**Mini Project : Student Management System**

**🧩 Step-by-Step Setup in Eclipse**

**🧱 Step 1: Create a New Java Project**

1. Open **Eclipse IDE**.
2. Click on **File → New → Java Project**
3. Name it → StudentManagementSystem
4. Click **Finish** ✅

### 🗂 Step 2: Create the Package Hierarchy

Inside the src folder of your project, create these packages one by one:

| **Package Name** | **Purpose** |
| --- | --- |
| com.studentmanagement.model | for Person, Student, Result |
| com.studentmanagement.interfaces | for Calculations interface |
| com.studentmanagement.exceptions | for InvalidMarksException |
| com.studentmanagement.util | for Utils |
| com.studentmanagement.main | for main class (entry point) |

👉 Right-click src → **New → Package** → type package name → click **Finish**  
Repeat for all 5 packages.

### 🧱 Step 3: Add Classes Inside Packages

| **Package** | **File** | **Type** |
| --- | --- | --- |
| com.studentmanagement.model | Person.java, Student.java, Result.java | Class / Abstract |
| com.studentmanagement.interfaces | Calculations.java | Interface |
| com.studentmanagement.exceptions | InvalidMarksException.java | Exception class |
| com.studentmanagement.util | Utils.java | Utility class |
| com.studentmanagement.main | StudentManagementSystem.java | Main class (with public static void main) |

You can create them easily:

Right-click the correct package → **New → Class** → Name it → Finish.

### 📌 Important

Each file **must** begin with the correct package line.  
For example,

package com.studentmanagement.model;

Eclipse will automatically detect and handle imports between these packages.

**▶️ Step 4: Run the Project**

1. Open StudentManagementSystem.java (inside com.studentmanagement.main)
2. Right-click anywhere inside the editor → **Run As → Java Application**
3. Console will open at the bottom — your program will start running ✅

**🧠 Step 5: Verify the Output**

You should see:

===== STUDENT MANAGEMENT SYSTEM =====

1. Add Student

2. View All Students

3. Search by Roll Number

4. Search by Course

5. Exit

Enter your choice:

Then you can start entering student data interactively.

**⚙️ Bonus Tip**

If Eclipse gives a *package not found* or *import error*:

* Right-click your project → **Build Path → Configure Build Path → Source tab → Add Folder → Select src**
* Then click **Apply and Close**
* Finally, **Project → Clean → Clean All Projects** and re-run.

✅ **In short — to run in Eclipse:**

* The **main class** is:
* com.studentmanagement.main.StudentManagementSystem
* Just **Run As → Java Application** from that file.

## ****Package Hierarchy****

com.studentmanagement.interfaces

com.studentmanagement.exceptions

com.studentmanagement.model

com.studentmanagement.util

com.studentmanagement.main

## 🔹 1. com/studentmanagement/interfaces/Calculations.java

package com.studentmanagement.interfaces;

public interface Calculations {

int calculateTotal(int[] marks);

double calculateAverage(int[] marks);

}

## 🔹 2. com/studentmanagement/exceptions/InvalidMarksException.java

package com.studentmanagement.exceptions;

public class InvalidMarksException extends Exception {

@Override

public String toString() {

return "Marks should be between 0 and 100.";

}

}

## 🔹 3. com/studentmanagement/model/Person.java

package com.studentmanagement.model;

public abstract class Person {

protected String name;

protected int rollNo;

public Person(String name, int rollNo) {

this.name = name;

this.rollNo = rollNo;

}

public abstract void display();

}

## 🔹 4. com/studentmanagement/model/Student.java

package com.studentmanagement.model;

import com.studentmanagement.exceptions.InvalidMarksException;

public class Student extends Person {

private String course;

private int[] marks; // 1D array for a student's marks

private char grade;

public static final int SUBJECT\_COUNT = 3;

public Student(String name, int rollNo, String course) {

super(name, rollNo);

this.course = course;

this.marks = new int[SUBJECT\_COUNT];

}

public void setMarks(int[] marks) throws InvalidMarksException {

for (int i = 0; i < SUBJECT\_COUNT; i++) {

if (marks[i] < 0 || marks[i] > 100)

throw new InvalidMarksException();

this.marks[i] = marks[i];

}

}

public int[] getMarks() {

return marks;

}

public String getCourse() {

return course;

}

public void setGrade(char grade) {

this.grade = grade;

}

public char getGrade() {

return grade;

}

@Override

public void display() {

System.out.println("Roll No: " + rollNo + " | Name: " + name + " | Course: " + course);

}

}

## 🔹 5. com/studentmanagement/model/Result.java

package com.studentmanagement.model;

import com.studentmanagement.interfaces.Calculations;

import com.studentmanagement.util.Utils;

public class Result extends Student implements Calculations {

public Result(String name, int rollNo, String course) {

super(name, rollNo, course);

}

@Override

public int calculateTotal(int[] marks) {

int total = 0;

for (int mark : marks)

total += mark;

return total;

}

@Override

public double calculateAverage(int[] marks) {

return calculateTotal(marks) / (double) marks.length;

