

EMI CALCULATOR APP

INTERDISCIPLINARY PROJECT

Submitted in partial fulfillment of the requirements for the award
of Bachelor of Technology in Information Technology

by

NAVEENKUMAR S (REG.NO-41120126)



DEPARTMENT OF INFORMATION TECHNOLOGY

SCHOOL OF COMPUTING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Category-1 University by UGC

Accredited with Grade “A++” by NAAC

12B Status by UGC |Approved by AICTE

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MAY- 2024



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DEPARTMENT OF INFORMATION TECHNOLOGY

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of NAVEENKUMAR S (41120126) who carried out the project entitled "EMI calculator app" under my supervision from January 2024 to May 2024.


Internal Guide 6/5/24

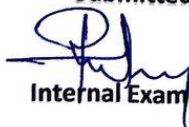
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DECLARATION

I Naveenkumar S hereby declare that the Project Report entitled “EMI calculator app” done by me under the guidance of **Ms.S.SAGEENGRANA,M.E.**, is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in Information Technology.

DATE: 08/05/2024

PLACE: CHENNAI



SIGNATURE OF THE CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to **Board of Management** of **SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

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I wish to express my thanks to all Teaching and Non-teaching staff members of the **Department of Information Technology** who were helpful in many ways for the completion of the project.

CERTIFICATE OF COMPLETION



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CERTIFICATE FOR INTERNSHIP

TO WHOMSOEVER IT MAY CONCERN

This is to Certify that **NAVEENKUMAR S (Reg No: 41120126)** student of Sathyabama Institute of Science and Technology, B. Tech Information Technology, has successfully completed the Internship at Hackwit Technologies from 22nd January to 30th January 2024.

During the internship, **NAVEENKUMAR S** has closely worked as a part of the **Flutter** by carrying out the project entitled "**EMI CALCULATOR APP**"

He demonstrated good developing and learning skill with self-motivated attitude to learn new things. His contribution to implement the Flutter was good. We wish him all the best for his future endeavors.

Best Regards,

Ravikumar S
CEO & Managing Director
Hackwit Technologies Pvt Ltd



CERTIFICATE OF COMPLETION



ABSTRACT

In the realm of personal finance, managing loans and understanding the implications of Equated Monthly Installments (EMIs) is crucial. To aid users in this endeavor, this paper presents the development of a Flutter-based EMI calculator application. Flutter, a versatile and rapidly evolving framework for cross-platform mobile app development, provides an ideal platform for creating user-friendly financial tools. The Flutter EMI Calculator app offers a seamless user experience across iOS and Android platforms, leveraging Flutter's single codebase approach. The application incorporates intuitive design elements to enhance usability and accessibility for users of varying levels of financial literacy. Users can input loan principal amounts, interest rates, and tenure periods, with the app instantly computing the corresponding EMIs. Furthermore, the Flutter EMI Calculator app goes beyond basic EMI calculations, offering additional features to empower users in making informed financial decisions. These features may include graphical representations of payment schedules, amortization tables, and interactive scenarios to visualize the impact of varying interest rates and tenure durations on loan repayment. Overall, the Flutter EMI calculator app exemplifies the potential of cross-platform application development frameworks in democratizing access to financial tools and promoting financial literacy among diverse user demographics. Through its user-centric design and comprehensive functionality, the app strives to foster financial empowerment and facilitate informed decision-making in personal finance management.

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LIST OF ABBREVIATIONS

ABBREVIATION	EXPANSION
UI	- User Interface
UX	- User Experience
iOS	- iPhone Operating System
UAT	- User Acceptance Testing
IDE	- Integrated Development Environment

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CHAPTER 1

INTRODUCTION

Flutter, an open-source UI software development kit created by Google, has gained significant traction for its ability to facilitate rapid and efficient cross-platform mobile app development. With its single codebase approach, Flutter allows developers to build high-quality, native-like applications for both iOS and Android platforms simultaneously, minimizing development time and effort while maximizing performance and user experience.

