MOBILE APPLICATION FOR CGPA AND SGPA CALCULATION

A DESIGN PROJECT REPORT

Submitted by

ARAVINTH M D

HASWIN KUMAR V T

JAYANAN M

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(An Autonomous Institution, affiliated to Anna University Chennai and Approved by AICTE, New Delhi)

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BONAFIDE CERTIFICATE

Certified that this project report titled **"MOBILE APPLICATION FOR CGPA AND SGPA CALCULATION"** is the bonafide work of the students ARAVINTH M D(811722104013), HASWIN KUMAR V T(811722104053), JAYANAN M (811722104062) who carried out the project under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasionon this orany other candidate.

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INTERNAL EXAMINER **EXTERNAL EXAMINER**

DECLARATION

We jointly declare that the project report on **"CGPA & SGPA CALCULATOR MOBILE APPLICATION"** is the result of original work done by us and best of our knowledge, similar work has not been submitted to **"ANNA UNIVERSITY CHENNAI"** for the requirement of Degree of **BACHELOR OF ENGINEERING**. This project report is submitted on the partial fulfilment of the requirement of the award of Degree of **BACHELOR OF ENGINEERING**.

Signature

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HASWIN KUMAR V T

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Place: Samayapuram

Date:

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ABSTRACT

The College CGPA & SGPA Calculator is a mobile app designed to simplify the calculation and management of academic performance metrics, specifically CGPA and SGPA. It addresses the challenges of manual tracking and inaccuracies in record-keeping by offering a user-friendly solution for both students and academic staff. The app allows students to input their grade points and credits for each course, automatically calculating SGPA and CGPA for individual semesters and overall academic performance. With a professional theme featuring the college's logo and colors, the app provides an intuitive interface built for Android platforms, using WebView for responsive design. By automating calculations, the app reduces errors and delays, supporting academic advising and helping students track their progress toward academic goals. It enhances efficiency, transparency, and adaptability to various grading systems, representing a step toward digital transformation in academic administration.

TABLE OF CONTENT

LIST OF FIGURES AND TABLES

LIST OF ABBREVIATIONS

DFD	Data Flow Diagram
UML	Unified Modeling Language
SGPA	Semester Grade Point Average
CGPA	Cumulative Grade Point Average
AI	Artificial Intelligence
HTML	Hypertext Markup Language
CSS	Cascading Style Sheets
RDBMS	Relational Database Management System
CRUD	Create, Read, Update, Delete
UI	User Interface
IDE	Integrated Development Environment
API	Application Programming Interface
RAM	Random Access Memory
SSD	Solid-State Drive

CHAPTER 1

INTRODUCTION

1.1 Project Overview

The **CGPA Calculation System** is developed to simplify and automate the process of calculating CGPA (Cumulative Grade Point Average) for students, making it easier and more efficient compared to traditional manual methods. The system is designed to assist students in tracking their academic progress without the need for complex manual calculations. The system enables students to input their grades, select courses, and instantly calculate their CGPA using pre-defined rules and parameters.

This project is an Android-based mobile application, providing users with an intuitive, easy-to-use interface. The CGPA Calculation System removes the burden of manual grade entry, calculation, and tracking. By automating these tasks, students can access their academic performance with just a few clicks. Additionally, the app provides detailed information on SGPA (Semester Grade Point Average) and CGPA, helping students plan their academic future with greater precision.

The main objective of the project is to provide an efficient, user-friendly, and accurate tool for students to calculate their CGPA, track academic progress, and make informed decisions about their studies. This system is intended to cater to students across different disciplines, and it can be customized to accommodate various grading systems used by different educational institutions.

The system also includes a "What-If Analysis" tool, allowing students to predict their future CGPA based on hypothetical grades. This empowers users to set academic goals and plan their studies more effectively, identifying areas of improvement.

1.2 Problem Statement

The traditional method of calculating CGPA is time-consuming, error-prone, and often leads to discrepancies. Students or administrators are required to manually input data, which can be tedious and may result in mistakes. Moreover, keeping track of academic performance manually, especially across multiple semesters, can be overwhelming.

The **CGPA Calculation System** aims to solve these challenges by automating the entire process. This system eliminates the need for students and administrators to manually calculate their CGPA, reducing human errors and saving valuable time. With an easy-to-use interface and immediate results, students can view their academic progress anytime, anywhere. This project addresses the limitations of the manual CGPA calculation process and provides a more reliable, faster, and transparent alternative.

By automating the CGPA calculation and enabling seamless tracking of academic records, the system improves the student experience. It ensures transparency, reduces errors, and provides students with an easy way to monitor their academic progress. This application also removes the stress of remembering complex formulas, making academic record-keeping more streamlined.

The traditional approach also lacks the ability to provide predictive insights into academic performance. Students are unable to anticipate the impact of their future grades on their CGPA, leaving them with limited tools to plan and improve their academic standing. Furthermore, manual methods do not support comparative analysis of grades over multiple semesters, making it challenging for students to identify patterns or areas that need improvement. The CGPA Calculation System bridges these gaps by offering features such as "What-If Analysis," allowing students to simulate various academic scenarios and make informed decisions about their studies. Additionally, it provides graphical analytics and trend reports, which simplify the interpretation of academic performance over time.

1.2.1 Goals

The primary goals of the **CGPA Calculation System** include:

- **Automate CGPA Calculation:** The system will automate the entire CGPA calculation process, ensuring accuracy and efficiency.
- **Track Academic Progress:** The system will allow students to view their CGPA and SGPA for each semester, helping them track their performance over time and identify areas of improvement.
- **User-Friendly Interface:** The application will be designed with a simple, intuitive user interface, ensuring that students of all levels can easily navigate and use the system.
- **Support Multiple Grading Systems:** The system will support different grading scales, allowing customization for various educational institutions with different grading norms.
- **Provide Instant Feedback:** Upon entering their grades, students will instantly receive their CGPA and SGPA calculations, enabling them to make decisions about their academic future without waiting for manual processing.
- **Data Security:** The system will ensure that students' academic data is stored securely and can only be accessed by authorized users.
- **Predictive Analysis**: The system will include a "What-If Analysis" feature, enabling students to predict their future CGPA based on hypothetical grades and make informed decisions to improve their academic standing.
- **Easy Data Entry**: Students can easily input grades for each subject, and the system will automatically calculate the corresponding grade points and aggregate them to provide the CGPA. This eliminates the need for manual calculations and reduces the risk of human error.

1.3 Objectives of the Project

The **CGPA Calculation System** has several key objectives, aimed at improving the student experience and providing a seamless academic record-keeping system:

- **To automate CGPA and SGPA calculation:** The system will automatically calculate CGPA and SGPA based on the grades entered by the students, ensuring accuracy and reducing the chances of human error.
- **To maintain an easily accessible student database:** The system will maintain a database of students' academic records, including grades, courses taken, and CGPA history, all accessible at any time.
- **To provide instant feedback on academic performance:** Students will receive immediate feedback on their CGPA and SGPA as soon as they enter the required grades, eliminating the need for waiting periods.
- **To simplify grade entry:** The system will provide a simple interface where students can input their grades for each course taken, eliminating the complexity of manual calculations.
- **To offer customization options for grading systems:** The system will support various grading systems used by educational institutions, including GPA scales, percentage-based systems, and letter grades.
- **To allow students to track academic trends:** Students can monitor their academic progress over the semesters and plan their future course selection based on past performance.
- **To reduce academic stress**: By automating the CGPA and SGPA calculations, the system will alleviate the stress associated with manual record-keeping and calculations, allowing students to focus on their studies rather than on complex mathematical formulas.
- **To ensure data privacy and security**: The system will incorporate measures to safeguard students' personal and academic information, ensuring that data is stored securely.

