : inputs) {
            Integer num = parseStringToInteger(input);
            if (num != null) {
                numbers.add(num); // Autoboxing: int -> Integer
            }
        }

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

    public static Integer parseStringToInteger(String str) {
        try {
            return Integer.parseInt(str); // Parsing string to Integer
        } catch (NumberFormatException e) {
```



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```
        System.out.println("Invalid number format: " + str);
        return null;
    }
}

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

4. Output:

```
● PS C:\Users\Kushagra\Desktop\Java lab\exp5> cd "c:\Users\Kushagra\Desktop\Java lab\exp5"
umCalculator }
The sum of the list (using loop) is: 150
The sum of the list (using stream) is: 150
○ PS C:\Users\Kushagra\Desktop\Java lab\exp5> |
```

5.2 Aim: - This program aims to demonstrate object serialization and deserialization in Java by saving a Student object to a file and then reading it back. It ensures proper handling of exceptions like FileNotFoundException, IOException, and ClassNotFoundException.

Objectives: - The objective is to implement a Student class that implements Serializable, serialize its instance to a file, and deserialize it back, displaying the student details. The program should also handle scenarios where the file is missing or an incompatible class version is encountered.

Code: -

```
import java.io.*;

// Student class implementing Serializable
class Student implements Serializable {
    private static final long serialVersionUID = 1L; // Ensures version consistency
    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 + ", Name: " + name + ", GPA: " + gpa);
    }
}

public class StudentSerialization {
    private static final String FILE_NAME = "student.ser"; // Serialized file name

    public static void main(String[] args) {
        // Test Case 1: Serialize and Deserialize a valid Student object
        Student student = new Student(1, "John Doe", 3.75);
        serializeStudent(student);
        Student deserializedStudent = deserializeStudent();

        if (deserializedStudent != null) {
            System.out.println("Student object has been deserialized.");
            System.out.println("Deserialized Student Details:");
            deserializedStudent.display();
        }
    }
}
```



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```
    }  
}  
  
// Method to serialize the Student object  
public static void serializeStudent(Student student) {  
    try (ObjectOutputStream oos = new ObjectOutputStream(new FileOutputStream(FILE_NAME)))  
    {  
        oos.writeObject(student);  
        System.out.println("Student object has been serialized and saved to file.");  
    } catch (IOException e) {  
        System.out.println("Error during serialization: " + e.getMessage());  
    }  
}  
  
// Method to deserialize the Student object  
public static Student deserializeStudent() {  
    try (ObjectInputStream ois = new ObjectInputStream(new FileInputStream(FILE_NAME))) {  
        return (Student) ois.readObject();  
    } catch (FileNotFoundException e) {  
        System.out.println("Error: File not found.");  
    } catch (IOException e) {  
        System.out.println("Error during deserialization: " + e.getMessage());  
    } catch (ClassNotFoundException e) {  
        System.out.println("Error: Class not found.");  
    }  
    return null;  
}  
}
```

Output:-

```
PS C:\Users\Kushagra\Desktop\Java lab\exp5\exp5_2> cd "c:  
java StudentSerialization }  
Student object has been serialized and saved to file.  
Student object has been deserialized.  
Deserialized Student Details:  
Student ID: 1, Name: John Doe, GPA: 3.75
```

5.3 Aim :- This program aims to create a menu-driven Java application that allows users to add employee details, store them in a file, and display all stored employee records. It ensures proper file handling and exception management for a smooth user experience.

Objectives:- The objective is to implement an Employee class that supports serialization, enabling the storage and retrieval of employee data from a file. The program provides menu options to add employees, display all employees.

Code:-

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

// Employee class implementing Serializable
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;
    }

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

public class EmployeeManagement {
    private static final String FILE_NAME = "employees.ser"; // Serialized file name
    private static Scanner scanner = new Scanner(System.in);

    public static void main(String[] args) {
        while (true) {
            System.out.println("\nMenu:");
            System.out.println("1. Add Employee");
            System.out.println("2. Display All Employees");
            System.out.println("3. Exit");
            System.out.print("Enter your choice: ");
```



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```
int choice = scanner.nextInt();
scanner.nextLine(); // Consume newline

switch (choice) {
    case 1:
        addEmployee();
        break;
    case 2:
        displayAllEmployees();
        break;
    case 3:
        System.out.println("Exiting program...");
        return;
    default:
        System.out.println("Invalid choice! Please try again.");
}
}
}

// Method to add an employee and serialize to file
public static void addEmployee() {
    try (ObjectOutputStream oos = new ObjectOutputStream(new FileOutputStream(FILE_NAME,
    true))) {
        System.out.print("Enter Employee ID: ");
        int id = scanner.nextInt();
        scanner.nextLine(); // Consume newline

        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);
        oos.writeObject(employee);
        System.out.println("Employee added successfully!");
    } catch (IOException e) {
        System.out.println("Error during file writing: " + e.getMessage());
    }
}
```



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```
// Method to display all employees from file
public static void displayAllEmployees() {
    List<Employee> employees = readEmployeesFromFile();
    if (employees.isEmpty()) {
        System.out.println("No employee records found.");
    } else {
        System.out.println("\nEmployee Records:");
        for (Employee emp : employees) {
            emp.display();
        }
    }
}

// Method to read employees from file
public static List<Employee> readEmployeesFromFile() {
    List<Employee> employees = new ArrayList<>();
    try (ObjectInputStream ois = new ObjectInputStream(new FileInputStream(FILE_NAME))) {
        while (true) {
            try {
                Employee employee = (Employee) ois.readObject();
                employees.add(employee);
            } catch (EOFException e) {
                break; // End of file reached
            }
        }
    } catch (FileNotFoundException e) {
        System.out.println("File not found. No employee records available.");
    } catch (IOException | ClassNotFoundException e) {
        System.out.println("Error reading employee data: " + e.getMessage());
    }
    return employees;
}
}
```



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Output :-

```
Menu:
1. Add Employee
2. Display All Employees
3. Exit
Enter your choice: 1
Enter Employee ID: 121
Enter Employee Name: kushagra
Enter Designation: software
Enter Salary: 1234567
Employee added successfully!

Menu:
1. Add Employee
2. Display All Employees
3. Exit
Enter your choice: 1
Enter Employee ID: 1234
Enter Employee Name: bharti
Enter Designation: civil
Enter Salary: 87659
Employee added successfully!

Menu:
1. Add Employee
2. Display All Employees
3. Exit
Enter your choice: 2
Error reading employee data: invalid type code: AC

Employee Records:
Employee ID: 121, Name: kushagra, Designation: software, Salary: 1234567.0

Menu:
1. Add Employee
2. Display All Employees
3. Exit
Enter your choice: █
```