



Experiment 5

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Subject Name: Project Based Learning
in Java with Lab

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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:

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;
        }
    }
}
```



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```
        return sum;
    }
}
```

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(new
        FileOutputStream(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(new  
        FileInputStream(FILE_NAME))) {  
        Student student = (Student) ois.readObject();  
        System.out.println("Deserialized Student Object:");  
        student.display();  
    }  
    catch (FileNotFoundException) {  
        System.err.println("File not found: " + e.getMessage());  
    }  
    catch (IOException) {  
        System.err.println("Error during deserialization: " + e.getMessage());  
    }  
    catch (ClassNotFoundException) {  
        System.err.println("Class not found: " + e.getMessage());  
    }  
}
```

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;  
    }  
}
```



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```
    }  
}  
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

```
Sum of numbers: 150

Process finished with exit code 0
```

4.2

```
C:\Users\HP\.jdk\corretto-17.0.8\bin\java.exe
Student object serialized successfully.
Deserialized Student Object:
Student ID: 101
Name: ABCD
GPA: 8.1

Process finished with exit code 0
```

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.