1.4 Scope of the Project

The scope of the **CGPA Calculation System** includes the following aspects:

- **User Roles:** The system will be designed primarily for students, who can log in and input their grades. It may also include an admin panel for system maintenance and customization of grading systems.
- **Academic Record Management:** The system will allow students to maintain a record of their grades for each semester, calculate SGPA, and update their CGPA accordingly.
- **Customization:** The system will be flexible enough to accommodate different grading systems used by various educational institutions, allowing the admin to adjust the grading scales based on the institution's requirements.
- **Real-Time Calculation:** As soon as the grades are entered, the system will automatically calculate and display the CGPA and SGPA without requiring any manual intervention.
- **Security and Privacy:** The system will store data securely, ensuring that student information is protected and accessible only by authorized users.
- **Future Expansion:** The application may be extended in future versions to include features such as cloud integration for data synchronization, analytics to track trends in academic performance, and cross-platform compatibility.
- • **User-Friendly Interface**: The system will provide a simple, intuitive user interface that allows students of varying technical expertise to easily navigate the application, input their grades, and receive immediate feedback on their academic performance.
- **Multi-Semester Support**: The system will allow students to input and track their grades over multiple semesters, enabling them to calculate cumulative CGPA and SGPA as they progress through their academic journey.

CHAPTER 2

LITERATURE REVIEW

2.1 Evolution of CGPA Calculation Systems

TITLE: Development of Automated CGPA Calculation Systems

AUTHOR: Zhang, X., & Liu, Y.

YEAR: 2019

This study examines the transition from manual to automated CGPA calculation systems in educational institutions. The authors discuss the challenges faced by traditional methods and the advantages of automated systems. Key points include:

- Integration with Learning Management Systems (LMS) for automatic updates based on grades.
- Time-saving benefits and the reduction of human errors.
- Improved access to academic data and ease of use for students and administrators.
- Real-time tracking of academic progress, allowing students to monitor their CGPA immediately after assessments.
- Scalability and flexibility, enabling the system to adapt to different institutions and handle large volumes of data efficiently.
- The shift from paper-based to digital records, reducing the risk of physical record loss and enabling efficient data retrieval.
- The role of student feedback in refining automated systems, ensuring the technology aligns with user needs.
- The potential for integrating automated CGPA systems with other academic tools, such as course selection, to provide a holistic academic experience.

2.2 Design and Development Approaches for CGPA Calculation Applications

TITLE: A Web-Based CGPA Calculation System for Higher Education Institutions

AUTHOR: Roy, S., & Dutta, A.

YEAR: 2020

This paper investigates the design of web-based CGPA calculation systems and compares it to mobile and desktop platforms. It emphasizes how such systems improve user experience by integrating with student databases. Key features discussed include:

- Object-Oriented Programming (OOP) for system modularity.
- The importance of seamless database integration for real-time grade and course updates.
- Popularity and convenience of mobile applications for students.
- Leveraging machine learning to provide personalized academic advice.
- Enhancing data security and reducing risks of data loss with cloud storage.
- The use of cross-platform development tools, such as React Native or Flutter, to make the application accessible on various devices and operating systems.
- A focus on the user interface (UI) and user experience (UX) design, ensuring that the system is both visually appealing and functional.
- Discussion on system performance optimization, ensuring fast calculations even with large data sets or long academic histories.
- The consideration of accessibility features, like voice input or high-contrast modes, to make the system usable for students with disabilities.

2.3 Integration of Advanced Technologies in CGPA Calculation Systems

TITLE: Cloud-Based CGPA Calculation and Predictive Analytics Using AI

AUTHOR: Chen, Z., & Wang, X.

YEAR: 2021

This paper explores the role of cloud computing and AI in enhancing CGPA calculation systems. The study highlights how these technologies improve scalability, data security, and predictive analytics. Key points include:

- Use of cloud platforms for secure access to student records.
- Artificial intelligence for predicting academic trends and suggesting improvements for students.
- Machine learning for providing personalized academic advice.
- Improving system scalability to handle a growing number of students and records.
- Enabling real-time updates for grades and course data through cloud synchronization.
- Reducing manual errors by automating data processing and CGPA calculations.
- Use of predictive analytics to help students understand the long-term impact of their current academic performance on future CGPA.
- Potential use of cloud-based systems for real-time collaborative features, such as live academic consultations between students and academic advisors.
- Discussion on the challenges of integrating AI in education, such as ensuring the quality and fairness of machine learning models and protecting student privacy.

2.4 Comparative Analysis of Manual and Automated Systems

TITLE: Comparison of Manual and Automated CGPA Calculation Systems

AUTHOR: Lim, H., & Kim, J.

YEAR: 2022

This study compares manual CGPA calculation methods with automated systems in terms of accuracy, efficiency, and user satisfaction. Key findings include:

- Automated systems show improved accuracy, speed, and user satisfaction compared to manual systems.
- The study stresses the importance of customization in the system to accommodate various grading schemes (e.g., GPA, percentage-based).
- Institutional adoption of automated systems offers significant administrative advantages, including integration with fee and course management systems.
- Providing a flexible, accessible platform for students and faculty, regardless of location.
- Allowing real-time collaboration between students and instructors for academic performance reviews and suggestions.
- A case study on the implementation of automated CGPA systems in a specific educational institution, including lessons learned and improvements made over time.
- The impact of automation on administrative efficiency, such as the reduction of time spent on grade calculation and report generation.
- Analysis of how manual systems often lead to delays in report generation, while automated systems provide immediate access to updated academic data.

CHAPTER 3

EXISTING SYSTEM

3.1 Overview of the Existing CGPA Calculation Systems

Currently, most educational institutions rely on manual methods or spreadsheets to calculate CGPA. While these methods work for smaller groups, they are inefficient for larger student populations and prone to errors. Manual systems involve staff manually entering grades, calculating GPAs, and generating reports. This process is both time-consuming and error-prone, with human mistakes often leading to discrepancies in the final CGPA calculation.

Another common approach is using spreadsheet software like Microsoft Excel, where grades are input into predefined templates that automatically calculate CGPA. While this system is relatively efficient for smaller institutions, it still requires human oversight to ensure the accuracy of the data and calculations. Moreover, spreadsheets do not offer scalability or a user-friendly interface, and they lack features like student login or real-time updates.

Some universities have developed in-house software solutions that automate CGPA calculation. These systems are typically built using programming languages like Java or Python and often include a database to store student grades. However, these systems tend to be complex and require significant technical expertise to maintain and update.

Despite these advancements, most existing systems lack integration with other student management functions such as course registration, fee payment, and class attendance. A fully integrated system that combines CGPA calculation with other student services remains rare.

3.2 Limitations of the Existing Systems

The main limitations of the existing systems include:

1. **Manual Errors:** Even with automated tools like spreadsheets, human errors can occur during data entry, leading to incorrect CGPA calculations.
2. **Lack of Integration:** Existing systems are often standalone applications, which means they do not interact with other student management systems. This lack of integration makes it difficult to update student records in real-time or access other academic information.
3. **Limited Customization:** Many systems are tailored to specific grading schemes, limiting their usability in institutions with different grading systems.
4. **Security Risks:** Data security is a concern in existing systems, especially those that are manually maintained or lack proper encryption.
5. **Inaccessibility:** Manual systems or non-web-based applications can be difficult for students and administrators to access remotely.
6. **Scalability Issues**: Many existing systems struggle to handle large volumes of student data, especially in institutions with high enrollment numbers. This can lead to slow performance or system crashes during peak usage periods, such as during exam results processing.
7. **Lack of Real-Time Updates**: Existing systems often require manual intervention for updates, meaning that academic data, such as grades or CGPA, may not be immediately reflected, leading to outdated or inaccurate information.
8. **Complex User Interfaces**: Some older systems have complicated user interfaces that make them difficult to use for both students and administrators. The lack of a user-friendly interface can lead to errors and inefficiencies.

CHAPTER 4

PROPOSED SYSTEM

4.1 Overview of the Proposed CGPA Calculation System

The proposed **CGPA Calculation System** is designed to address the limitations of the existing systems and provide a seamless, efficient, and secure method of calculating and tracking students' academic performance. The system will automate the entire CGPA calculation process, from grade entry to report generation, ensuring that students' records are accurate and up to date.

The system will be web-based, allowing students and administrators to access it from any device with an internet connection. It will support multiple grading schemes, enabling customization based on the institution's requirements. Additionally, the system will be secure, with encrypted data storage and role-based access controls to ensure that sensitive information is protected.

By integrating CGPA calculation with other student services such as course registration, fee payment, and attendance tracking, the system will provide a holistic solution for academic administration.