The Flutter EMI Calculator application aims to simplify the process of calculating EMIs for loans by providing users with a user-friendly and intuitive interface. Gone are the days of cumbersome manual calculations or reliance on complex spreadsheets. With just a few taps, users can input essential loan parameters such as principal amount, interest rate, and tenure period, and the application will instantly compute the corresponding EMI amount.

Through the development of the Flutter EMI Calculator application, we aim to democratize access to financial tools and empower users to make informed decisions regarding their loans. By leveraging Flutter's robust capabilities for UI/UX design and performance optimization, we endeavor to provide a seamless and engaging user experience across diverse demographics and usage scenarios.

In the following sections, we will delve deeper into the architecture, design considerations, and key features of the Flutter EMI Calculator application, highlighting its potential to revolutionize personal finance management and contribute to financial literacy and empowerment.

1.1 FLUTTER

The Flutter EMI Calculator app is a cross-platform mobile application built using the Flutter framework for the frontend and supported by a backend server. The frontend, developed with Flutter's widget-based UI toolkit and Dart programming language, provides the user interface for inputting loan parameters such as loan amount, interest rate, and tenure. It utilizes Flutter's rich set of widgets to create a responsive and visually appealing design.

The backend, typically implemented using a server-side language such as Node.js, Python, or Java, handles the computation logic and data processing. It receives the user's input from the frontend, calculates Equated Monthly Installments (EMI) based on the provided parameters, and returns the calculated results to the frontend for display. The backend may also include additional functionalities such as user authentication, data validation, and database integration for storing user preferences or past calculations.

Communication between the frontend and backend is established through APIs (Application Programming Interfaces), allowing seamless data exchange between the client-side and server-side components. The app prioritizes security measures to protect sensitive user data during transmission and storage, employing encryption techniques and secure communication protocols.

1.2 DART

i)Unified Codebase:

A unified codebase for a Flutter EMI Calculator app refers to a single code repository that contains both the frontend and backend components necessary for the application to function. Dart's versatility enables developers to maintain a unified codebase for both the frontend (Flutter) and backend, fostering consistency and ease of collaboration

ii)Asynchronous Programming:

Asynchronous programming in the context of a Flutter EMI Calculator refers to a programming paradigm that allows certain tasks to be executed independently of the main program flow. In Flutter, asynchronous programming is crucial for handling operations that may take time to complete, such as fetching data from a remote server or performing complex calculations.

iii)Scalability:

In the context of an EMI Calculator developed using Dart and Flutter, scalability refers to the ability of the application to accommodate growth in terms of users, features, and data without compromising performance or stability. Dart's ability to scale allows the platform to handle higher traffic, ensuring a smooth and responsive experience for all users.

iv)Strong Typing System:

In Dart, the strong typing system refers to the language's capability to enforce strict type checking at compile time. This means that every variable, parameter, and function return type must be explicitly declared with a specific data type, and the Dart compiler verifies that these types are used consistently throughout the code.

1.3 FIREBASE

Firebase Realtime Database can be leveraged to enable real-time data synchronization for an EMI calculator and Store loan data such as loan amount, interest rate, tenure, and other relevant details in the Firebase Realtime Database. Each loan entry can be represented as a node in the database. Firebase Authentication provides a secure and easy-to-use solution for authenticating users in your application. Firebase Authentication handles the user registration process securely, storing user credentials in a Firebase project. Using serverless cloud functions for an EMI calculator can be an efficient and cost-effective approach. Cloud functions for the EMI calculator can be triggered by events such as user requests to calculate EMI, changes in loan parameters, or scheduled tasks for recurring calculations. Storing media assets, such as profile pictures and discussion attachments, is streamlined with Firebase Cloud Storage. utilizes this feature to efficiently manage and serve multimedia content, ensuring a smooth and responsive user experience for both mentors and students. Cloud Firestore extends Firebase's database capabilities, offering a scalable and flexible solution for mobile, web, and server development. Its integration with other Firebase and Google Cloud Platform services ensures seamless data management and accessibility. Developers can leverage Cloud Firestore to build robust applications capable of handling large volumes of data while maintaining performance and scalability. The platform's analytics and monitoring capabilities further enhance developers' ability to understand user behavior, optimize app performance, and track key metrics. Features like Performance Monitoring and Remote Config enable developers to identify and address performance issues and customize app behavior without requiring app updates. Overall, Firebase provides a comprehensive suite of tools and services that empower developers to build, deploy, and grow high-quality mobile and web applications with ease.

