**Assignment No. 08**

Name:- Anirudha Shripad Kale.

Roll No. :- 223029

PRN No :- 22210288

Batch: C1

**Problem Statement:** Implement student database (Roll number, Name of student, Gr. Number, Class etc.) using text or binary files in JAVA.

**Objectives:**

1. To understand the concept of file handling.
2. To implement the student database using java.
3. To understand the concept of text and binary file .

**Theory:**

**Text File Handling:**

1. Classes Used: File, FileReader, FileWriter, BufferedReader, BufferedWriter
2. Reading Text Files: Use FileReader and BufferedReader to read text line by line or character by character.
3. Writing Text Files: Use FileWriter and BufferedWriter to write text to a file.
4. Exception Handling: Handle IOException for file-related errors.

**Binary File Handling:**

1. Classes Used: FileInputStream, FileOutputStream, ObjectInputStream, ObjectOutputStream
2. Reading Binary Files: Use FileInputStream and ObjectInputStream to read objects from a binary file.
3. Writing Binary Files: Use FileOutputStream and ObjectOutputStream to write objects to a binary file.
4. Object Serialization: Serializable classes can be written to binary files.
5. Exception Handling: Handle IOException and ClassNotFoundException for object-related errors.

**Algorithm:**

1. Define the Student class with attributes for roll number, name, grade number, and class name.
2. Implement a constructor in the Student class to initialize student objects.
3. Implement methods writeToFile() and readFromFile() in the Student class to write student details to a file and read student details from a file, respectively.
4. In the main method:
5. Create a Scanner object for user input.
6. Initialize an empty list to store student objects.
7. Display a menu to the user with options to add a student, save students to a file, retrieve students from a file, and exit.
8. Use a loop to repeatedly prompt the user for their choice and perform the corresponding actions.
9. In the writeToFile() method:
10. Open a BufferedWriter to append student details to a text file.
11. Write each student's details to the file in a comma-separated format.
12. In the readFromFile() method:
13. Open a BufferedReader to read student details from a text file.
14. Read each line from the file and split it into parts using a comma as the delimiter.
15. Create Student objects from the parsed parts and add them to a list.
16. Implement the toString() method in the Student class to provide a string representation of a student object.
17. Run the program and interact with the menu to add, save, retrieve, and display student information from the text file.

Code**:**

import java.util.\*;

import java.io.\*;

class Student {

    private static final String fileName = "student.txt";

    int rollNumber;

    String name;

    int grNo;

    String className;

    public Student(int rollNumber, String name, int grNo, String className) {

        this.rollNumber = rollNumber;

        this.name = name;

        this.grNo = grNo;

        this.className = className;

    }

    public void writeToFile() {

        try (BufferedWriter writer = new BufferedWriter(new FileWriter(fileName, true))) {

            writer.write(rollNumber + "," + name + "," + grNo + "," + className);

            writer.newLine();

            System.out.println("Student details added to file successfully.");

        } catch (IOException e) {

            e.printStackTrace();

        }

    }

    public static List<Student> readFromFile() {

        List<Student> students = new ArrayList<>();

        try (BufferedReader reader = new BufferedReader(new FileReader(fileName))) {

            String line;

            while ((line = reader.readLine()) != null) {

                String[] parts = line.split(",");

                if (parts.length == 4) {

                    int rollNumber = Integer.parseInt(parts[0]);

                    String name = parts[1];

                    int grNo = Integer.parseInt(parts[2]);

                    String className = parts[3];

                    students.add(new Student(rollNumber, name, grNo, className));

                }

            }

        } catch (IOException e) {

            e.printStackTrace();

        }

        return students;

    }

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        List<Student> students = new ArrayList<>();

        System.out.println("-----------------------------------------------------------------------");

        System.out.println("\t\*\*\*\*\* Implementing Student Database Using Text files \*\*\*\*\*\t");

        System.out.println("------------------------------------------------------------------------");

        while (true) {

            System.out.println("Options Avaliable :");

            System.out.println("1. Add Student");

            System.out.println("2. Save Students to File");

            System.out.println("3. Get Students info from File");

            System.out.println("4. Exit");

            System.out.println("-----------------------------------------------------------------------");