4.2 Features of the Proposed System

The **CGPA Calculation System** will include the following key features:

- **User Login:** Students will be able to log in and access their academic records securely.
- **Grade Entry and Calculation:** Students can input their grades for each course, and the system will automatically calculate their SGPA and CGPA.
- **Real-Time Updates:** As grades are entered, the system will immediately update the CGPA and provide feedback.
- **Multiple Grading Systems:** The system will support different grading systems, including GPA, percentage-based systems, and letter grades.

- **Data Security and Privacy**: The system will ensure that student data is securely stored and transmitted, adhering to privacy regulations such as GDPR, to protect sensitive academic information.
- **User-Friendly Interface**: The system will provide an intuitive and easy-to-navigate interface for both students and administrators, ensuring a seamless user experience for accessing and managing academic records.
- **Performance Analytics**: The system will offer insights and analytics, allowing students to track their academic progress over time, visualize trends in their grades, and identify areas for improvement.
- **Mobile Access**: The system will be developed as a mobile application, allowing students to access and calculate their CGPA and SGPA on the go, providing convenience for remote access.
- **Real-Time Updates**: As students input their grades, the system will automatically calculate and display the updated SGPA and CGPA, providing instant feedback.
- **Multiple Grading Systems**: The system will support various grading systems, such as GPA, percentage-based systems, and letter grades, making it adaptable to different academic standards.
- **Customizable Grading Scales**: Institutions can define and adjust grading scales according to their specific grading criteria, ensuring the system works for a variety of grading norms.
- **User-Friendly Interface**: The system will feature a simple, intuitive, and easy-to-navigate interface, ensuring that students of all levels can easily use it to input their grades and check their academic performance.
- **Offline Functionality**: The system will allow students to enter grades and calculate their CGPA even without an internet connection. Once reconnected, the system will automatically synchronize and update the results.

CHAPTER 5

SYSTEM ARCHITECTURE

5.1 Data Flow Diagram (DFD)

A **Data Flow Diagram (DFD)** is a visual representation of how data moves within the system. It shows the data sources, destinations, processes, and data stores. The DFD of the CGPA Calculation System illustrates the flow of information from students' grade entries to the final CGPA calculation.

In the first level of the DFD, students enter their grades through a user interface. These grades are sent to the system's backend, where the system calculates the SGPA and CGPA using predefined rules. The results are then displayed to the students in real-time.

The **Level 1 DFD** of the system might look like this:

1. **External Entities:**
    - **Student:** Inputs grades for each subject.
    - **Admin:** Manages grading rules and checks student records.
2. **Processes:**
    - **Grade Entry:** Students enter grades into the system.
    - **CGPA Calculation:** The system calculates SGPA and CGPA based on the entered grades.
    - **Report Generation:** Generates reports for students and administrators.
3. **Data Stores:**
    - **Student Records:** Stores student data including grades.
    - **Course Information:** Stores data about courses, including credit hours and grading schemes.

- The **Grade Entry** process is connected to both the **Student Records** and **Course Information** data stores, as students input grades for specific courses, which are tied to course information like credit hours.
- The **CGPA Calculation** process takes data from the **Grade Entry** and **Course Information** processes, calculating the SGPA and CGPA based on the grades entered and the respective grading scheme.
- The **Report Generation** process takes the calculated SGPA and CGPA and presents them in a user-friendly format, making it easy for students and administrators to track academic progress.

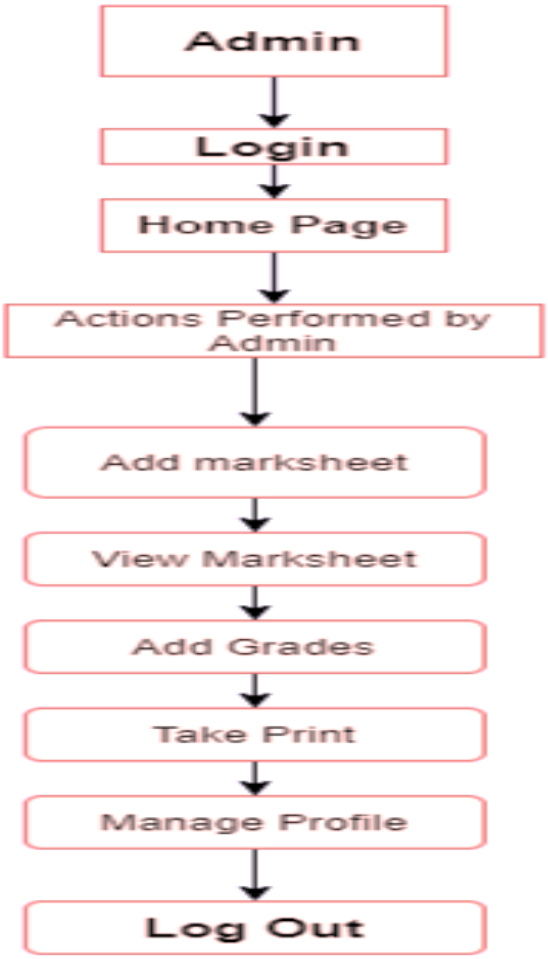


Figure 5.1 DFD Diagram

5.2 Use-Case Diagram

The **Use-Case Diagram** provides a high-level overview of the system's functionality from the perspective of the users. It identifies the system's actors and their interactions with the system.

Actors in the system include:

1. **Student:** Enters grades, views CGPA, checks reports.
2. **System logic:** Manages system settings, updates grading schemes, checks overall CGPA records.
3. **System:** Calculates SGPA/CGPA, generates reports, sends notifications.

In the use-case diagram:

- Students input their grades and view the CGPA.
- Administrators manage grading systems and generate reports.
- The system automatically calculates CGPA based on entered data.
- **Student Interface**: The student will have an intuitive interface where they can input grades for each course, view real-time CGPA/SGPA updates, and generate academic performance reports.
- **System Functions**: The system will automatically calculate the CGPA and generate reports, providing immediate feedback to the student upon grade entry.

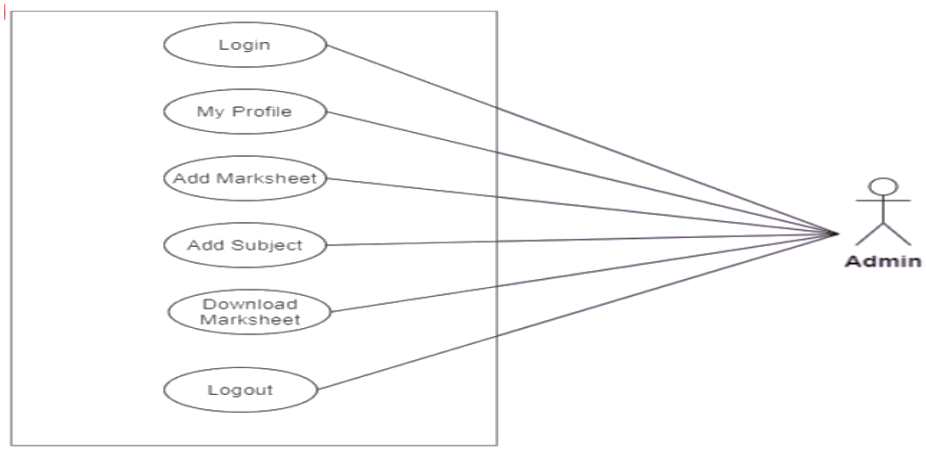


Figure 5.2 Use Case Diagram

5.3 Activity Diagram

The **Activity Diagram** represents the workflow of the system's operations. It highlights the sequence of actions that the system performs to calculate the CGPA.

1. **Start**
2. **Login:** Student logs into the system.
3. **Enter Grades:** Students enter grades for each subject.
4. **Calculate CGPA:** The system calculates the CGPA.
5. **View Results:** Students view their CGPA and grades.
6. **Generate Reports:** The system generates CGPA reports.
7. **End**

Flow of Activities:

Start → Enter Grades → Calculate CGPA → View Results → Generate Reports → End

Each step in the activity diagram represents a specific action or decision in the system, ensuring that the process flows smoothly from start to finish. This diagram allows developers to visualize the entire interaction process for the user and aids in understanding how the system operates in response to user inputs.