}

@Override

public void display() {

super.display();

int[] m = getMarks();

int total = calculateTotal(m);

double avg = calculateAverage(m);

char grade = Utils.calculateGrade(avg);

setGrade(grade);

System.out.print("Marks: ");

for (int mark : m) System.out.print(mark + " ");

System.out.println("\nTotal: " + total + " | Average: " + avg + " | Grade: " + grade);

}

}

## 🔹 6. com/studentmanagement/util/Utils.java

package com.studentmanagement.util;

import com.studentmanagement.model.Student;

public final class Utils {

private Utils() {}

public static void printLine() {

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

}

public static char calculateGrade(double average) {

if (average >= 90) return 'A';

else if (average >= 75) return 'B';

else if (average >= 60) return 'C';

else if (average >= 40) return 'D';

else return 'F';

}

// Method overloading

public static void printStudent(Student s) {

s.display();

}

public static void printStudent(Student[] sArr) {

for (Student s : sArr) {

if (s != null) s.display();

}

}

}

## 🔹 7. com/studentmanagement/main/StudentManagementSystem.java

package com.studentmanagement.main;

import java.util.Scanner;

import com.studentmanagement.model.\*;

import com.studentmanagement.exceptions.\*;

import com.studentmanagement.util.Utils;

public class StudentManagementSystem {

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

final int MAX\_STUDENTS = 5;

Result[] students = new Result[MAX\_STUDENTS];

int[][] allMarks = new int[MAX\_STUDENTS][Student.SUBJECT\_COUNT]; // 2D Array

int count = 0;

System.out.println("===== STUDENT MANAGEMENT SYSTEM =====");

while (true) {

Utils.printLine();

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

System.out.println("2. View All Students");

System.out.println("3. View 2D Marks Table");

System.out.println("4. Search by Roll Number");

System.out.println("5. Exit");

Utils.printLine();

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

int choice = sc.nextInt();

switch (choice) {

case 1:

if (count >= MAX\_STUDENTS) {

System.out.println("Cannot add more students.");

break;

}

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

String name = sc.next();

System.out.print("Enter Roll No: ");

int roll = sc.nextInt();

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

String course = sc.next();

Result r = new Result(name, roll, course);

int[] marks = new int[Student.SUBJECT\_COUNT];

for (int i = 0; i < Student.SUBJECT\_COUNT; i++) {

System.out.print("Enter Marks for Subject " + (i + 1) + ": ");

marks[i] = sc.nextInt();

}

try {

r.setMarks(marks);

students[count] = r;

allMarks[count] = marks; // store in 2D array

count++;

System.out.println("Student added successfully!");

} catch (InvalidMarksException e) {

System.out.println(e);

}

break;

case 2:

if (count == 0) {

System.out.println("No students added yet.");

} else {

for (int i = 0; i < count; i++) {

students[i].display();

Utils.printLine();

}

}

break;

case 3:

if (count == 0) {

System.out.println("No students available.");

} else {

System.out.println("===== 2D MARKS TABLE =====");

System.out.print("RollNo\t");

for (int j = 0; j < Student.SUBJECT\_COUNT; j++) {

System.out.print("Sub" + (j + 1) + "\t");

}

System.out.println();

Utils.printLine();

for (int i = 0; i < count; i++) {

System.out.print(students[i].rollNo + "\t");

for (int j = 0; j < Student.SUBJECT\_COUNT; j++) {

System.out.print(allMarks[i][j] + "\t");

}

System.out.println();

}

}

break;

case 4:

System.out.print("Enter Roll No to search: ");

int searchRoll = sc.nextInt();

boolean found = false;

for (int i = 0; i < count; i++) {

if (students[i].rollNo == searchRoll) {

students[i].display();

found = true;

break;

}

}

if (!found)

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

break;

case 5:

System.out.println("Exiting... Thank you!");

sc.close();

return;

default:

System.out.println("Invalid choice.");

}

}

}

}

**✅ How to Run in Eclipse**

1. Create a new **Java Project** → StudentManagementSystem
2. Inside src, create these packages:
3. com.studentmanagement.interfaces
4. com.studentmanagement.exceptions
5. com.studentmanagement.model
6. com.studentmanagement.util
7. com.studentmanagement.main
8. Create the .java files under their respective packages and **paste the code** above.
9. Open StudentManagementSystem.java
10. Right-click → **Run As → Java Application**

**🧩 Example Console Output**

===== STUDENT MANAGEMENT SYSTEM =====

1. Add Student

2. View All Students

3. View 2D Marks Table

4. Search by Roll Number

5. Exit

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

Enter your choice: 1

Enter Name: Arjun

Enter Roll No: 101

Enter Course: BCA

Enter Marks for Subject 1: 85

Enter Marks for Subject 2: 90

Enter Marks for Subject 3: 80

Student added successfully!

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

1. Add Student

2. View All Students

3. View 2D Marks Table

4. Search by Roll Number

5. Exit

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

Enter your choice: 3

===== 2D MARKS TABLE =====

RollNo Sub1 Sub2 Sub3

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

101 85 90 80