**📄 Student Management System – Documentation**

**1. Project Overview**

The **Student Management System** is a Java console application designed to manage student records and their examination details. It allows administrators to:

* Add new students
* Add examination details (subject-wise marks)
* View student personal details
* View overall examination performance

**2. Technologies Used**

* **Language**: Java
* **Data Structures**:
  + ArrayList for storing student and subject data
  + HashMap for associating roll numbers with examination records
* **User Input**: Java Scanner class for console-based interaction

**3. Class Diagram Overview**

+------------------------+

| Student |

+------------------------+

| - name: String |

| - rollNumber: int |

| - dob: String |

| - email: String |

| - studentId: String |

| - course: String |

+------------------------+

| +displayDetails() |

+------------------------+

+------------------------+

| Subject |

+------------------------+

| - name: String |

| - marks: int |

| - grade: String |

| - percentage: double |

+------------------------+

| +displaySubjectDetails() |

+------------------------+

+------------------------+

| Examination |

+------------------------+

| - subjects: ArrayList |

| - overallPercentage: double |

| - overallGrade: String |

+------------------------+

| +addSubject() |

| +displayExamResults() |

+------------------------+

+----------------------------+

| StudentManagementSystem |

+----------------------------+

| - students: ArrayList |

| - examinations: HashMap |

| - scanner: Scanner |

+----------------------------+

| +main() |

| +addStudent() |

| +addExaminationDetails() |

| +viewStudentDetails() |

| +viewExaminationResults() |

| +findStudentByRollNumber() |

+----------------------------+

**4. Core Functionalities**

**✅ Add Student**

* Captures: Name, Roll Number, DOB, Email, Student ID, Course
* Stores data in an ArrayList<Student>

**✅ Add Examination Details**

* Accepts marks for 5 subjects (0–100 range)
* Validates input
* Calculates grades and percentage per subject
* Computes overall performance
* Stores examination data in HashMap<Integer, Examination>

**✅ View Student Details**

* Search by roll number
* Displays student's full profile

**✅ View Examination Results**

* Displays subject-wise and overall performance
* Fetches data using roll number

**5. Grade Logic**

| **Marks Range** | **Grade** |
| --- | --- |
| 90–100 | A+ |
| 80–89 | A |
| 70–79 | B+ |
| 60–69 | B |
| 50–59 | C |
| 40–49 | D |
| Below 40 | F |

**6. Output Sample**

Student Management System

1. Add New Student

2. Add Examination Details

3. View Student Details

4. View Examination Results

5. Exit

Enter your choice: 1

Enter Student Details:

Name: Deepak

Roll Number: 101

Date of Birth: 01/01/2000

Email: deepak@example.com

Student ID: ST101

Course: MCA

Student added successfully!

**7. Future Improvements (Optional)**

* GUI using JavaFX or Swing
* File storage or database integration
* Support for multiple exams per student
* Password-protected admin panel

**8. Author**

* **Name**: Deepak Negi
* **Course**: MCA
* **University**: Sharda University