

A
Project Report
On

“GIETU OFFICIAL APP”

BACHELOR OF TECHNOLOGY
IN
COMPUTER SCIENCE & ENGINEERING

By

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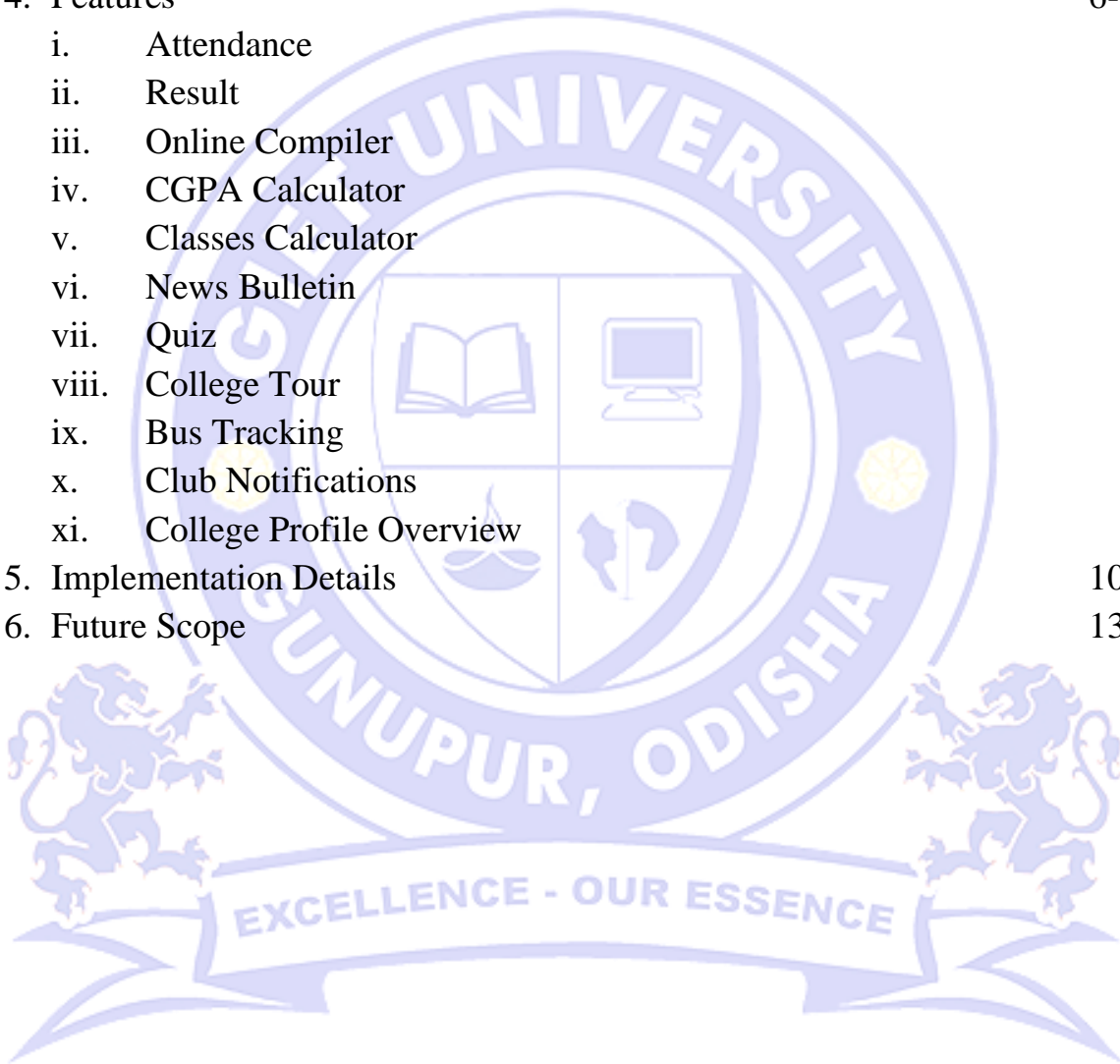
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



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TABLE OF CONTENTS

1. Abstract	1
2. Technology Stack	2-4
3. System Overview	5
4. Features	6-9
i. Attendance	
ii. Result	
iii. Online Compiler	
iv. CGPA Calculator	
v. Classes Calculator	
vi. News Bulletin	
vii. Quiz	
viii. College Tour	
ix. Bus Tracking	
x. Club Notifications	
xi. College Profile Overview	
5. Implementation Details	10-12
6. Future Scope	13



Abstract

The GIETU Official App serves as a comprehensive digital platform designed to enhance the academic experience of students at GIET University, Gunupur. This mobile application integrates various functionalities aimed at streamlining college-related activities, such as attendance tracking, academic results, transportation updates, and club notifications.

