Experiment 5.1

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

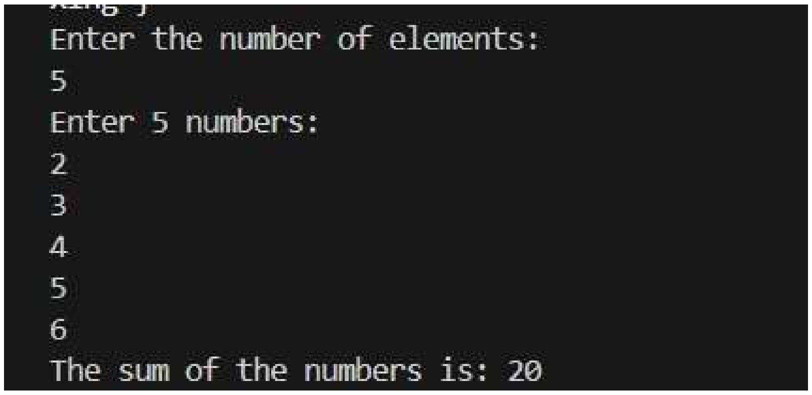
Aim: Write a Java program to calculate the sum of a list of integers using autoboxing and unboxing. Include methods to parse strings into their respective wrapper classes (e.g., Integer.parseInt()).

Objective: The goal of this Java program is to demonstrate autoboxing and unboxing while calculating the sum of a list of integers.

Code:

```
import java.util.*;

public class autoboxing {    public static List<Integer>
parseStringToIntegers(List<String> strNumbers) {
        List<Integer> intNumbers = new ArrayList<>();
        for (String num : strNumbers) {
            intNumbers.add(Integer.parseInt(num));
         }
        return intNumbers;
    }

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

   public static void main(String[] args) {
Scanner scanner = new Scanner(System.in);

        System.out.println("Enter the number of elements:");
int n = scanner.nextInt();
        scanner.nextLine();

        List<String> strNumbers = new ArrayList<>();
System.out.println("Enter " + n + " numbers:");
        for (int i = 0; i < n; i++) {
            strNumbers.add(scanner.nextLine());
        }

        List<Integer> numbers = parseStringToIntegers(strNumbers);
int sum = calculateSum(numbers);

        System.out.println("The sum of the numbers is: " + sum);

        scanner.close();
    } }
```

Output:



```
Enter the number of elements:
5
Enter 5 numbers:
2
3
4
5
6
The sum of the numbers is: 20
```

Learning Outcomes:

- Understand the concept of autoboxing and unboxing in Java and how primitive types are automatically converted to their wrapper classes and vice versa.
- Learn how to convert string values into Integer objects using Integer.parseInt() and store them in a list.
- Gain experience in working with ArrayLists to store and manipulate a collection of numbers dynamically.
- Develop proficiency in iterating through collections and performing arithmetic operations like summation.

<u>Experiment 5.2</u>

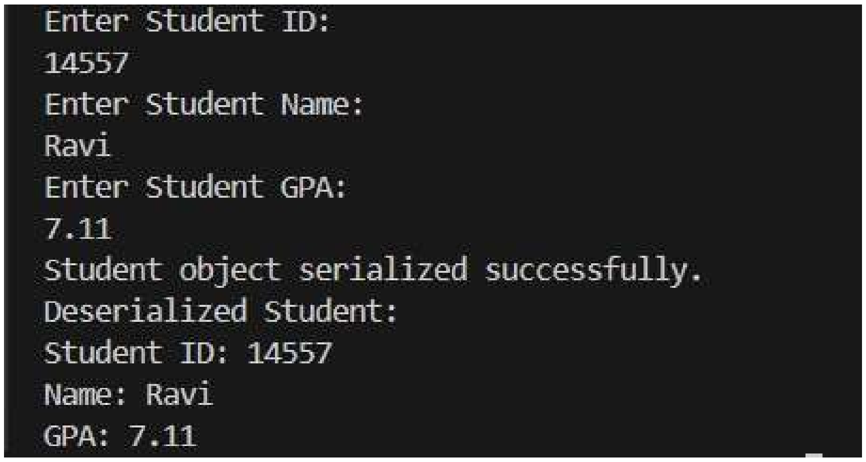
1. **Aim:** Create a Java program to serialize and deserialize a Student object. The program should: Serialize a Student object (containing id, name, and GPA) and save it to a file. Deserialize the object from the file and display the student details. Handle FileNotFoundException, IOException, and ClassNotFoundException using exception handling.

