Lab Assignment: MVC Architecture in Java

Objective:

Understand and implement the MVC design pattern by creating a simple Java application.

Requirements:

1. Create a Java program to simulate a basic `Student Management System` with:
   - **Model:** A `Student` class with attributes `name`, `rollNumber`, and `grade`.
   - **View:** A `StudentView` class to display student details.
   - **Controller:** A `StudentController` class to manage the interaction between the model and the view.
2. Implement a `main` method to:
   - Create a `Student` object and set its details using the `Controller`.
   - Update the `Student` details and refresh the view.

Code Starter:

```
// Student.java (Model)
public class Student {
    private String name;
    private int rollNumber;
    private String grade;

    // Getters and setters
}

// StudentView.java (View)
public class StudentView {
    public void displayStudentDetails(String name,
                    int rollNumber, String grade) {
        // TODO: Display details
    }
}

// StudentController.java (Controller)
public class StudentController {
    private Student model;
    private StudentView view;

    public StudentController(Student model, StudentView view) {
        this.model = model;
        this.view = view;
    }

    public void updateView() {
```

```
        // TODO: Refresh view
    }

    public void setStudentName(String name) {
        // TODO: Update model
    }
}
```

Exercises:

1. Add functionality to manage multiple students using a collection.
2. Create a method in the `Controller` to search for students by their roll number.
3. Extend the `View` to display all students in a tabular format.

Bonus Tasks:

1. Implement the `Observer` pattern so the `View` automatically updates when the `Model` changes.
2. Add a graphical interface to the `View` using Swing.
3. Include validation for inputs in the `Controller`.

Submission:
Submit your code and screenshots of your program's output.