1.4 PROBLEM STATEMENT

The Flutter EMI calculator app is designed to offer users a seamless and efficient way to estimate their monthly loan repayments. With its intuitive user interface, users can input loan parameters effortlessly, including loan amount, interest rate, and tenure. The application provides real-time updates, allowing users to see the calculated EMI instantly as they adjust the parameters. Data security is paramount, with robust measures in place to protect sensitive user information. Additionally, the app ensures compliance with data privacy regulations to safeguard user privacy. Users can also enjoy offline functionality, enabling them to perform calculations even without an internet connection. Error handling and validation mechanisms are implemented to guide users and ensure accurate results. Overall, the Flutter EMI calculator app aims to provide users with a reliable tool for financial planning and decision-making, offering flexibility, accuracy, and ease of use. Customization options allow users to tailor parameters to their specific needs, while comprehensive error handling ensures reliable performance and user guidance. Developed using Flutter, the app offers cross-platform compatibility, enabling access on both Android and iOS devices seamlessly. Overall, the Flutter EMI calculator app empowers users with a reliable and flexible solution for effective financial planning and decision-making. implementing the logic for calculating EMI involves intricate financial calculations based on the input parameters provided by the user. This calculation typically follows a predefined formula that considers factors such as the loan amount, interest rate, and tenure. Accuracy and reliability are paramount in this calculation, as it directly impacts the financial planning and decision-making process for users. By addressing these aspects comprehensively, developers can create a robust and user-friendly EMI calculator that meets the needs of users seeking to plan and manage their loans effectively.

1.5 OBJECTIVES

The main objective of today's fast-paced digital world, the demand for efficient and reliable financial tools is on the rise. The Flutter EMI Calculator aims to meet this demand by providing users with a streamlined solution for estimating equated monthly installments (EMIs) for various types of loans. Whether it's a home loan, car loan, or personal loan, this app offers users the ability to input key loan parameters such as loan amount, interest rate, and tenure, and instantly receive accurate EMI calculations. With its user-friendly interface, real-time updates, and robust security measures, the Flutter EMI Calculator empowers users to make informed financial decisions with confidence and convenience.

KEY CHALLENGES:

i)Complex Calculations:

Implementing accurate EMI calculations for various types of loans (e.g., home loans, car loans) can be challenging due to the complexity of the mathematical formulas involved, especially when considering factors like interest rates, tenures, and loan amounts. Balancing inclusivity without compromising simplicity and clarity in the app's design.

ii)Accurate Financial Calculations:

Implementing the formula for calculating EMI involves complex financial calculations based on parameters such as loan amount, interest rate, and tenure. Ensuring accuracy in these calculations is crucial to provide users with reliable results for their financial planning.

ii)User interface design:

Designing an intuitive and user-friendly interface that effectively presents input fields for loan parameters and displays calculated EMIs in a clear and understandable format can be challenging. Balancing simplicity with necessary detail is essential to ensure a positive user experience.

iv)Security and Privacy:

Ensuring the security and privacy of user data, especially sensitive financial information, is critical. Implementing appropriate security measures, such as data encryption and secure authentication mechanisms, is essential to protect user data from unauthorized access or breaches.

