Experiment 5

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Subject: Java **Subject Code:22CSH-359**

Problem - 5.1

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

Code:

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

public class SumCalculator {

    public static Integer parseStringToInteger(String str) {
        try {
            return Integer.parseInt(str);
        } catch (NumberFormatException e) {
            System.out.println("Invalid number format: " + str);
            return null;
        }
    }

    public static int calculateSum(List<Integer> numbers) {
        int sum = 0;
        for (Integer number : numbers) {
            if (number != null) {
                sum += number;
            }
        }
        return sum;
    }

    public static void main(String[] args) {

        List<Integer> numbers = new ArrayList<>();

        numbers.add(10);
```

```
        numbers.add(20);
        numbers.add(30);

        // Parsing strings and adding them to the list
        numbers.add(parseStringToInteger("40"));
        numbers.add(parseStringToInteger("50"));

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

        // Test case with strings only
        List<Integer> stringParsedNumbers = new ArrayList<>();
        stringParsedNumbers.add(parseStringToInteger("100"));
        stringParsedNumbers.add(parseStringToInteger("200"));
        stringParsedNumbers.add(parseStringToInteger("300"));

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

        // Test case with invalid input
        List<Integer> invalidInputTest = new ArrayList<>();
        invalidInputTest.add(parseStringToInteger("50"));
        invalidInputTest.add(parseStringToInteger("invalid"));
        invalidInputTest.add(parseStringToInteger("70"));

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

Output:

```
The sum of the list is: 150
The sum of the list is: 600
Invalid number format: invalid
The sum of the list is: 120

Process finished with exit code 0
```

Test Cases:

Test Case 1:
Input: 10, 20, 30, "40", "50"

Expected Output: The sum of the list is: 150
Description: The list contains a mix of primitive integers and integers parsed from strings.

Test Case 2:
Input: "100", "200", "300"
Expected Output: The sum of the list is: 600
Description: All values are parsed from strings, and the sum is calculated.

Test Case 3:
Input: "50", "invalid", "70"
Expected Output:
Invalid number format: invalid
The sum of the list is: 120

Problem - 5.2

Aim : Java program that serializes and deserializes a Student object. It saves the Student object to a file and then reads it back, displaying the student details.

The program handles exceptions like FileNotFoundException, IOException, and ClassNotFoundException.

Code :

```
package javaSem6;

import java.io.*;

// Student class implementing Serializable
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";

    // Method to serialize a 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.err.println("Error during serialization: " + e.getMessage());
        }
    }

    // Method to deserialize a Student object
    public static Student deserializeStudent() {
        try (ObjectInputStream ois = new ObjectInputStream(new FileInputStream(FILE_NAME))) {
            return (Student) ois.readObject();
        } catch (FileNotFoundException e) {
            System.err.println("Error: File not found.");
        } catch (IOException e) {
            System.err.println("Error during deserialization: " + e.getMessage());
        } catch (ClassNotFoundException e) {
            System.err.println("Error: Class not found.");
        }
        return null;
    }

    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:\n" + deserializedStudent);
        }
    }
}
```

Output :

```
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

Process finished with exit code 0
```

Test Cases:

Test Case 1: Serialize and Deserialize a valid student object.

Input: Student(1, "John Doe", 3.75)
Expected Output:
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

Test Case 2: Try to deserialize from a non-existent file.
Expected Output:
Error: File not found.

Test Case 3: Handle invalid class during deserialization.
Input: Manually modify the class file to simulate a ClassNotFoundException.
Expected Output:
Error: Class not found.

Problem - 5.3

Aim : Menu-based Java application that allows you to add employee details, display all employees, and exit. The employee details will be stored in a file, and the program will read the file to display the stored employee information.

