Programming in Java Lab

**Assignment 3**

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**Q.1** Write a menu-driven Java Program to study the concepts of classes, array  
of objects, instance members, constructors in java.

**Main.Java**

//Main.java

package Assign3;

import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        // Create a Scanner object to take user input

        Scanner sc = new Scanner(System.in);

        // Create an instance of UserInput class to handle student operations

        UserInput user = new UserInput();

        // Display menu and handle user input in a loop

        while (true) {

            // Display menu options

            System.out.println("Menu:");

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

            System.out.println("2. Display Students");

            System.out.println("3. Search by PRN");

            System.out.println("4. Update Student Name");

            System.out.println("5. Delete Student");

            System.out.println("6. Exit");

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

            // Read user choice

            int choice = sc.nextInt();

            // Process user choice using switch statement

            switch (choice) {

                case 1:

                    // Add a new student

                    user.addStudent();

                    break;

                case 2:

                    // Display all student details

                    System.out.println("Student Details:");

                    user.display();

                    break;

                case 3:

                    // Search for a student by PRN

                    System.out.println("Enter PRN to search:");

                    int prn = sc.nextInt();

                    int index = user.searchByPrn(prn);

                    if (index != -1) {

                        System.out.println("Student found at index " + index);

                    }

                    else {

                        System.out.println("Student not found.");

                    }

                    break;

                case 4:

                    // Update student name by PRN

                    System.out.println("Enter PRN to update details:");

                    int prn1 = sc.nextInt();

                    user.updateName(prn1);

                    user.display();

                    break;

                case 5:

                    // Delete a student by PRN

                    System.out.println("Enter PRN to delete:");

                    int prn2 = sc.nextInt();

                    user.deleteStudent(prn2);

                    user.display();

                    break;

                case 6:

                    // Exit the program

                    System.out.println("Exiting program. Goodbye!");

                    System.exit(0);

                default:

                    // Handle invalid choice

                    System.out.println("Invalid choice. Please try again.");

            }

        }

    }

}

**Student.Java**

// Student.java

package Assign3;

public class Student {

    // Private fields to store student information

    private int prn; // PRN

    private String name; // Name of the student

    private String dob; // Date of birth of the student

    private float marks; // Marks obtained by the student

    // Constructor to initialize the Student object

    Student(int prn, String name, String dob, float marks) {

        this.prn = prn;

        this.name = name;

        this.dob = dob;

        this.marks = marks;

    }

    // Setter method to set the PRN

    public void setPrn(int prn) {

        this.prn = prn;

    }

    // Getter method to get the PRN

    public int getPrn() {

        return prn;

    }

    // Setter method to set the name

    public void setName(String name) {

        this.name = name;

    }

    // Getter method to get the name

    public String getName() {

        return name;

    }

    // Setter method to set the date of birth

    public void setDob(String dob) {

        this.dob = dob;

    }

    // Getter method to get the date of birth

    public String getDob() {

        return dob;

    }

    // Setter method to set the marks

    public void setMarks(float marks) {

        this.marks = marks;

    }

    // Getter method to get the marks

    public float getMarks() {

        return marks;

    }

}

**UserInput.Java**

//UserInput.java

package Assign3;

import java.util.ArrayList;

import java.util.Scanner;

public class UserInput {

    // ArrayList to store Student objects

    ArrayList<Student> student = new ArrayList<Student>();

    // Method to add students to the ArrayList

    public void addStudent() {

        Scanner sc = new Scanner(System.in);

        System.out.println("Enter number of students: ");

        int n = sc.nextInt();

        sc.nextLine();

        for (int i = 0; i < n; i++) {

            System.out.println("Enter details of student " + (i + 1) + ": ");

            String input = sc.nextLine();

            String[] details = input.split(" ");

            if (details.length >= 4) {

                // Extracting details from input and creating Student object

                int prn = Integer.parseInt(details[0]);

                String name = details[1];

                String dob = details[2];

                float marks = Float.parseFloat(details[3]);

                // Creating Student object and adding it to the ArrayList

                Student s = new Student(prn, name, dob, marks);

                student.add(s);

            } else {

                // Error message for invalid input format

                System.out.println("Invalid input format. Please enter details in the format: PRN Name DOB Marks");

                i--; // Decrementing the loop counter to re-enter the details

            }

        }

    }

    // Method to display details of all students

    public void display(){

        for(int i = 0; i < student.size(); i++){

            System.out.println(student.get(i).getPrn() + " " + student.get(i).getName() + " " + student.get(i).getDob() + " " + student.get(i).getMarks());

        }

    }

    // Method to search for a student by PRN

    public int searchByPrn(int prn){

        int index = -1;

        for(int i = 0; i < student.size(); i++){

            if(student.get(i).getPrn() == prn){

                index = i;

                break;

            }

        }

        return index;

    }

    // Method to update the name of a student by PRN

    public void updateName(int prn){

        int index = searchByPrn(prn);

        if(index != -1){

            Scanner sc = new Scanner(System.in);

            System.out.println("Enter new name: ");

            String name = sc.nextLine();

            student.get(index).setName(name);

            System.out.println("Name updated successfully");

        }

        else {

            System.out.println("Student not found");

        }

    }

    // Method to delete a student by PRN

    public void deleteStudent(int prn){

        int index = searchByPrn(prn);

        if(index != -1){

            student.remove(index);

            System.out.println("Student deleted successfully");

        }

        else {

            System.out.println("Student not found");

        }

    }

}

**Github Link : -**

[**https://github.com/Jayaditya177/PIJ/tree/main/Assignment%20-3**](https://github.com/Jayaditya177/PIJ/tree/main/Assignment%20-3)