Key features include real-time attendance monitoring, which provides students with detailed insights into their class attendance through both tabular and pie chart formats. The app also offers secure access to academic results, allowing students to track semester-wise marks and CGPA through personalized dashboards. An online compiler is integrated into the app, enabling students to write, compile, and execute code in popular programming languages like Python, C, and C++ directly within the application.

Additional functionalities include a CGPA calculator for estimating academic performance based on GIETU's grading system, a classes calculator to help manage academic progress towards target grades, and a news bulletin for disseminating important announcements and updates. The app features an interactive quiz platform for self-assessment, a virtual college tour, and a bus tracking system that utilizes GPS technology for real-time bus location updates.

By providing these user-friendly features, the GIETU Official App aims to foster an organized and efficient college environment, ultimately supporting students in their academic journey and enhancing their overall educational experience.

Technology Stack

The technology stack for the GIETU Official App is designed to ensure a robust, efficient, and user-friendly experience for students. It encompasses several layers that work together to deliver a seamless application.

Backend Technologies

Node.js :

The backend of this application is written in Node.js following the MVC architecture. It allows for the execution of JavaScript on the server, enabling asynchronous, event-driven programming which is ideal for handling multiple requests simultaneously.

Express.js:

Express.js is employed to streamline the process of building APIs, offering powerful routing capabilities. It serves as the foundation for the server-side logic of the application, simplifying the management of HTTP requests and responses.

MongoDB:

A NoSQL database, MongoDB is utilized for storing and retrieving data efficiently. Its flexible schema allows for easy adjustments as the application evolves, accommodating various data types essential for student management.

Python:

The Streamlit framework is used to create an admin dashboard for the Bus Tracking System, providing an intuitive interface for managing bus operations. Additionally, Python's Transformers library is leveraged for Optical Character Recognition (OCR) to solve CAPTCHAs, enhancing user interaction.

C++:

C++ programming is applied in Arduino development to manage the IoT modules integrated into the Bus Tracking System. This allows for real-time data collection and monitoring of bus locations.

Kotlin:

The backend and core logic of the College Official App are fully developed in Kotlin, chosen for its modern programming paradigms and robust support for Android development.

- **Backend Logic:** Manages data processing, API integration, and Firebase services like authentication, real-time updates, and storage.
- **Modular Codebase:** Uses Kotlin features like higher-order functions and extension functions for reusable, maintainable code.
- **Error Handling:** Kotlin's null safety prevents runtime errors, ensuring app stability.
- **Performance:** Coroutines enable efficient multitasking, optimizing memory and handling background tasks seamlessly.
- **Jetpack Support:** Integrates with LiveData, ViewModel, and Navigation for MVVM-based, modern app architecture.

Firebase:

Firebase is integrated into the app to offer powerful backend services, ensuring real-time data handling and enhanced user experience. Key Firebase modules used include:

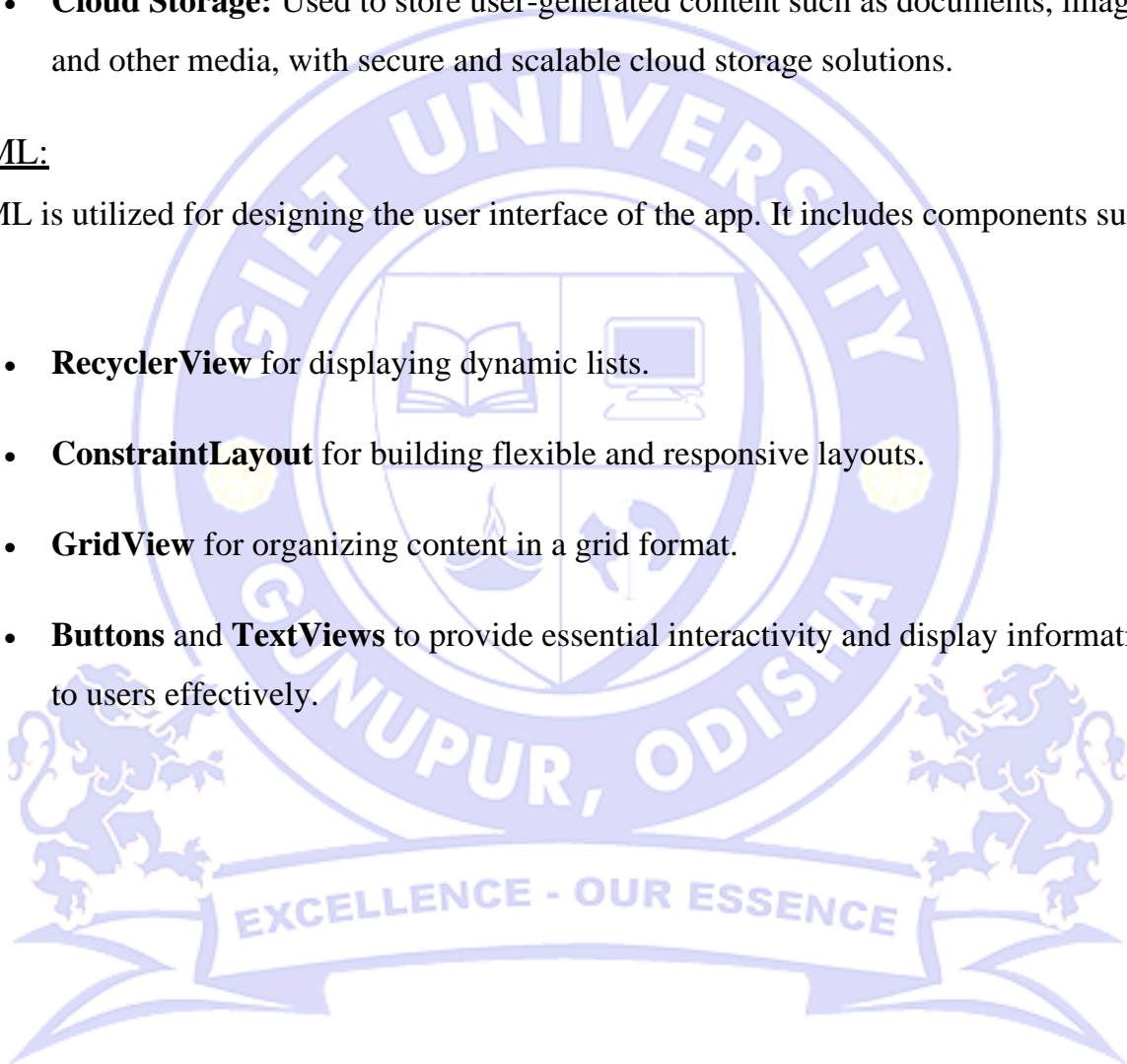
- **Realtime Database:** Facilitates real-time synchronization of data, enabling instant updates across users.

- **Authentication:** Provides secure user login and registration functionality using various authentication methods, such as email/password and Google Sign-In.
- **Cloud Messaging:** Enables push notifications for important updates and alerts, enhancing communication with users.
- **Cloud Storage:** Used to store user-generated content such as documents, images, and other media, with secure and scalable cloud storage solutions.

XML:

XML is utilized for designing the user interface of the app. It includes components such as:

- **RecyclerView** for displaying dynamic lists.
- **ConstraintLayout** for building flexible and responsive layouts.
- **GridView** for organizing content in a grid format.
- **Buttons** and **TextViews** to provide essential interactivity and display information to users effectively.



System Overview

The system is built on a robust configuration featuring an Intel i5 10th generation processor and NVIDIA graphics, ensuring efficient performance for running applications. It is equipped with 128 GB SSD storage, providing fast data access and improved application load times. The operating system is Ubuntu 23, with stable and extensive support for development tools.