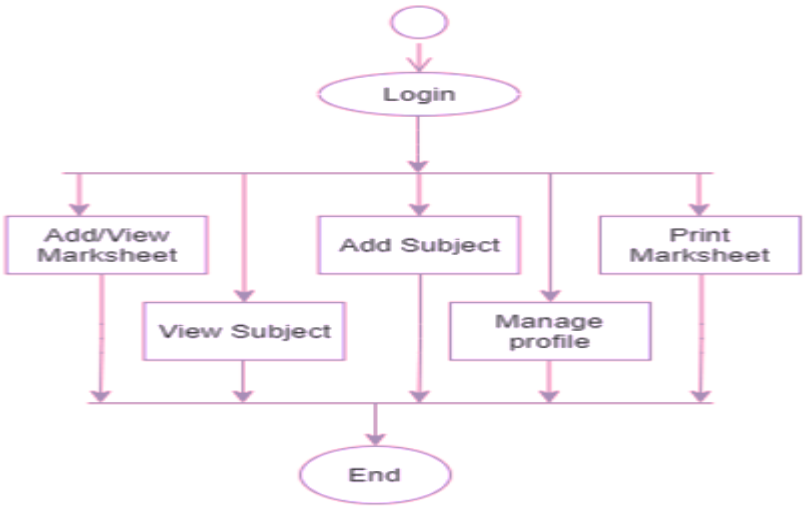


Figure 5.3 Activity Diagram

5.4 Sequence Diagram

The **Sequence Diagram** depicts the interaction between different objects over time. For example, when a student logs into the system and submits their grades, the system processes the input and responds with the CGPA.

- **Objects:**
  - Student
  - User Interface (UI)
  - System (Backend)
  - Database

- **Flow:**
  1. The **Student** interacts with the **UI** to enter grades.
  2. The **UI** sends the grades to the **System** for processing.
  3. The **System** calculates the SGPA/CGPA and fetches relevant data from the database for formulae.
  4. The **System** responds with the CGPA.
  5. The **UI** displays the result to the student.

Sequence Overview:

1. **Student → UI**: Logs in and inputs grades.
2. **UI → System (Backend)**: Sends grades for processing.
3. **System (Backend) → Database** (if applicable): Fetches additional data for calculations.
4. **System (Backend) → UI**: Sends calculated SGPA/CGPA.
5. **UI → Student**: Displays the calculated CGPA and SGPA to the student.

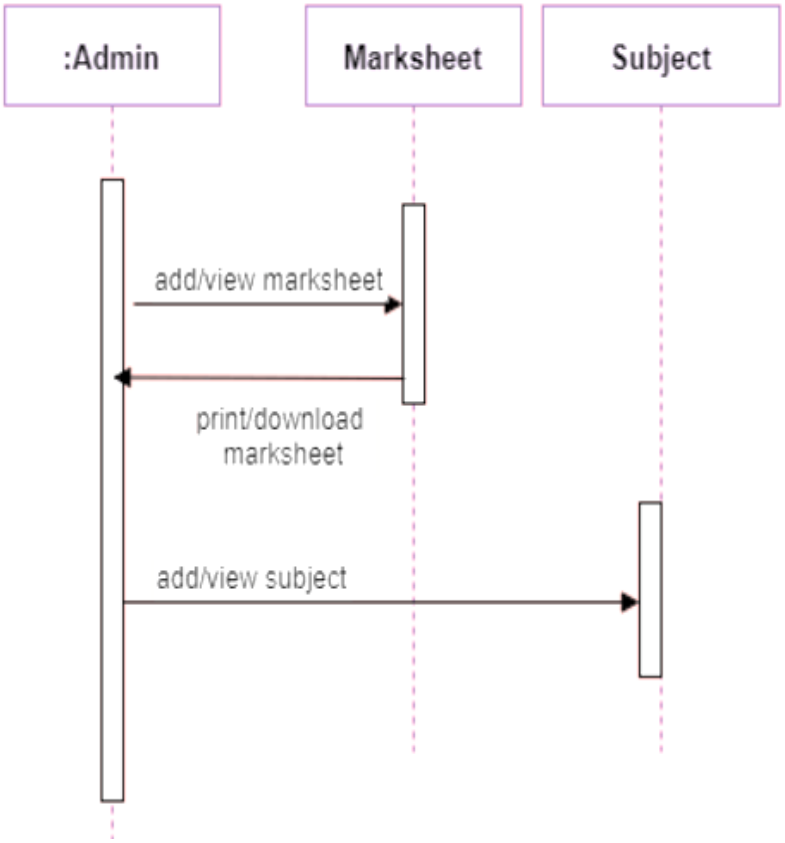


Figure 5.4 Sequence Diagram

5.5Data Flow Between Entities

The Data Flow between the entities in the CGPA Calculation System outlines how information flows between Students, Courses, and Grades, which are essential components of the system for calculating SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).

Student → Courses and Grades

The Student entity is the primary actor in the system. Each student is associated with multiple Courses, and each course has a corresponding Grade that reflects the student's performance.

- Student Enrollment: A student is enrolled in one or more courses, and each course has an associated grade, which will be used for CGPA calculation.

- Course and Grade Relationship: Each course has a corresponding grade. This grade, entered by the student, is used in the system for calculating SGPA and CGPA.

Course → Course Credits

Each Course in the system is assigned Course Credits. These credits represent the weight or significance of each course in the overall academic program. The credits are important for determining how much each course influences the student's CGPA.

- Course Definition: Each course in the system has attributes such as course name, course code, and Course Credits.
- Course Credits in CGPA Calculation: The Course Credits determine the weight of each course when calculating CGPA. Courses with higher credits will have a greater influence on the overall CGPA.

Grade → CGPA Calculation

The Grade assigned to a student for each course is crucial for the CGPA calculation process. The grade, along with the course credits, is used to compute the final CGPA.

- Grade Entry: Students enter their grades for each course.
- Grade and Credit Combination: The system combines the grade and the corresponding course credits to calculate the CGPA.
- CGPA Calculation: The system multiplies the grade points (assigned to each grade) by the course credits and divides by the total course credits to compute the CGPA.

Data Flow Overview:

- The Student enters grades for each Course.
- Each Course is linked to Course Credits, determining its weight in the CGPA calculation.
- The Grade for each course is combined with Course Credits in the CGPA calculation formula.

CHAPTER 6

SYSTEM REQUIREMENTS

6.1 Hardware Requirements

To ensure the system operates smoothly and efficiently, the following hardware specifications are recommended:

- **Processor:** Intel Core i3 or higher for stable and reliable performance. An Intel Core i5 or equivalent would further improve processing speed for complex calculations.
- **RAM:** Minimum of 4GB for standard operations; however, 8GB or more is recommended to handle multiple users and processes simultaneously, especially when integrating database and web interactions.
- **Storage:** At least 20GB of free disk space, primarily for database and application storage. SSDs are recommended to enhance data retrieval speeds.
- **Display:** 15-inch screen with a minimum resolution of 1366x768 to ensure all interface components are visible.
- **Internet Connectivity:** High-speed internet is required for accessing the web-based application, ensuring quick and reliable access for users.
- **Power Supply**: A reliable power supply to prevent interruptions during usage. A UPS (Uninterruptible Power Supply) is recommended for critical systems to avoid data loss during power outages.
- **Network Port or Wi-Fi Adapter**: A high-speed Ethernet port or Wi-Fi adapter to ensure seamless internet access for cloud-based functionality, if applicable.
- **Peripheral Devices**: A standard keyboard and mouse for data entry and navigation.
- **Hardware Compatibility**: The system should support running on both desktop and laptop environments for flexibility in use.

6.2 Software Requirements

The software components necessary for this project include:

- **Operating System:** Compatible with Windows 10, Linux, or macOS, offering flexibility across platforms.
- **Web Browser:** Google Chrome or Mozilla Firefox, latest versions, for an optimal and secure web experience.
- **Database Management System (DBMS):** MySQL or PostgreSQL, which provide efficient data management for storing and retrieving large volumes of academic records and performance metrics.
- **Programming Languages:**
    - **Backend Development:** Java or Python, selected for their robust performance, security, and extensive library support.
    - **Frontend Development:** HTML, CSS, and JavaScript for responsive and user-friendly interface design.
- **Web Server:** Apache or Nginx, essential for hosting the web application on a local or cloud server.
- **IDE/Code Editor**: Visual Studio Code or PyCharm for efficient development and debugging of code.
- **Version Control System**: Git for version control and collaborative development. Platforms like GitHub or GitLab can be used for repository management.

