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Student Management System (Java GUI Project)

1. Problem Statement

Managing student data manually can be tedious, error-prone, and inefficient. Institutions require a system that allows seamless handling of student registration, course management, exam conduction, and result tracking. Currently, many educational platforms lack an integrated offline solution where students can register, select courses, read structured notes, appear in exams, and view results while allowing administrators to manage data effortlessly.

2. Solution Overview

This project provides a Java-based GUI Student Management System (SMS) using Swing. It facilitates the following:

- Student registration with field validation.
- Subject selection per course.
- Viewing of detailed subject-wise notes (50-60 paragraphs each).
- Conducting MCQ-based exams (10 questions, 2 per subject).
- Displaying student results with scores and feedback.
- Admin panel for viewing/updating student details and managing results.

The system uses Java collections (ArrayList, HashMap) for temporary in-memory storage and is designed with modular GUI classes for scalability.

3. How the Student Management System is Created

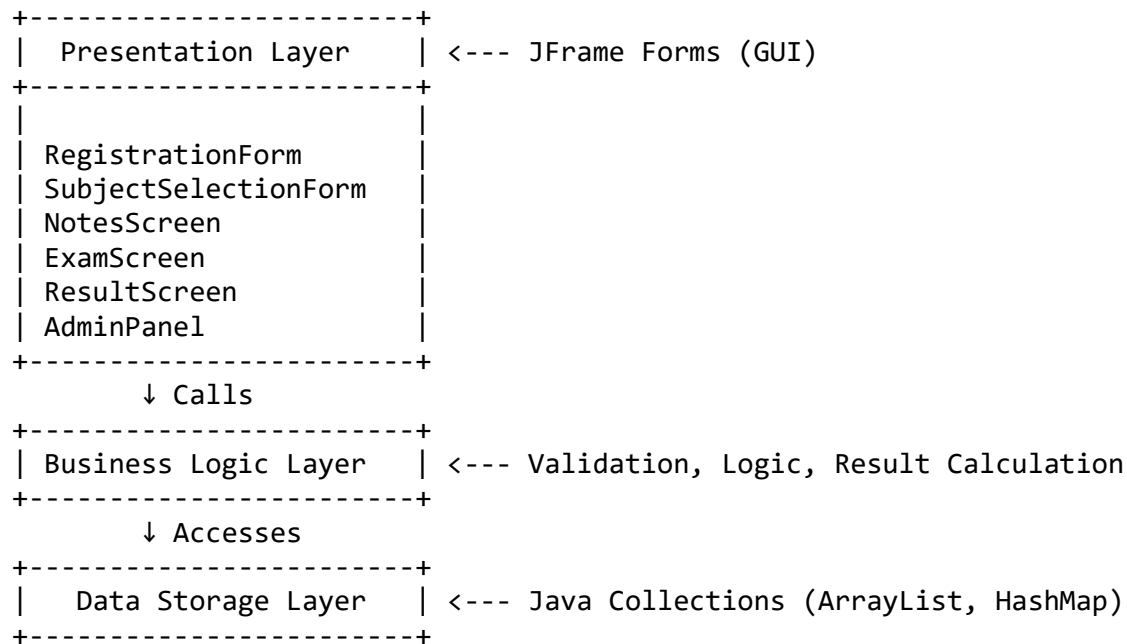
Technologies Used:

- **Language:** Java
- **GUI:** Swing (JFrame, JPanel, JComboBox, JTable, etc.)
- **IDE:** IntelliJ IDEA or Eclipse
- **Data Storage:** Java Collections (future-ready for database integration)

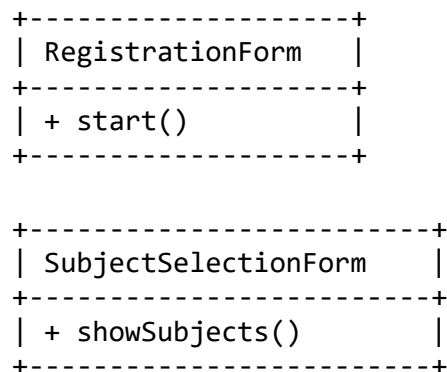
Steps:

1. Created GUI forms using Swing for all user actions (registration, notes, exams).
2. Implemented input validation in RegistrationForm.
3. Stored sample notes and questions in-memory for each subject.
4. Created subject-wise MCQs with correct answer tracking.
5. Developed AdminPanel to view, update, and manage student data.
6. Modularized code into packages for maintainability.