v)Scalability and Performance:

Thoroughly testing the app to identify and address bugs, inconsistencies, and performance issues is crucial to ensure a reliable and stable user experience. Comprehensive testing, including unit tests, integration tests, and user acceptance tests, is necessary to validate the app's functionality across various scenarios.

vi)Flutter Codebase Maintenance:

Managing the complexity of a Flutter-based codebase to ensure code readability, maintainability, and scalability. Keeping the codebase up-to-date with the latest Flutter releases and best practices to leverage new features and improvements

CHAPTER 2

METHODOLOGY

2.1. INITIAL PROJECT REQUIREMENTS

The initial project requirements for EMI calculator app encompass various aspects such as functionalities, technologies, and packages.

i)Technologies:

- 1)Flutter: Utilize Flutter for cross-platform mobile app development, ensuring a consistent user experience on both iOS and Android.
- 2)Dart: Employ the Dart programming language as the primary language for Flutter app development.
- 3)Firebase: Integrate Firebase for backend services, including authentication, real-time database (Firestore), and cloud storage.

ii)Functionalities:

- 1)User Authentication: Implement a secure user authentication system for both mentors and students.
- 2)Accessibility features: Implement accessibility features such as screen reader support and text scaling to make the app accessible to users with disabilities.
- 3)Offline Support: Enable the app to work offline by caching data and calculations locally for users who may not have a stable internet connection.
- 4)Reset Functionality : Allow users to reset the input fields to clear previous calculations and start over
- 5)Save and Share results: Allow users to save or share the calculated EMI and amortization schedule for future reference or sharing with others

iii) Packages Used

i) get:

Version: 4.6.6

Purpose: State management and navigation framework.

ii) firebase_core:

Version: 2.25.3

Purpose: Firebase initialization and core functionality.

iii) firebase_auth:

Version: 4.17.3

Purpose: User authentication with Firebase.

iv) cloud_firestore:

Version: 4.15.3

Purpose: Interaction with Cloud Firestore for real-time data.

v) cloud_firestore_web:

Version: 3.10.3

Purpose: Web implementation of Cloud Firestore.

vi) firebase_auth_web:

Version: 5.9.3

Purpose: Web implementation of Firebase Authentication.

vii) firebase_core_web:

Version: 2.11.3

Purpose: Web implementation of Firebase Core.

viii) cloud_firestore_web:

Version: 3.10.3

Purpose: Web implementation of Cloud Firestore.

ix) firebase_auth_web:

Version: 5.9.3

Purpose: Web implementation of Firebase Authentication.

2.2 PROPOSED APPLICATION ARCHITECTURE

The proposed application architecture for an EMI calculator in Flutter involves a clear separation of concerns across different layers. At the presentation layer, the user interface (UI) components are structured into widgets responsible for input fields, buttons, and result displays the proposed application architecture is shown in figure 2.1