6.3 Hardware Description

The system is hosted on a cloud server, allowing for high scalability, enhanced security, and remote access. This setup benefits students and administrators, as they can access the application on various devices, including desktops, tablets, and smartphones, ensuring flexibility in different learning environments.

CHAPTER 7

SYSTEM TESTING

7.1 Testing Steps

System testing is crucial to confirm that the system meets functional requirements and operates as expected across all components. The testing phase includes multiple levels to thoroughly evaluate each module, feature, and interaction within the system.

7.1.1 Types of Tests

1. **Unit Testing**:
    - Purpose: To validate the accuracy of individual components, such as grade input fields, the CGPA calculator, and result outputs.
    - Approach: Developers will isolate specific functions or classes and test them independently to ensure each works as expected before integrating them into the system.
2. **System Testing**:
    - Purpose: To confirm the system functions as a cohesive unit, verifying overall stability and reliability.
    - Approach: Testing is conducted on the full application setup, ensuring that it can handle expected loads and operates within specified performance parameters.
3. **Integration Testing**:
    - Purpose: To assess how individual modules interact when combined. For instance, integration between the frontend (data input forms) and backend (CGPA calculations, database storage) is crucial.
    - Approach: Tests focus on data flow, communication between modules, and any potential discrepancies when components are linked together.

4. **User Acceptance Testing (UAT)**:
    - Purpose: To validate the system against end-user expectations. This final stage ensures the product meets practical and usability requirements.
    - Approach: Select users (e.g., students and administrators) will test the system to confirm that features align with their needs. Feedback will help identify any areas needing improvement or additional support.
5. **Performance Testing**:
    - Purpose: To evaluate the system's responsiveness and stability under varying levels of load.
    - Approach: Simulate multiple users inputting grades simultaneously to ensure the system remains fast and functional under heavy use.
6. **Edge Case Testing**:
    - Purpose: To test how the system handles unusual or extreme input values, such as invalid grades, empty fields, or incorrect data formats.
    - Approach: Intentionally input boundary cases and verify that the system generates appropriate error messages without crashing.

7.1.2 Testing Tools

The system was tested using mobile phones and web platforms to ensure smooth functionality and compatibility. Tools like BrowserStack were used to simulate different devices and browsers, while Selenium and Appium facilitated automated testing for web and mobile environments. Additionally, manual testing on various mobile devices ensured real-world performance and usability.

CHAPTER 8

CONCLUSION AND FUTURE SCOPE

8.1 Conclusion

The **CGPA Calculation System** is a significant advancement in automating the process of academic performance tracking. The system provides an efficient and reliable means to calculate and manage students' CGPA with minimal manual intervention. By digitizing the entire process, it not only reduces human errors but also significantly reduces the time and effort spent on repetitive tasks, such as grade entry, CGPA calculation, and report generation.

One of the key strengths of this system is its user-friendly interface, which ensures that both students and administrators can interact with it seamlessly. Students can easily input their grades, view their current CGPA, and track their academic progress over time, while administrators can manage grading schemes, generate detailed reports, and monitor the overall performance of students.

Moreover, the system enhances transparency by providing real-time feedback to students regarding their academic standing. It allows for greater accountability by storing records securely and enables easy access to historical data, reducing the risk of data loss or errors often associated with paper-based systems. This transition from a manual system to a digital system is a major step forward for educational institutions looking to improve operational efficiency and provide better services to students.

The automation of CGPA calculation also ensures consistency in grading and helps eliminate discrepancies, making it easier for institutions to uphold academic standards. The system's scalability means that it can be easily adapted to accommodate a larger number of students or be integrated with other institutional systems, such as course management and attendance tracking.

Furthermore, the web-based nature of the system makes it highly accessible,

providing users with the flexibility to interact with the system from any location, at any time, which is particularly beneficial in today's increasingly remote and hybrid learning environments.

In summary, the CGPA Calculation System addresses the challenges faced by educational institutions in managing academic performance data. It offers a robust, efficient, and secure solution that not only saves time but also improves the overall academic experience for students, faculty, and administrators alike. This project marks a significant step toward modernizing academic processes and can serve as a model for similar systems in other educational contexts.

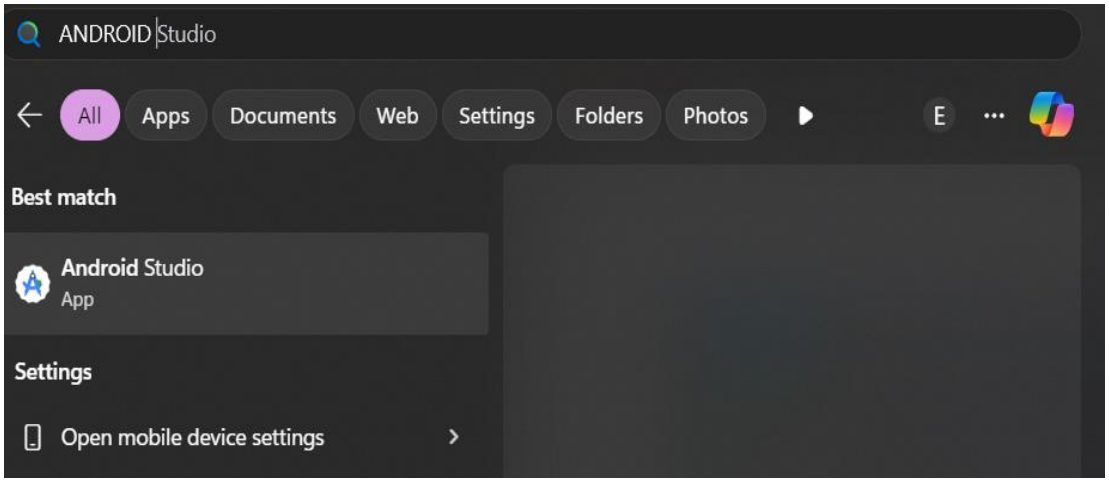
8.2 Future Scope

The future scope of this project includes:

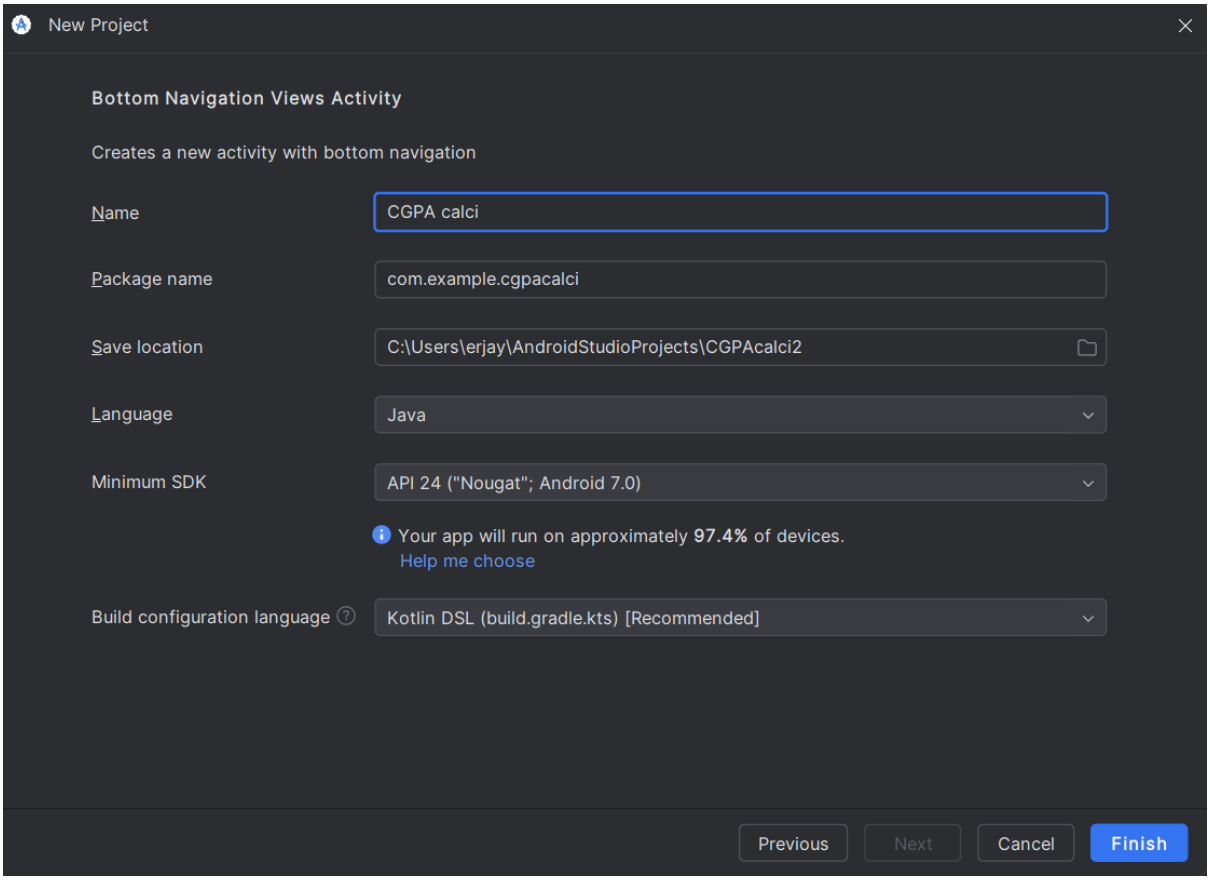
1. **Mobile Application:** Expanding the system to mobile platforms to offer students more convenience.
2. **AI Integration:** Adding AI capabilities to provide students with personalized academic suggestions and performance predictions.
3. **Cloud Integration:** Enabling cloud storage to allow students to access their academic records and CGPA data from any device, ensuring data synchronization and backup.
4. **Advanced Analytics:** Introducing visual representations of academic progress through graphs and charts, helping students better understand trends and identify areas for improvement.
5. **Cross-Platform Compatibility:** Developing the system to work seamlessly across various platforms, including tablets and desktop environments, for broader accessibility.
6. **Multi-Language Support:** Incorporating support for multiple languages to cater to a diverse user base.
7. **Collaboration Features:** Enabling students to share their progress and achievements with mentors or peers for collaborative learning and guidance.