4. Architecture Diagram



5. UML Class Diagram



```

+-----+
| NotesScreen |
+-----+
| + displayNotes |
+-----+

+-----+
| ExamScreen |
+-----+
| + startExam |
| + initializeQuestions() |
+-----+

+-----+
| ResultScreen |
+-----+
| + showResult |
+-----+

+-----+
| AdminPanel |
+-----+
| + showPanel |
+-----+

```

6. Use Case Diagram (Actors & Interactions)

Actor: Student

- Register
- Select Subjects
- Read Notes
- Take Exam
- View Results

Actor: Admin

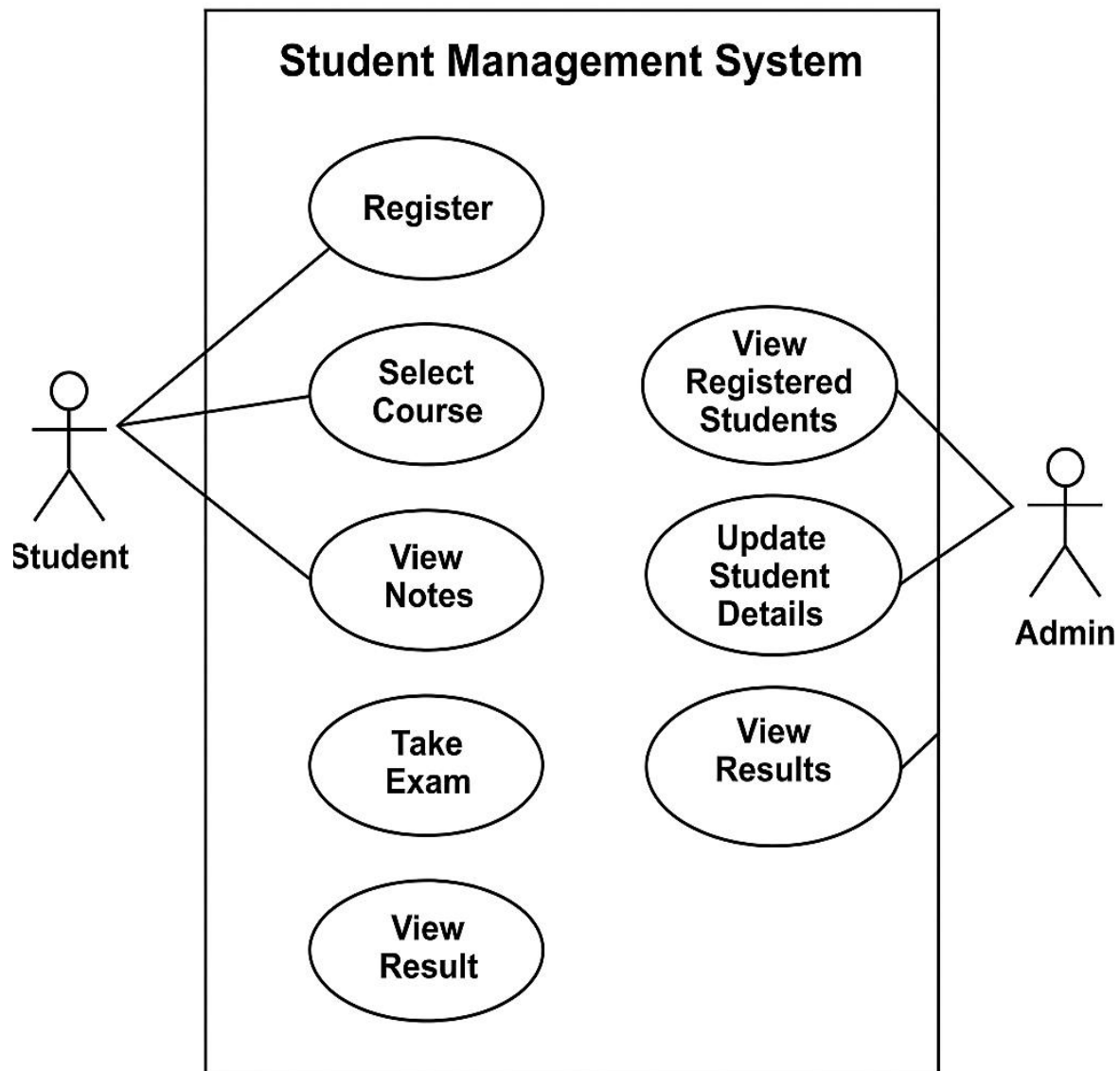
- View Student List
- Update Student Info
- View Results

```

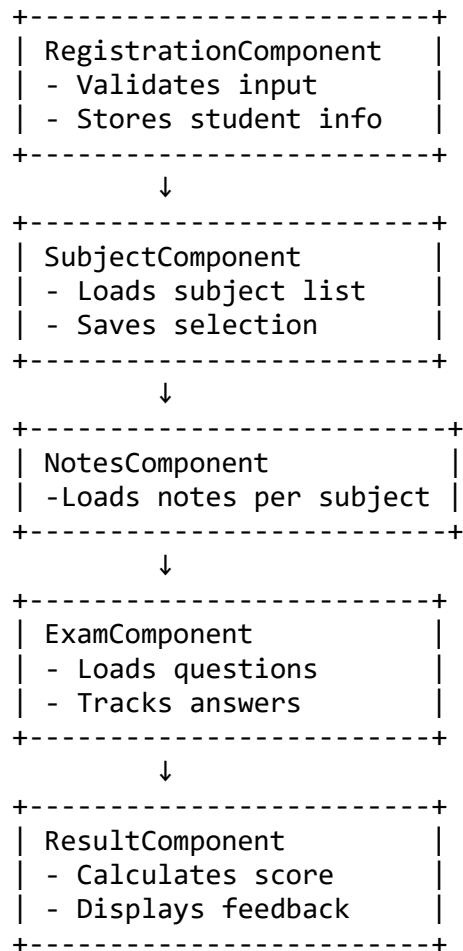
[Student] --> (Register) --> [RegistrationForm]
           --> (Select Course) --> [SubjectSelectionForm]
           --> (View Notes) --> [NotesScreen]
           --> (Take Exam) --> [ExamScreen]
           --> (View Result) --> [ResultScreen]