2. **Objective:** The objective is to serialize and deserialize a Student object, store and retrieve its id, name, and GPA from a file, and handle exceptions like FileNotFoundException, IOException, and ClassNotFoundException.

3. **Implementation Code:**

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

class Student implements Serializable {
    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("Student ID: " + id);
        System.out.println("Name: " + name);
        System.out.println("GPA: " + gpa);
    }
}

public class StudentSerialization {
    public static void serializeStudent(Student student, String filename) {
        try (ObjectOutputStream oos = new ObjectOutputStream(new FileOutputStream(filename))) {
oos.writeObject(student);
            System.out.println("Student object serialized successfully.");
        } catch (IOException e) {
            System.err.println("Error during serialization: " + e.getMessage());
        }
    }

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

    public static void main(String[] args) {
Scanner scanner = new Scanner(System.in);
System.out.println("Enter Student ID:");         int
id = scanner.nextInt();         scanner.nextLine();
        System.out.println("Enter Student Name:");
        String name = scanner.nextLine();
System.out.println("Enter Student GPA:");
        double gpa = scanner.nextDouble();

        Student student = new Student(id, name, gpa);
String filename = "student.ser";
        serializeStudent(student, filename);

        Student deserializedStudent = deserializeStudent(filename);
        if (deserializedStudent != null) {
            System.out.println("Deserialized Student:");
deserializedStudent.display();
        }
        scanner.close();
    }
}
```

4. Output