APPENDIX A

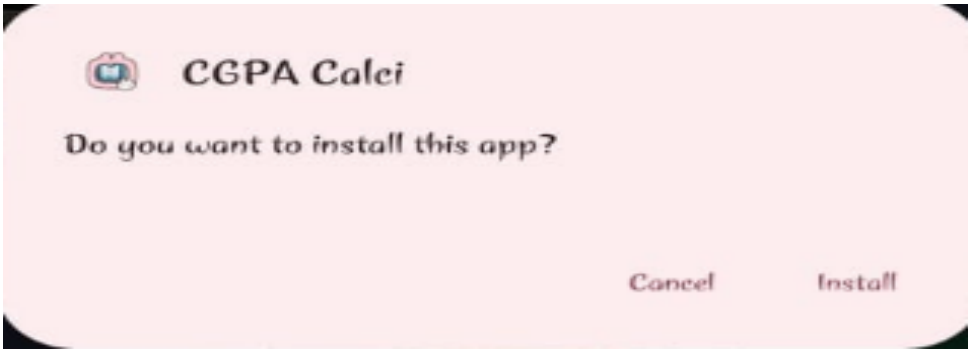
ANDROID STUDIO OPENING WINDOW



NEW PROJECT CREATION

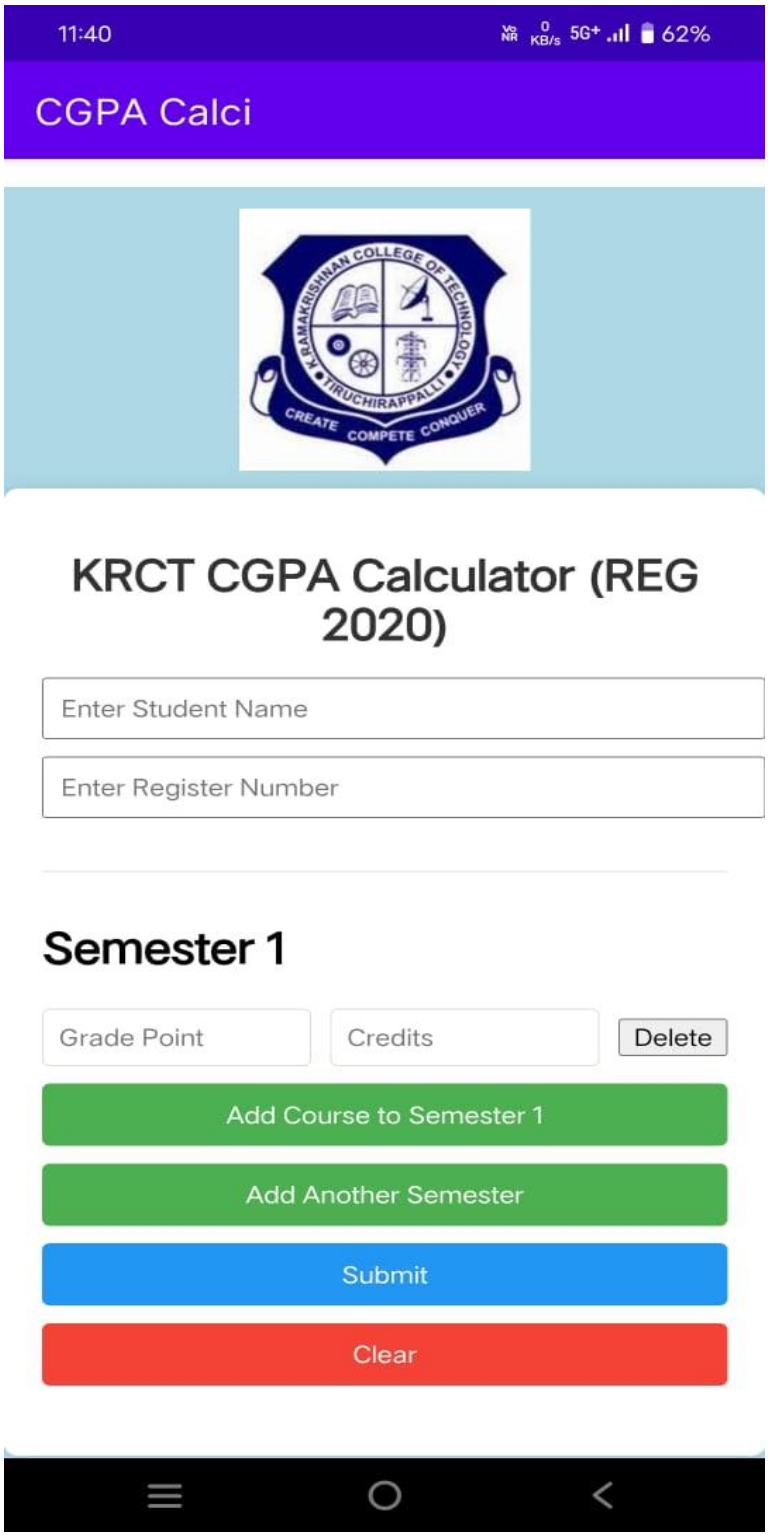


INSTALLATION OF APPLICATION IN MOBILE

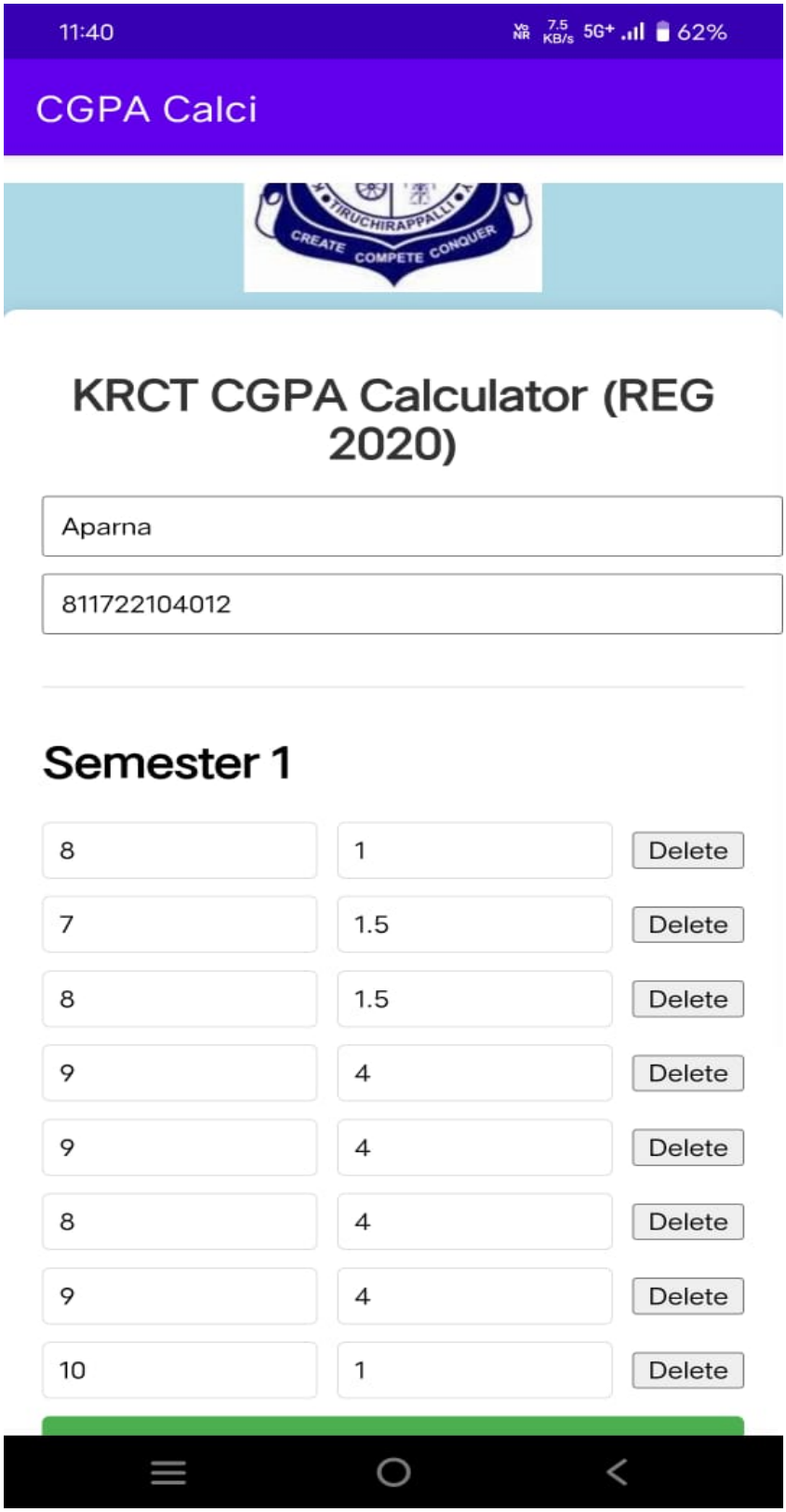


SPLASH SCREEN(5 SEC)

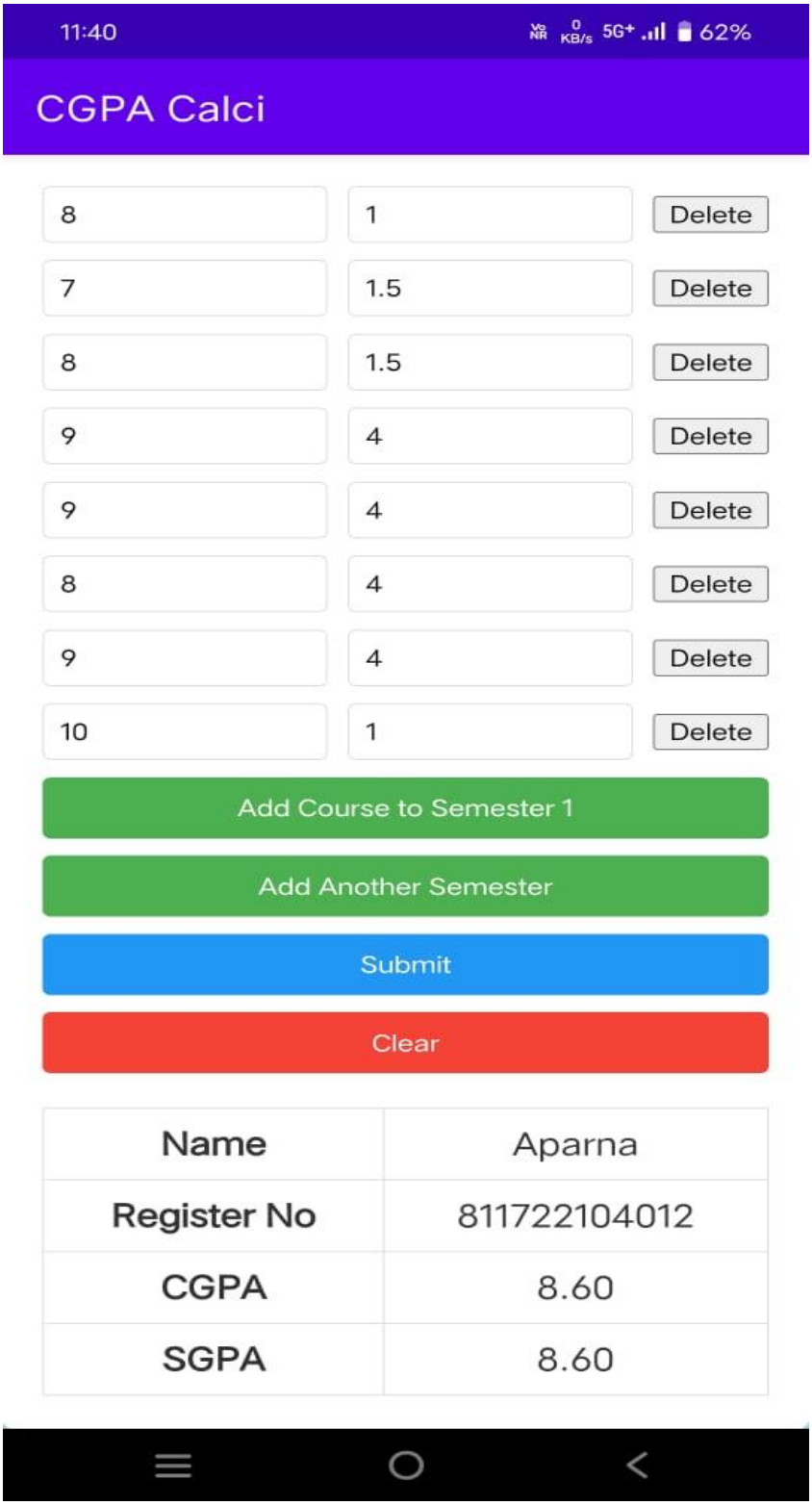
HOME PAGE


11:40
62%
CGPA Calci
K.RAMAKRISHNAN COLLEGE OF TECHNOLOGY
TIRUCHIRAPPALLI
CREATE COMPETE CONQUER
KRCT CGPA Calculator (REG 2020)
Enter Student Name
Enter Register Number
Semester 1
Grade Point
Credits
Delete
Add Course to Semester 1
Add Another Semester
Submit
Clear

INPUT FEEDING



DISPLAY OF CALCULATED CGPA



APPENDIX B

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <WebView
        android:id="@+id/webview"
        android:layout_width="0dp"
        android:layout_height="0dp"
        android:layout_marginTop="16dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

Mainactivity.java

```
package com.example.cgpacalci;
import android.content.Intent;
import android.os.Bundle;
import android.webkit.WebChromeClient;
```

```
import android.webkit.WebResourceRequest;
import android.webkit.WebView;
import android.webkit.WebViewClient;
import android.widget.Toast;

import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {

    private WebView webView;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        webView = findViewById(R.id.webview);

        // Enable JavaScript
        webView.getSettings().setJavaScriptEnabled(true);

        // Set WebViewClient to handle internal links
        webView.setWebViewClient(new WebViewClient());

        // Load the HTML file from assets folder
        webView.loadUrl("file:///android_asset/index.html");
    }
}
```

activity_splash_screen.xml

```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    <ImageView
        android:id="@+id/logo"
        android:layout_width="200dp"
        android:layout_height="200dp"
        android:layout_centerInParent="true"
        android:src="@drawable/college_logo" />

    <TextView
        android:id="@+id/splash_text"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="CGPA Calci for REG 2020"
        android:textSize="18sp"
        android:textColor="#FFFFFF"
        android:layout_below="@id/logo"
        android:layout_centerHorizontal="true"
        android:layout_marginTop="20dp" />
</RelativeLayout>
```