To facilitate application management and terminal multiplexing, the system utilizes PM2 and tmux. PM2 is a powerful process manager for Node.js applications that allows for easy management of application processes, including monitoring, logging, and automatic restarts. This ensures that applications remain running smoothly and can recover from unexpected crashes.

tmux, on the other hand, is a terminal multiplexer that enables users to run multiple terminal sessions within a single window. This is particularly useful for managing long-running processes and maintaining persistent sessions, allowing developers to switch between tasks seamlessly without losing their progress.

Features

User-friendly features to help college students keep track of their official day to day college related activities like attendance, club events, results, transportation, news, etc.

Attendance - It provides real-time attendance tracking for students. Students can view their attendance records. Attendance generates reports and analytics for better monitoring and decision-making.

The attendance features in the app provide a comprehensive overview of attendance data, presented in both tabular and visual formats.

Tabular View:

- **Clear and Concise:** Displays attendance information in an easy-to-read table format.
- **Detailed Breakdown:** Includes specific details like date, time, and status (present, absent).

Pie Chart View:

- **Visual Representation:** Presents a visual summary of attendance data in the form of a pie chart.
- **Clear and concise:** It displays attendance and helps to know the track of the attendance.
- **Quick Insights:** Offers a quick understanding of overall attendance.
- **Percentage Breakdown:** Clearly shows the percentage distribution of different attendance statuses (present, absent).

Result - A secure access to academic results, including semester-wise marks and CGPA. It personalized result dashboards for students.

Online Compiler – An integrated code editor and compiler for popular programming languages (Python, C++, C). A real-time code execution and output display.

The online compiler feature in the app provides a convenient and accessible platform for coding and executing code snippets in C, C++, and Python directly within the app itself.

Key Features:

- **Code Editor:** A user-friendly code editor interface where users can write, edit, and save their code.
- **Real-time Compilation and Execution:** The app compiles and executes the code instantly as the user makes changes, providing immediate feedback.
- **Output Display:** The output of the code execution is displayed directly within the app, eliminating the need for external terminals or consoles.
- **Language Support:** The compiler supports popular programming languages like C, C++, and Python, catering to a wide range of users.
- **Error Highlighting and Suggestions:** The editor often includes features like syntax highlighting, auto-completion, and error detection to improve coding efficiency and accuracy.

CGPA Calculator - A simple and intuitive CGPA calculator for students to estimate their academic performance. It provides input fields for credit hours and grades. It generates accurate CGPA calculations based on GIETU's grading system.

Key Features:

- **Accurate Conversion:** Ensures precise calculations to provide reliable results.
- **User-Friendly Interface:** A simple and intuitive interface that is easy to navigate.
- **Instant Results:** Provides immediate conversion results upon input.

How it Works:

1. **CGPA to Percentage:**
 - The user inputs their CGPA.
 - The calculator applies a specific conversion formula which is based on GIETU's grading system.
 - The equivalent percentage is calculated and displayed.
2. **Percentage to CGPA:**
 - The user inputs their percentage.
 - The calculator uses a reverse conversion formula to determine the corresponding CGPA.
 - The calculated CGPA is presented to the user.

Classes Calculator - The Classes Calculator is a feature designed to help students track and manage their academic progress. It estimates the number of classes required to achieve a specific target grade, typically an 80% criterion which avoids any academic penalty.

News Bulletin - A centralized platform for disseminating important news, announcements, and circulars. It pushes notifications for urgent updates. It provides categorized news feeds for easy navigation.

Quiz – An online quiz platform for self-assessment and practice. It enhances the knowledge of the students. The Quiz feature in the app offers an interactive and engaging way to test your knowledge and compete with others. It provides a series of online quizzes covering various topics and a leaderboard to track your progress and performance.

Key Features:

- **Diverse Quiz Topics:** A wide range of subjects to cater to different interests and learning needs.
- **Leaderboard:** Track your rank and compare your performance with other users.
- **Knowledge Reinforcement:** Reinforce learning through practice and application.
- **Gamified Learning:** Make learning fun and enjoyable.

College Tour - A virtual tour of the campus. It provides interactive 360-degree views and informative descriptions. It is integrated with Google Maps for location-based information.

Bus Tracking – Bus tracking provides real-time tracking of college buses using GPS. It tells the live bus routes and positions of the bus in the city and college.

