



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Experiment 5

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Branch: BE-CSE

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Subject Name: PBLJ Lab

UID: 22BCS15338

Section/Group: IOT-640/A

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Subject Code: 22CSH-359

1. Aim:

Implement and manage data using Java Collections and Exception Handling.

2. Problem Statements:

- **Easy Level:** 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()).
- **Medium Level:** 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.
- **Hard Level:** 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



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is selected, the application should display all the employee details. If option 3 is selected, the application should exit.

3. Implementation/Code:

Problem 1.1: Sum of Integers Using Autoboxing and Unboxing

```
import java.util.*;

public class SumCalculator {
    public static int calculateSum(List<Integer> numbers) {
        int sum = 0;
        for (Integer num : numbers) {
            sum += num; // Autounboxing happens here
        }
        return sum;
    }

    public static void main(String[] args) {
        List<Integer> numbers = Arrays.asList(1, 2, 3, 4, 5);
        System.out.println("Sum: " + calculateSum(numbers));
    }
}
```

Problem 1.2: Serialization and Deserialization of a Student Object

```
import java.io.*;

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;
    }
}
```



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```
}

@Override public
String toString() {
    return "ID: " + id + ", Name: " + name + ", GPA: " + gpa;
}

}

public class StudentSerialization {
public static void main(String[] args) {
    Student student = new Student(101, "Alice", 3.9);
    String filename = "student.ser";

    // Serialization
    try (ObjectOutputStream out = new ObjectOutputStream(new
FileOutputStream(filename))) {        out.writeObject(student);
        System.out.println("Student object serialized successfully.");
    } catch (IOException e) {
        System.err.println("IOException: " + e.getMessage());
    }

    // Deserialization
    try (ObjectInputStream in = new ObjectInputStream(new FileInputStream(filename))) {
        Student deserializedStudent = (Student) in.readObject();
        System.out.println("Deserialized Student: " + deserializedStudent);
    } catch (FileNotFoundException e) {
        System.err.println("FileNotFoundException: " + e.getMessage());
    } catch (IOException e) {
        System.err.println("IOException: " + e.getMessage());
    } catch (ClassNotFoundException e) {
        System.err.println("ClassNotFoundException: " + e.getMessage());
    }
}
}
```

Problem 1.3: Employee Management System (Menu-Based Application)



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

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;
    }

    @Override
    public String toString() {
        return "ID: " + id + ", Name: " + name + ", Designation: " + designation + ", Salary: " +
        salary;
    }
}

public class EmployeeManagement {
    private static final String FILE_NAME = "employees.ser";

    public static void addEmployee(Employee emp) {
        List<Employee> employees = loadEmployees();
        employees.add(emp);
        saveEmployees(employees);
    }

    public static List<Employee> loadEmployees() {
        try (ObjectInputStream in = new ObjectInputStream(new
        FileInputStream(FILE_NAME))) {
            return (List<Employee>) in.readObject();
        }
    }
}
```



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```
        } catch (IOException | ClassNotFoundException e) {
return new ArrayList<>();
    }
}

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

    public static void displayEmployees() {
        List<Employee> employees = loadEmployees();
if (employees.isEmpty()) {
    System.out.println("No employees found.");
} else {
    for (Employee emp : employees) {
        System.out.println(emp);
    }
}
}

    public static void main(String[] args) {
Scanner scanner = new Scanner(System.in);
while (true) {
    System.out.println("\n1. Add Employee\n2. Display All\n3. Exit\nEnter choice: ");
int choice = scanner.nextInt();        scanner.nextLine();

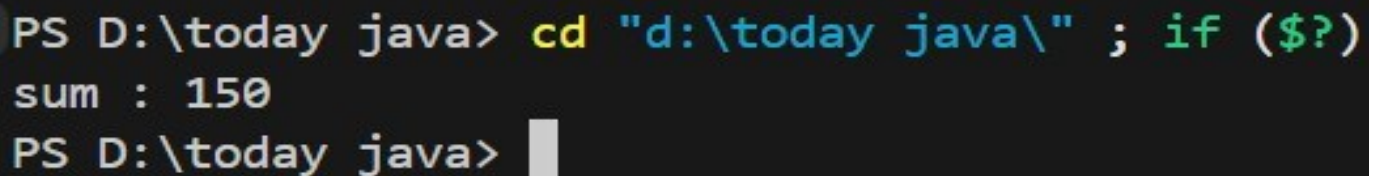
    switch (choice) {
case 1:
        System.out.print("Enter ID: ");
int id = scanner.nextInt();
scanner.nextLine();
```



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```
        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();
        addEmployee(new Employee(id, name, designation, salary));
    break;           case 2:
        displayEmployees();
        break;
case 3:
scanner.close();
        System.exit(0);
    }
}
}
```

4. Output:

A screenshot of a Windows command prompt window. The prompt is 'PS D:\today java>'. The user has entered 'cd "d:\today java\" ; if (\$?)' and the output is 'sum : 150'. The prompt is now 'PS D:\today java>' with a cursor at the end.

```
PS D:\today java> cd "d:\today java\" ; if ($?)
sum : 150
PS D:\today java> 
```

(Fig. 1 - Sum of Integers Output)



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```
PS D:\today java> cd "d:\today java\" ; if ($?) { javac StudentSerialization.java }
Student object serialized to student.ser
Deserialized Student: Student{id=15377, name='Jobajeet Singh', gpa=7.5}
PS D:\today java> █
```

(Fig. 2 - Student Serialization & Deserialization Output)

```
PS D:\today java> cd "d:\today java\" ; if ($?) { javac Main.java } ; if ($?) { java Main }
Menu:
1. Add an Employee
2. Display All
3. Exit
Enter your choice: 1
Enter employee name: jobanjeet singh
Enter employee id: 15377
Enter employee designation: Amritsar
Enter employee salary: 200000
Menu:
1. Add an Employee
2. Display All
3. Exit
Enter your choice: 2
Employee{name='jobanjeet Singh', id=15377, designation='Amritsar', salary=200000.0}
Error reading from file: invalid type code: AC
Menu:
```



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(Fig. 3 - Employee Management System Output)

5. Learning Outcome:

1. Understand autoboxing and unboxing in Java.
2. Learn how to parse and work with wrapper classes.
3. Gain hands-on experience with serialization and deserialization of objects.
4. Implement exception handling for file operations in Java.
5. Develop a menu-based Java application with file handling.