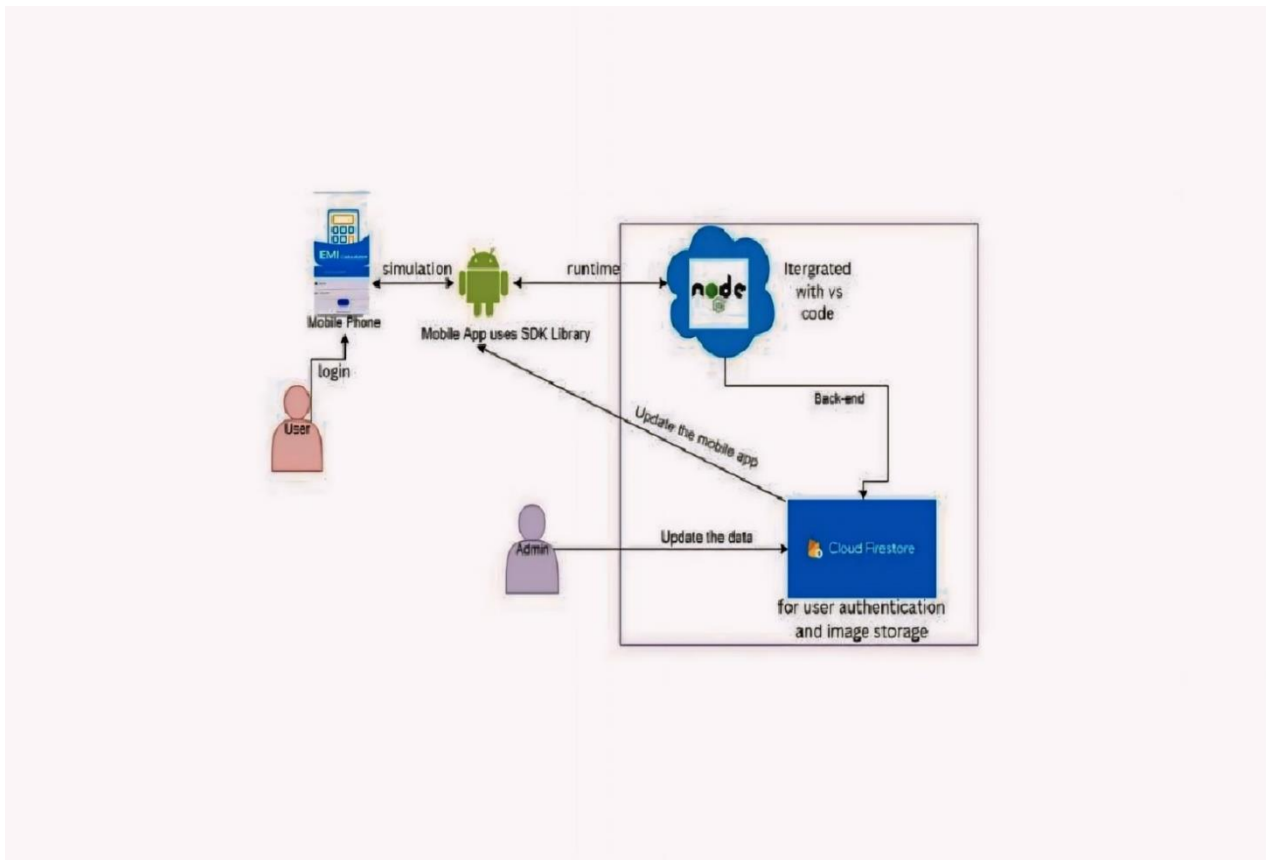


Fig:2.1: Proposed Application Architecture

2.2.1 EXPLANATION OF PROPOSED ARCHITECTURE DIAGRAM

The proposed application architecture for an EMI calculator in Flutter follows a clear separation of concerns to ensure maintainability and scalability. At the presentation layer, the user interface (UI) components are designed to facilitate user interaction, including input fields for the principal amount, interest rate, and loan tenure, along with a button to trigger the calculation and a display area to show the computed EMI. State management is handled within the Stateful Widget, allowing the application to reactively update based on user input. Moving to the business logic layer, the EMI calculation logic resides here, implementing the necessary formulas to calculate the EMI based on the provided input values. Additionally, validation logic ensures that input values are within acceptable ranges and data types, preventing calculation errors. While a data layer might not be essential for a basic EMI calculator, it can be extended in the future to support features like saving loan details or accessing historical data. Overall, this architecture promotes modularity and separation of concerns, making the application easier to understand, maintain, and scale as requirements evolve. The code structure is organized into directories such as screens, widgets, logic, models, utils, and services to maintain modularity and code clarity. Overall, this architecture promotes maintainability, extensibility, and code reusability, making it easier to enhance and scale the application in the future.

i)Custom Dart Code:

This represents any custom code you write in Dart specifically for your Flutter app. It could be business logic, UI components, or any other functionality unique to your application. The custom Dart code interacts with the Flutter framework to achieve various tasks.

ii)Flutter Framework:

The Flutter framework is the heart of your app. It provides a rich set of widgets, tools, and APIs for building cross-platform mobile applications.

iii) Method Channel:

The Method Channel allows communication between Dart code and native platform code (Android or iOS). When we invoke a method on the Method Channel from Dart, it triggers a corresponding method call on the native side.

iv) Flutter Engine Android Shell:

On the Android side, the Flutter engine runs within an Android shell.