SplashScreenActivity.java

```
package com.example.cgpacalci;


import android.content.Intent;
import android.os.Bundle;
import android.os.Handler;
import androidx.appcompat.app.AppCompatActivity;


public class SplashScreenActivity extends AppCompatActivity {


    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_splash_screen);  // Make sure activity_splash_screen.xml
exists


        // Handler to show the splash screen for 3 seconds and then start MainActivity
        new Handler().postDelayed(new Runnable() {
            @Override
            public void run() {
                // Start MainActivity after the splash screen
                Intent intent = new Intent(SplashScreenActivity.this, MainActivity.class);
                startActivity(intent);
                finish();  // Finish SplashActivity so that it doesn't show again
            }
        }, 3000);  // 3000 milliseconds = 3 seconds
```

Androidmanifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.cgpacalci">

    <!-- Permission to use internet (if needed for your webview app) -->
    <uses-permission android:name="android.permission.INTERNET" />

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="CGPA Calci"
        android:theme="@style/Theme.CGPACalci">

        <!-- Splash Screen Activity -->
        <activity
            android:name=".SplashScreenActivity"
            android:exported="true"> <!-- Make it exported if it's the entry point for the app -->
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>

        <!-- Main Activity for the app (WebView) -->
        <activity
            android:name=".MainActivity"
```

```
        android:exported="true">
    </activity>
  </application>
</manifest>
```

index.html

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>CGPA Calculator</title>
  <style>
    body {
      font-family: Arial, sans-serif;
      background-color: #add8e6; /* Light blue background */
      display: flex;
      justify-content: center;
      align-items: center;
      min-height: 100vh;
      margin: 0;
      flex-direction: column;
    }
    .container {
      background-color: #fff;
      padding: 20px;
      border-radius: 8px;
```

```
    box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);
    width: 90%;
    max-width: 600px;
}
h1 {
    text-align: center;
    color: #333;
    font-size: 24px;
}
.college-logo {
    width: 150px;
    margin: 10px auto;
    display: block;
}
.semester-group {
    border-top: 1px solid #ddd;
    padding-top: 10px;
    margin-top: 10px;
}
.course-group {
    display: flex;
    gap: 10px;
    align-items: center;
    margin-bottom: 10px;
}
.course-group input {
    width: 40%;
    padding: 8px;
```

```
    border: 1px solid #ddd;
    border-radius: 4px;
}
.add-course, .add-semester, .submit-btn, .clear-btn {
    margin-top: 10px;
    padding: 10px;
    background-color: #4CAF50;
    color: white;
    border: none;
    border-radius: 4px;
    cursor: pointer;
    display: block;
    width: 100%;
    text-align: center;
}
.submit-btn {
    background-color: #2196F3; /* Blue button for submission */
}
.clear-btn {
    background-color: #f44336; /* Red button for clearing */
}
.result {
    margin-top: 20px;
    font-size: 18px;
    text-align: center;
    color: #333;
}
.result-table {
```

```
            width: 100%;
            border-collapse: collapse;
            margin-top: 20px;
        }
        .result-table th, .result-table td {
            padding: 10px;
            border: 1px solid #ddd;
            text-align: center;
        }
    </style>
</head>
<body>

<!-- Display the college logo here -->
<img src="file:///android_asset/college_logo.jpg" alt="College Logo" class="college-logo">

<div class="container">
    <h1>KRCT CGPA Calculator (REG 2020)</h1>

    <!-- Input for name and register number -->
    <input type="text" id="studentName" placeholder="Enter Student Name" required style="width:
100%; padding: 8px; margin-bottom: 10px;">
    <input type="text" id="registerNo" placeholder="Enter Register Number" required style="width:
100%; padding: 8px; margin-bottom: 20px;">

    <!-- Semester and course input section -->
    <div id="semesters">
        <div class="semester-group" id="semester1">
```

```
            <h2>Semester 1</h2>
            <div class="course-group">
                <input type="number" step="0.01" placeholder="Grade Point" required>
                <input type="number" step="0.5" placeholder="Credits" required>
                <button onclick="deleteCourse(this)">Delete</button>
            </div>
            <!-- The Add Course button for Semester 1 -->
            <button class="add-course" onclick="addCourse(1)">Add Course to Semester 1</button>
        </div>
    </div>

    <button class="add-semester" onclick="addSemester()">Add Another Semester</button>
    <button class="submit-btn" onclick="submitCGPA()">Submit</button>
    <button class="clear-btn" onclick="clearFields()">Clear</button>

    <!-- Result section -->
    <div id="result" class="result"></div>
</div>

<script>
    let semesterCount = 1;

    function addCourse(semesterId) {
        const semesterDiv = document.getElementById(`semester${semesterId}`);
        const courseDiv = document.createElement("div");
        courseDiv.className = "course-group";
        courseDiv.innerHTML = `
            <input type="number" step="0.01" placeholder="Grade Point" required>
```

```
        <input type="number" step="0.5" placeholder="Credits" required>
        <button onclick="deleteCourse(this)">Delete</button>
    `;
    semesterDiv.insertBefore(courseDiv, semesterDiv.querySelector('.add-course'));
}

function addSemester() {
    semesterCount++;
    const semestersDiv = document.getElementById("semesters");

    const newSemester = document.createElement("div");
    newSemester.className = "semester-group";
    newSemester.id = `semester${semesterCount}`;
    newSemester.innerHTML = `<h2>Semester ${semesterCount}</h2>`;

    semestersDiv.appendChild(newSemester);

    // Add course input field
    addCourse(semesterCount);

    // Add "Add Course" button below
    const addCourseBtn = document.createElement("button");
    addCourseBtn.className = "add-course";
    addCourseBtn.onclick = () => addCourse(semesterCount);
    addCourseBtn.innerText = `Add Course to Semester ${semesterCount}`;
    newSemester.appendChild(addCourseBtn);
}
```

```
function deleteCourse(button) {
    button.parentElement.remove();
}

function calculateCGPA() {
    let totalCredits = 0;
    let totalWeightedGrades = 0;
    const sgpaList = [];

    for (let i = 1; i <= semesterCount; i++) {
        let semesterCredits = 0;
        let semesterWeightedGrades = 0;

        const semester = document.getElementById(`semester${i}`);
        const courses = semester.querySelectorAll(".course-group");

        courses.forEach(course => {
            const gradePoint = parseFloat(course.children[0].value);
            const credits = parseFloat(course.children[1].value);

            if (!isNaN(gradePoint) && !isNaN(credits)) {
                semesterCredits += credits;
                semesterWeightedGrades += gradePoint * credits;
            }
        });

        if (semesterCredits > 0) {
            const sgpa = (semesterWeightedGrades / semesterCredits).toFixed(2);
```

```
            sgpaList.push(sgpa);
            totalCredits += semesterCredits;
            totalWeightedGrades += semesterWeightedGrades;
        }
    }

    const cgpa = totalCredits ? (totalWeightedGrades / totalCredits) : 0;
    return { cgpa, sgpaList };
}

function submitCGPA() {
    const studentName = document.getElementById("studentName").value;
    const registerNo = document.getElementById("registerNo").value;
    const { cgpa, sgpaList } = calculateCGPA();

    if (!studentName || !registerNo) {
        alert("Please enter both student name and register number.");
        return;
    }

    let resultHtml = `
        <table class="result-table">
            <tr><th>Name</th><td>${studentName}</td></tr>
            <tr><th>Register No</th><td>${registerNo}</td></tr>
            <tr><th>CGPA</th><td>${cgpa.toFixed(2)}</td></tr>
            <tr><th>SGPA</th><td>${sgpaList.join(", ")}</td></tr>
        </table>
    `;
```

```
        document.getElementById("result").innerHTML = resultHtml;
    }

    function clearFields() {
        // Reset all input fields
        document.getElementById("studentName").value = '';
        document.getElementById("registerNo").value = '';
        const semestersDiv = document.getElementById("semesters");
        semestersDiv.innerHTML = '';  // Clear all semesters
        semesterCount = 0;  // Reset semester counter
        addSemester();  // Add first semester back
        document.getElementById("result").innerHTML = ''; // Clear result
    }
</script>
</body>
</html>
```

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