The app's Bus Tracking feature provides real-time location information for buses, enabling users to stay informed about their arrival times and routes.

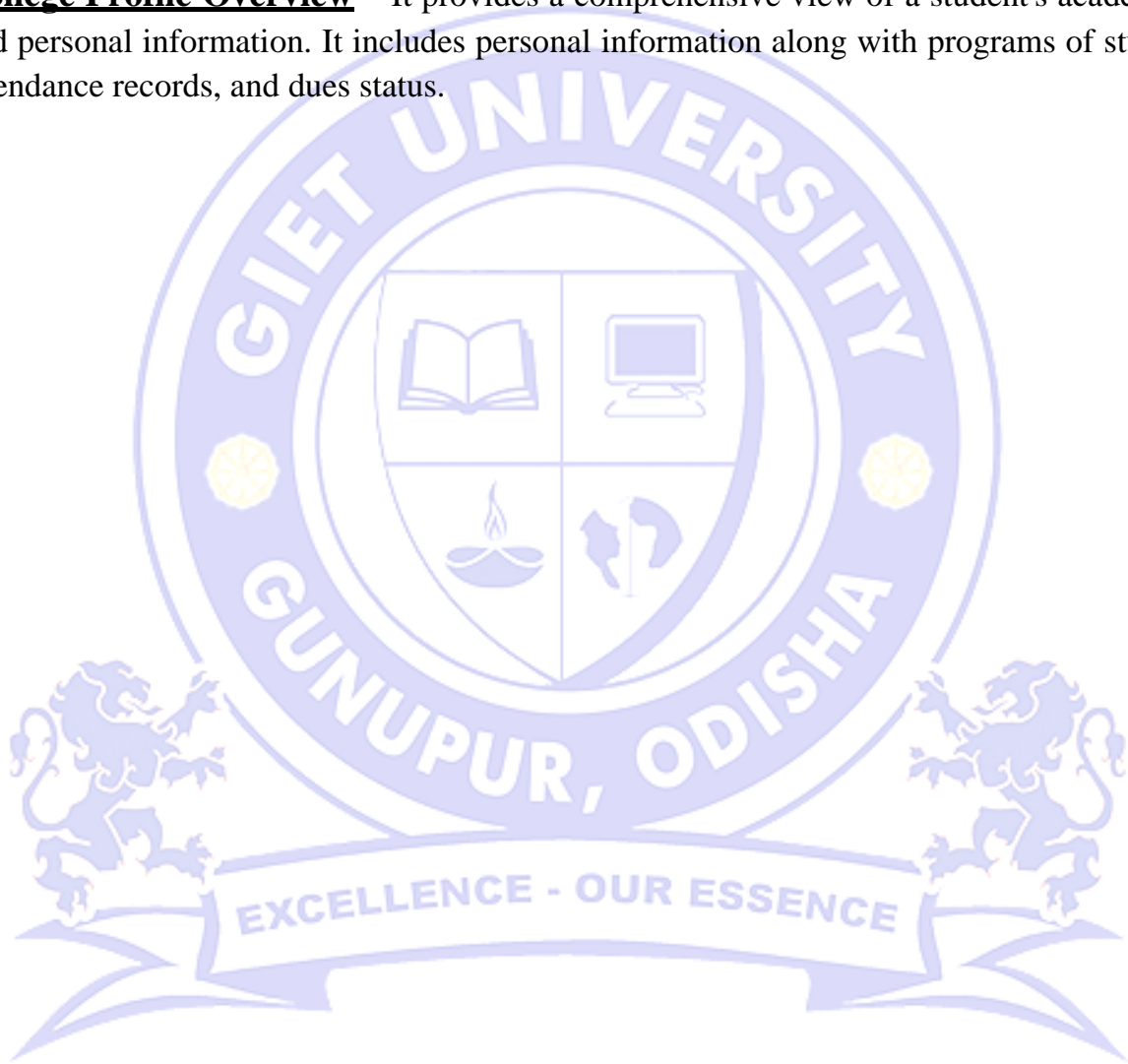
Key Features:

- **Real-time Tracking:** Utilizes GPS technology to track the exact location of buses.
- **Interactive Map:** Displays the bus's current position on a map, along with its route.
- **Reduced Waiting Time:** Users can plan their trips more efficiently and minimize wait times.
- **Increased Reliability:** Provides accurate and up-to-date information, reducing uncertainty.
- **Improved User Experience:** Enhances the overall travel experience by providing a seamless and informative service.