- i) Flutter View: This is the Android view that displays your Flutter UI.
- ii) BinaryMessenger: It handles communication between the Flutter engine and the Android platform.

v) Flutter Engine iOS Shell:

On iOS, the Flutter engine runs within an iOS shell.

- i) Flutter ViewController: The iOS view controller responsible for displaying your Flutter UI.
- ii) Flutter BinaryMessenger: Handles communication between the Flutter engine and the iOS platform.

vi) Custom Android Code and Custom iOS Code:

These represent platform-specific code written in Java/Kotlin (for Android) and Objective-C/Swift (for iOS). You'll write custom code here to interact with the Flutter framework.

vii) Firebase:

Firebase is a comprehensive platform developed by Google that provides a

wide range of backend services and tools to help developers build, grow, and scale their apps more efficiently. It offers a variety of features that enable developers to develop high-quality applications across multiple platforms, including web, Android, and iOS. firebase architecture is shown in figure 2.2

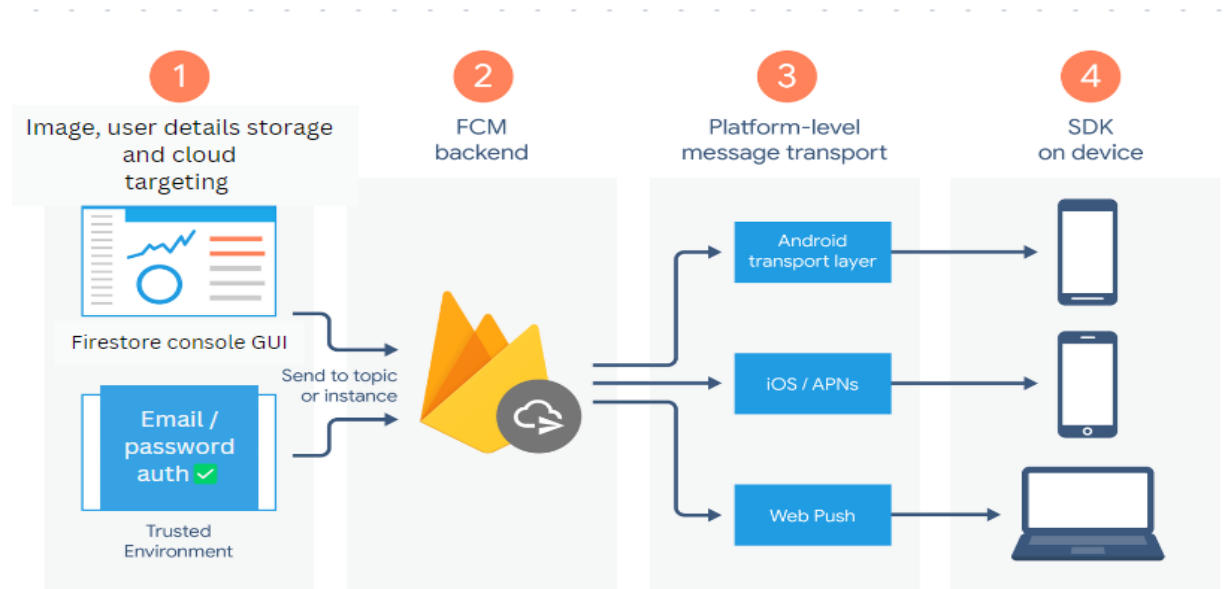


Fig:2.2: Firebase Architecture

viii) Firebase Authentication:

Firebase Authentication offers ready-to-use authentication services. It integrates seamlessly with Flutter, allowing users to sign up, sign in, and manage their accounts. MFA (Multi-factor Authentication).

ix) Cloud Storage:

Firebase Storage offers secure and reliable cloud storage for user-generated content such as images, videos, and other files.

