**Student Management System**

**Complete project in shell scripting**

**🔍 Overview of the Script**

This script is a **command-line Student Management System** written in **Bash**. It allows **teachers and students** to manage academic records such as marks, grades, and CGPA. The records are stored in text files, making the system lightweight and easy to run on any Unix-like system.

**📁 Files Used**

* students.txt: Stores student records in CSV format:  
  RollNumber,Name,Marks,Grade,GPA
* credentials.txt: Stores teacher login credentials in username:password format.

**✅ Main Functionalities**

**1. File Initialization**

* initialize\_files:
  + Ensures that students.txt and credentials.txt exist.
  + Creates them if missing, and initializes the credentials file with a default teacher account.

**2. Grading and GPA System**

* calculate\_grade(marks):
  + Maps numerical marks to letter grades.
  + Uses a 12-point grading scale (A+ to F).
* calculate\_grade\_point(grade):
  + Converts grades to corresponding GPA values (e.g., A = 4.00, B = 3.00, F = 0.00).

**3. Student Management Operations**

* add\_student():
  + Adds a new student record.
  + Prevents duplicate roll numbers.
  + Calculates and stores grade and GPA based on input marks.
  + Limits the number of students to 20.
* update\_student():
  + Allows updating name or marks for a student.
  + Recalculates grade and GPA if marks are updated.
* delete\_student():
  + Deletes a student record by roll number.
* view\_student\_details():
  + Displays a student’s record using roll number.

**4. Reports & Analysis**

* generate\_report():
  + Displays all student records in a formatted table sorted by roll number.
* calculate\_student\_cgpa(roll):
  + Computes the average GPA (CGPA) for a student across multiple records.

**5. Result Filtering**

* list\_passed\_students():
  + Lists students with GPA > 2.00.
* list\_failed\_students():
  + Lists students with GPA ≤ 2.00.
* list\_students\_ascending():
  + Displays all students sorted by CGPA in **ascending** order.
* list\_students\_descending():
  + Displays all students sorted by CGPA in **descending** order.

**🔐 User Authentication**

* Teacher login credentials are verified using credentials.txt.
* Student login is validated using roll number and name from students.txt.

*(Note: the actual login functions and menu-driven interface may be located in the part of the script you didn’t paste yet.)*