Student Grade Tracker

Project Details

Project Title: Student Grade Tracker

Technologies: Java, JavaFX, FXML, CSS

Developer: Aryan Sengar

Platform: Desktop (JavaFX GUI)

GitHub Repository: https://github.com/aryansengar007/CodeAlpha_StudentGradeTracker

Introduction

The Student Grade Tracker is a desktop application designed to help teachers, educators, or administrators easily record, analyze, and manage student grades. Built using JavaFX, the application features a modern and interactive GUI, real-time statistical insights, and data visualization through pie charts.

Problem Statement

Managing student grades manually or using spreadsheets can be time-consuming, error-prone, and lacks visual insights. There is a need for a lightweight yet efficient solution to:

- Add student scores dynamically

- Search/filter students based on performance

- Calculate performance metrics

- Visualize grade distribution

- Export data for external use

Key Observations

- JavaFX provides a powerful UI framework with excellent layout control and media integration.

- Real-time updates and user feedback enhance usability.

- Input validation and filtering are essential for a clean dataset.

Challenges / Doubts

- Learning FXML structure and linking it to controller logic properly using Scene Builder.

- Binding dynamic UI elements like charts and labels with backend logic.

- Managing data flow between different components (TextFields, TableView, PieChart).

- Ensuring smooth and bug-free file export handling.

Libraries Used

Library	Purpose
javafx.fxml	For loading FXML-based UI
javafx.scene	For JavaFX elements and layouts
javafx.stage	For window (stage) control
javafx.chart	For visualizing grade distribution
java.io	For file writing/exporting data
javafx.collections	For observable lists and filtering

Functions Explained

Function Name	Description
handleAddGrade()	Adds a new student and grade with validation
updateStats()	Calculates and displays average, highest, and lowest grades
updateChart()	Updates the pie chart to reflect current grade distribution
applyFilters()	Filters students by name and performance category
handleSaveToFile()	Saves student data to a local `.txt` file
showAlert(String msg)	Shows informational popup dialogs for user actions

Main Components

1. Main.java
Launches the application, loads the FXML layout, and applies CSS styling.

2. Controller.java
Contains all event handling, logic processing, and data interaction with the UI.

3. Student.java
Simple POJO model class representing a student's name and grade.

4. dashboard.fxml
FXML layout created with Scene Builder. Manages layout for inputs, table, labels, and chart.

5. style.css
Custom styling for UI elements to ensure a clean, modern appearance.

Future Improvements

- Add CSV/Excel export support

- Allow grade editing and deletion

- Integrate login/user authentication

- Add sorting by grade or name

- Support additional subjects per student

- Dark mode toggle with theme persistence

Conclusion

The Student Grade Tracker successfully demonstrates the power of JavaFX for creating desktop applications with professional UIs. With functionalities like data validation, dynamic charts, filtering, and file export, it offers a solid base for more advanced educational tools in the future.