```
Enter Student ID:
14557
Enter Student Name:
Ravi
Enter Student GPA:
7.11
Student object serialized successfully.
Deserialized Student:
Student ID: 14557
Name: Ravi
GPA: 7.11
```

5. Learning Outcomes:

- Understand object serialization and deserialization in Java.
- Learn how to use ObjectOutputStream and ObjectInputStream for file operations.
- Implement exception handling for FileNotFoundException, IOException, and ClassNotFoundException.
- Gain hands-on experience in storing and retrieving objects from a file.
- Develop skills in data persistence and file management using Java.

Experiment 5.3

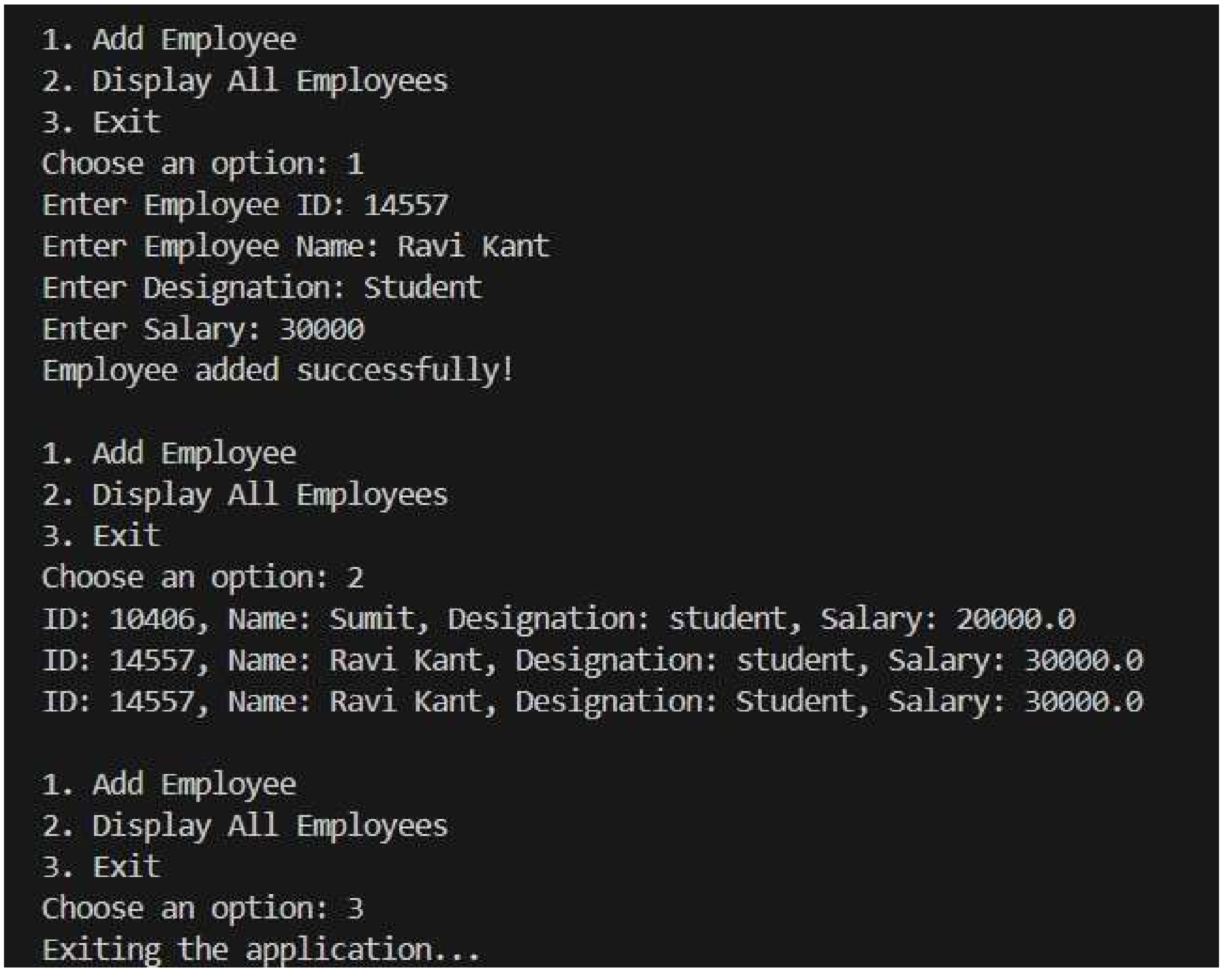
1. **Aim:** Create a menu-based Java application with the following options. 1.Add an Employee 2. Display All 3. Exit If option 1 is selected, the application should gather details of the employee like employee name, employee id, designation and salary and store it in a file. If option 2 is selected, the application should display all the employee details. If option 3 is selected the application should exit.

2. Objective: The objective of this Java application is to create a **simple** menu-driven employee management **system** using file handling for data persistence.

3. **Implementation Code:**

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

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 + "," + name + ","
+ designation + "," + salary;
   }

   public static Employee fromString(String line) {
String[] parts = line.split(",");
       return new Employee(Integer.parseInt(parts[0]), parts[1], parts[2],
Double.parseDouble(parts[3]));
   }
}

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

   public static void addEmployee() {
        Scanner scanner = new Scanner(System.in);
System.out.print("Enter Employee ID: ");
        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: ");
        double salary = scanner.nextDouble();

        Employee employee = new Employee(id, name, designation, salary);
try (FileWriter fw = new FileWriter(FILE_NAME, true);
             BufferedWriter bw = new BufferedWriter(fw);
PrintWriter pw = new PrintWriter(bw)) {
pw.println(employee);         } catch (IOException e) {
            System.err.println("Error saving employee data: " + e.getMessage());
        }
        System.out.println("Employee added successfully!");
    }

    public static void displayAllEmployees() {
File file = new File(FILE_NAME);
        if (!file.exists()) {
            System.out.println("No employee records found.");
return;
        }
        try (BufferedReader br = new BufferedReader(new FileReader(FILE_NAME))) {
            String line;
            while ((line = br.readLine()) != null) {
                Employee emp = Employee.fromString(line);
                System.out.println("ID: " + emp.id + ", Name: " + emp.name + ", Designation: " +
emp.designation + ", Salary: " + emp.salary);
            }
        } catch (IOException e) {
            System.err.println("Error reading employee data: " + e.getMessage());
        }
    }

    public static void main(String[] args) {
Scanner scanner = new Scanner(System.in);
while (true) {
            System.out.println("\n1. Add Employee");
            System.out.println("2. Display All Employees");
            System.out.println("3. Exit");
            System.out.print("Choose an option: ");
int choice = scanner.nextInt();

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

4. Output:



```
1. Add Employee
2. Display All Employees
3. Exit
Choose an option: 1
Enter Employee ID: 14557
Enter Employee Name: Ravi Kant
Enter Designation: Student
Enter Salary: 30000
Employee added successfully!

1. Add Employee
2. Display All Employees
3. Exit
Choose an option: 2
ID: 10406, Name: Sumit, Designation: student, Salary: 20000.0
ID: 14557, Name: Ravi Kant, Designation: student, Salary: 30000.0
ID: 14557, Name: Ravi Kant, Designation: Student, Salary: 30000.0

1. Add Employee
2. Display All Employees
3. Exit
Choose an option: 3
Exiting the application...
```

5. Learning Outcomes:

- Understand file handling and serialization in Java to store and retrieve objects persistently.
- Learn how to implement a menu-driven console application using loops and conditional statements.
- Gain experience in object-oriented programming (OOP) by defining and managing Employee objects.
- Practice exception handling to manage file-related errors like FileNotFoundException and IOException.
- Develop skills in list manipulation and user input handling using ArrayList and Scanner.