            System.out.print("Enter your choice: ");

            int choice = sc.nextInt();

            sc.nextLine(); // Consume newline

            switch (choice) {

                case 1:

                    System.out.print("Enter Roll Number : ");

                    int rollNumber = sc.nextInt();

                    sc.nextLine(); // Consume newline

                    System.out.print("Enter Name : ");

                    String name = sc.nextLine();

                    System.out.print("Enter Gr. Number : ");

                    int grNo = sc.nextInt();

                    sc.nextLine(); // Consume newline

                    System.out.print("Enter Class Name : ");

                    String className = sc.nextLine();

                    students.add(new Student(rollNumber, name, grNo, className));

                    System.out.println("-----------------------------------------------------------------------");

                    break;

                case 2:

                    for (Student student : students) {

                        student.writeToFile();

                    }

                    System.out.println("Student info get saves to file.");

                    System.out.println("-----------------------------------------------------------------------");

                    break;

                case 3:

                    System.out.println("Avaliable Students to database : ");

                    List<Student> studentDB = Student.readFromFile();

                    for (Student student : studentDB) {

                        System.out.println(student);

                    }

                    System.out.println("-----------------------------------------------------------------------");

                    break;

                case 4:

                    System.out.println(" !! Thank you for responding !! \nHave a nice day ");

                    System.exit(0);

                    System.out.println("-----------------------------------------------------------------------");

                default:

                    System.out.println("Invalid choice. Please enter a valid option.");

                    System.out.println("-----------------------------------------------------------------------");

            }

        }

    }

    @Override

    public String toString() {

        return "Roll Number: " + rollNumber +

                "\n Name: " + name +

                "\n Grade Number: " + grNo +

                "\n Class Name: " + className;

    }

}

**Output:**

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\*\*\*\*\* Implementing Student Database Using Text files \*\*\*\*\*

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Options Avaliable :

1. Add Student

2. Save Students to File

3. Get Students info from File

4. Exit

-----------------------------------------------------------------------

Enter your choice: 1

Enter Roll Number : 223029

Enter Name : Anirudha

Enter Gr. Number : 22210288

Enter Class Name : SY-C

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Options Avaliable :

1. Add Student

2. Save Students to File

3. Get Students info from File

4. Exit

-----------------------------------------------------------------------

Enter your choice: 1

Enter Roll Number : 223016

Enter Name : Yash

Enter Gr. Number : 22210603

Enter Class Name : SY-C

-----------------------------------------------------------------------

Options Avaliable :

1. Add Student

2. Save Students to File

3. Get Students info from File

4. Exit

-----------------------------------------------------------------------

Enter your choice: 1

Enter Roll Number : 223025

Enter Name : Abhishek

Enter Gr. Number : 22210380

Enter Class Name : SY-C

-----------------------------------------------------------------------

Options Avaliable :

1. Add Student

2. Save Students to File

3. Get Students info from File

4. Exit

-----------------------------------------------------------------------

Enter your choice: 1

Enter Roll Number : 223011

Enter Name : Sanchit

Enter Gr. Number : 22210595

Enter Class Name : SY-C

-----------------------------------------------------------------------

Options Avaliable :

1. Add Student

2. Save Students to File

3. Get Students info from File

4. Exit

-----------------------------------------------------------------------

Enter your choice: 2

Student details added to file successfully.

Student details added to file successfully.

Student details added to file successfully.

Student details added to file successfully.

Student info get saves to file.

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Options Avaliable :

1. Add Student

2. Save Students to File

3. Get Students info from File

4. Exit

-----------------------------------------------------------------------

Enter your choice: 3

Avaliable Students to database :

Roll Number: 223029

Name: Anirudha

Grade Number: 22210288

Class Name: SY-C

Roll Number: 223016

Name: Yash

Grade Number: 22210603

Class Name: SY-C

Roll Number: 223025

Name: Abhishek

Grade Number: 22210380

Class Name: SY-C

Roll Number: 223011

Name: Sanchit

Grade Number: 22210595

Class Name: SY-C

-----------------------------------------------------------------------

Options Avaliable :

1. Add Student

2. Save Students to File

3. Get Students info from File

4. Exit

-----------------------------------------------------------------------

Enter your choice: 4

!! Thank you for responding !!

Have a nice day