```

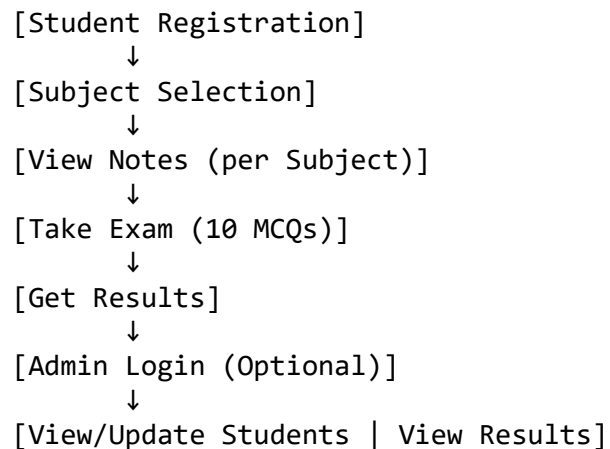
[Admin] ---> (View Registered Students)
---> (Update Student Details)
---> (View Results)
---> [AdminPanel]



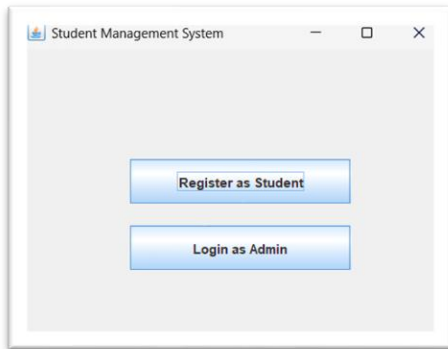
7. Component Diagram



8. System Workflow



9. Screenshots:



The screenshot shows a "Student Registration - Step 1" form with the following fields and values:

| Field | Value |
|----------------------------|----------------------------|
| Name | junaid hussain |
| Student ID | 2022529486 |
| Date of Birth (dd/mm/yyyy) | 29/07/2002 |
| Phone No | 9981710192 |
| Email | hussainjunaids00@gmail.com |
| Semester (1-8) | 7 |
| Select Course | B.Tech |

A "Next" button is located at the bottom right.

The screenshot shows a "Subject Selection - B.Tech" form with the heading "Select 5 Subjects:". The following subjects are checked:

- ☒ DSA
- ☒ OS
- ☐ CN
- ☒ DBMS
- ☒ AI
- ☒ ML
- ☐ Web Dev

A "Register & View Notes" button is at the bottom.

The screenshot shows a "Subject Notes - B.Tech" form with a text area containing notes for three subjects:

Subject: DSA
Data Structures and Algorithms form the backbone of computer science. It involves organizing data efficiently and developing optimal algorithms. Key concepts include arrays, linked lists, trees, graphs, sorting, and searching algorithms. Mastering DSA is crucial for technical interviews and solving complex computational problems.

Subject: OS
Operating Systems manage computer hardware and software resources. Key topics include process management, memory allocation, file systems, and device drivers. Modern OS like Windows and Linux handle multitasking, user interfaces, and security. Understanding OS concepts helps in system programming and performance optimization.

Subject: DBMS
Database Management Systems store and retrieve data efficiently. Relational databases use SQL and follow ACID properties. Topics include normalization, transactions, indexing, and query optimization. NoSQL databases handle unstructured data. DBMS skills are essential for backend development and data analytics.

A "Take Exam" button is at the bottom.

The screenshot shows an "exam portal" window with a question: "1) Time complexity of binary search?". The options are:

- ☐ $O(n)$
- ☒ $O(\log n)$
- ☐ $O(1)$
- ☐ $O(n^2)$

A "Next" button is at the bottom.

The screenshot shows an "Exam Result" window with the following text:

Total Score: 5 / 25
Percentage: 20.00%
GPA: 2.00
Overall Grade: F

The screenshot shows a "Registered Students" dialog box with an information icon and the following text:

Name: Junaid Hussain, Course: B.Tech, Roll: 101
Name: rocky, Course: MBA, Roll: 201

An "OK" button is at the bottom.