Code:

```
package javaSem6;

import java.io.*;
```

```
import java.util.*;

// Employees class implementing Serializable
class Employees implements Serializable
{
   private static final long serialVersionUID = 1L;
   private int id;
   private String name;
   private String designation;
   private double salary;

   public Employees(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 EmployeeManagement
 {
   private static final String FILE_NAME = "employees.dat";

   // Method to add an employee
   public static void addEmployee()
 {
       Scanner scanner = new Scanner(System.in);
       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 employee = new Employees(id, name, designation, salary);
        saveEmployeeToFile(employee);
        System.out.println("Employee added successfully!\n");
    }

    // Method to save an employee to a file
    private static void saveEmployeeToFile(Employees employee)
{
        List<Employees> employees = readEmployeesFromFile(); // Read existing employees
        employees.add(employee); // Add new employee

        // Write entire list back to the file (overwriting)
        try (ObjectOutputStream oos = new ObjectOutputStream(new
FileOutputStream(FILE_NAME)))
{
            oos.writeObject(employees);
        } catch (IOException e) {
            System.err.println("Error saving employee: " + e.getMessage());
        }
    }

    // Method to display all employees
    public static void displayAllEmployees() {
        List<Employees> employees = readEmployeesFromFile();
        if (employees.isEmpty()) {
            System.out.println("No employees found.\n");
        } else {
            System.out.println("Employee List:");
            employees.forEach(System.out::println);
            System.out.println();
        }
    }


    // Method to read employees from file
    private static List<Employees> readEmployeesFromFile() {
        List<Employees> employees = new ArrayList<>();
        if (!new File(FILE_NAME).exists()) {
            return employees; // Return empty list if file does not exist
        }


        try (ObjectInputStream ois = new ObjectInputStream(new FileInputStream(FILE_NAME))) {
            Object obj = ois.readObject();
```

```
            if (obj instanceof List<?>) {
                employees = (List<Employees>) obj; // Cast safely
            }
        } catch (EOFException ignored) {
            // End of file reached
        } catch (IOException | ClassNotFoundException e) {
            System.err.println("Error reading employees: " + e.getMessage());
        }
        return employees;
    }



    public static void main(String[] args)
{
        Scanner scanner = new Scanner(System.in);
        while (true)
{
            System.out.println("1. Add Employee");
            System.out.println("2. Display All Employees");
            System.out.println("3. Exit");
            System.out.print("Enter your choice: ");
            int choice = scanner.nextInt();

            switch (choice) {
                case 1 -> addEmployee();
                case 2 -> displayAllEmployees();
                case 3 -> {
                    System.out.println("Exiting program.");
                    System.exit(0);
                }
                default -> System.out.println("Invalid choice. Please try again.\n");
            }
        }
    }
}
```

Output :

```
1. Add Employee
2. Display All Employees
3. Exit
Enter your choice: 1
Enter Employee ID: 17184
Enter Name: Dipendra
Enter Designation: Software Engineer
Enter Salary: 15000
Employee added successfully!

1. Add Employee
2. Display All Employees
3. Exit
Enter your choice: 1
Enter Employee ID: 13906
Enter Name: Om
Enter Designation: Web developer
Enter Salary: 1700
Employee added successfully!

1. Add Employee
2. Display All Employees
3. Exit
Enter your choice: 1
Enter Employee ID: 10790
Enter Name: Sanjay
Enter Designation: Full stack developer
Enter Salary: 16000
Employee added successfully!
```

```
Employee ID: 17184, Name: Dipendra, Designation: Software Engineer, Salary: 15000.0
Employee ID: 13906, Name: Om, Designation: Web developer, Salary: 1700.0
Employee ID: 10790, Name: Sanjay, Designation: Full stack developer, Salary: 16000.0
Employee ID: 50206, Name: Sumantra, Designation: Softare engineer, Salary: 15000.0
```

Test Cases:

1. Add Employee
2. Display All Employees
3. Exit
Enter your choice: 1
Enter Employee ID: 17184
Enter Name: Dipendra
Enter Designation: Software engineer
Enter Salary: 15000
Employee added successfully!

1. Add Employee
2. Display All Employees

```
3. Exit
Enter your choice: 1
Enter Employee ID: 13906
Enter Name: Om
Enter Designation: Web developer
Enter Salary: 17000
Employee added successfully!

1. Add Employee
2. Display All Employees
3. Exit
Enter your choice: 1
Enter Employee ID: 10790
Enter Name: Sanjay
Enter Designation: Full stack developer
Enter Salary: 16000
Employee added successfully!

1. Add Employee
2. Display All Employees
3. Exit
Enter your choice: 1
Enter Employee ID: 50206
Enter Name: Sumantra
Enter Designation: Software developer
Enter Salary: 17000
Employee added successfully!

1. Add Employee
2. Display All Employees
3. Exit
Enter your choice: 2
Employee List:
Employee ID: 17184, Name: Dipendra, Designation: Software engineer, Salary: 15000.0
Employee ID: 13906, Name: Om, Designation: Web developer, Salary: 17000.0
Employee ID: 10790, Name: Sanjay, Designation: Full stack developer, Salary: 16000.0
Employee ID: 50206, Name: Sumantra, Designation: Software developer, Salary: 17000.0
```