- **Enhanced Safety:** Provides peace of mind by knowing the bus's location and status.

Club Notifications - A dedicated section for club activities, events, and membership information. It pushes notifications for upcoming events and important announcements. A forum for club members to interact and collaborate.

College Profile Overview – It provides a comprehensive view of a student's academic and personal information. It includes personal information along with programs of study, attendance records, and dues status.



Implementation Details

The GIETU Official App is designed to serve as a comprehensive platform for students at GIET University, providing access to various features that enhance their academic experience. Below are the detailed implementation aspects of the application:

1. User Authentication:

- All GIETU students with access to their college email IDs can directly log in to the application using their Gmail accounts.
- The authentication process includes a security mechanism that allows for 5 retries for failed login attempts. After five unsuccessful attempts, the user is timed out for the day to enhance security and prevent unauthorized access.

2. Dashboard Overview:

- Upon successful login, users are directed to a personalized dashboard that provides access to all available features of the app. This dashboard serves as the central hub for navigation and interaction with various functionalities.

3. Data Integration:

- The application retrieves data directly from the GIETU ERP system (<https://gietuerp.in/>) through web scraping techniques. This ensures that students have real-time access to their attendance records, results, and other academic information.
- The scraping process is scheduled regularly to keep the data up-to-date and accurate.

4. Feature Implementation:

- Attendance Tracking: Real-time attendance data is displayed in both tabular and pie chart formats, allowing students to monitor their attendance easily.
- Results Access: Students can securely view their mid-semester marks (Cycle Test 1 and 2) and class test scores.
- Online Compiler: An integrated code editor allows students to write, compile, and execute code in languages such as Python, C, and C++ directly within the app.
- CGPA Calculator: This feature provides an intuitive interface for calculating CGPA based on input grades and credit hours.
- Classes Calculator: Helps students estimate the number of classes required to maintain minimum attendance criteria or take urgent leaves.
- News Bulletin: A centralized platform for important announcements, notifications, and updates from the college.
- Quiz Platform: Offers interactive quizzes covering various subjects, complete with leaderboards for tracking performance.
- Virtual College Tour: Provides an immersive experience with 360-degree views of the campus integrated with Google Maps for location-based information.
- Bus Tracking System: Utilizes GPS technology to provide real-time tracking of college buses, enhancing transportation reliability.

5. Middleware Functionality:

- Middleware functions manage request processing within the application. They handle tasks such as logging user activity, managing session states, and ensuring that data is validated before being processed by controllers.

6. Error Handling:

- The application implements robust error handling mechanisms to capture and log errors that occur during user interactions or data processing. User-friendly error messages are displayed to guide users in case of issues.

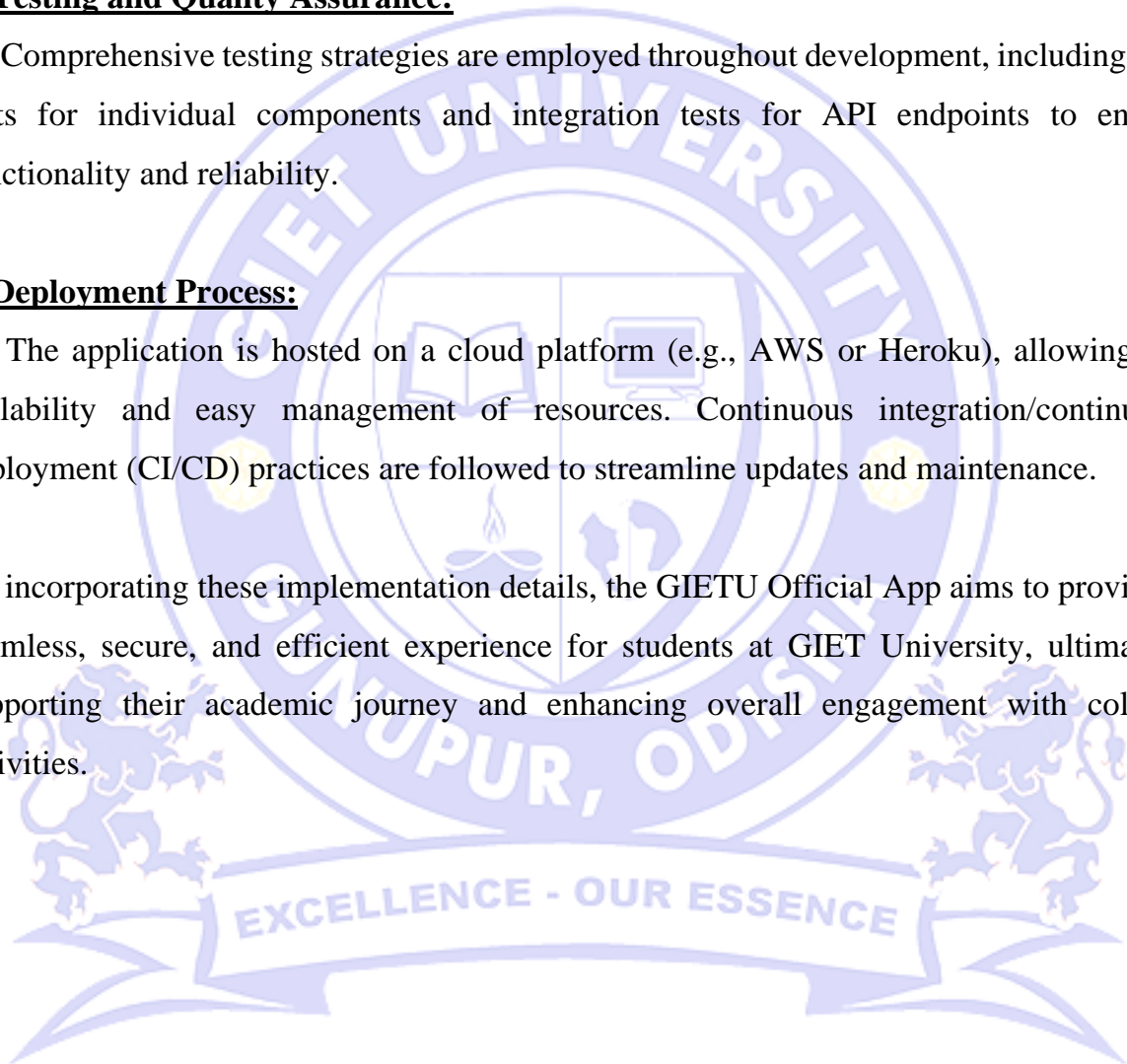
7. Testing and Quality Assurance:

- Comprehensive testing strategies are employed throughout development, including unit tests for individual components and integration tests for API endpoints to ensure functionality and reliability.

8. Deployment Process:

- The application is hosted on a cloud platform (e.g., AWS or Heroku), allowing for scalability and easy management of resources. Continuous integration/continuous deployment (CI/CD) practices are followed to streamline updates and maintenance.

By incorporating these implementation details, the GIETU Official App aims to provide a seamless, secure, and efficient experience for students at GIET University, ultimately supporting their academic journey and enhancing overall engagement with college activities.



Future Scope

The GIETU Official App has significant potential for expansion and enhancement to further support students and improve their academic experience. The following features are envisioned for future development

On-Campus Placement Updates:

Implement a dedicated section for real-time updates on placement opportunities, including job openings, recruitment drives, and internship offers. This feature will provide students with essential information regarding upcoming placement events, application deadlines, and company profiles, helping them prepare effectively for their careers.

Faculty Details:

Introduce a feature that allows students to view detailed profiles of faculty members, including their qualifications, areas of expertise, research interests, and contact information. This will facilitate better communication between students and faculty, encouraging mentorship and academic support.

Timetable Management:

Develop a timetable feature that enables students to view their class schedules, including lecture timings, locations, and any changes or updates. This functionality could also include reminders for upcoming classes and exams, helping students manage their time more effectively.

Feedback Mechanism:

Implement a feedback system where students can provide suggestions or report issues regarding the app or college services. This will help in continuous improvement of the app based on user experiences.

Alumni Network Integration:

Develop features that connect current students with alumni for networking opportunities, mentorship programs, and career guidance.