2.3 SOFTWARE ANALYSIS

i) Requirement Analysis:

Gathering Requirements Interacting with stakeholders to understand the purpose of the EMI calculator, target audience, and specific features required and Documenting Requirements Capturing key requirements such as input fields for principal amount, interest rate, loan tenure, and a button to calculate EMI.

ii) **Structural Analysis:**

UI Design Planning the layout and design of the calculator interface, including input fields, buttons, and result display. State Management Deciding on the state management approach, such as using Stateful Widget to manage input fields and calculated results.

iii) **Performance Analysis:**

Efficiency Ensuring efficient calculation algorithms to provide quick responses even for complex calculations. Resource Usage Analyzing resource usage to ensure the application performs well on devices with varying specifications.

iv) **Quality Analysis:**

Testing Conduct thorough testing to verify the accuracy of the calculation logic and validate the user interface Error Handling Implement error handling mechanisms to gracefully handle invalid input and edge cases. User Experience Ensure a seamless and intuitive user experience by incorporating feedback and usability testing.

v) **Accessibility Analysis:**

AccessibilityFeatures Evaluate the accessibility of the user interface components, ensuring that users with disabilities can effectively use the calculator. Screen Reader Support Test the compatibility with screen readers and implement necessary enhancements to improve accessibility.

2.4 MODULES

2.4.1 LOGIN AUTHENTICATION:

login authentication for an EMI calculator can add security and personalization features to the application and interests, enhancing user profile completeness.

Algorithm:

- i) User registration: Allow users to register for an account using their email address and password. You can also offer alternative registration methods like social media sign-in if needed.
- ii) Authentication middleware: Allow users to register for an account using their email address and password. You can also offer alternative registration methods like social media sign-in if needed.
- iii) Secure password manager : Use secure hashing algorithms like bcrypt to encrypt and store user passwords in the database. Never store passwords in plaintext.
- iv) Create User Account: After successful validation, the system creates a new user account using the provided information. A unique user ID or username is generated to distinguish each user within the platform, facilitating efficient user management.
- v) Session Management: Manage user sessions securely by generating and storing session tokens upon successful authentication. Set session expiration times to enhance security.

2.4.2 PERFORMANCE METRICS:

Performance metrics for the emi calculator app can include various aspects that contribute to the overall user experience and efficiency of the application. Here's a brief overview of some performance metrics you may consider:

Alogrithm:

Responsive Time Measure the time taken by the app to respond to user interactions such as opening the app, navigating between screens, and performing actions like event registration or theme changes. Optimize the app to ensure minimal response times, providing a smooth and responsive user experience.

Loading Time Evaluate the time taken for the app to load initially and fetch data from the backend server. Minimize loading times by optimizing network requests, caching frequently accessed data, and employing lazy loading techniques to fetch data only when needed.

App size Monitor the size of the app package to ensure it is optimized for efficient installation and storage on users' devices. Minimize unnecessary dependencies, resources, and assets to reduce the app size and improve download and installation times.

Network Performance Evaluate network performance metrics such as latency, throughput, and packet loss to ensure fast and reliable communication between the app and the backend server. Optimize network requests, use caching mechanisms, and employ content delivery networks (CDNs) to improve network performance.

Grant Access If the entered credentials or authentication tokens are valid, the system grants the user access to the platform, allowing them to explore features and functionalities.

Session Management Upon successful authentication, the system creates a session or issues a token to maintain the user's logged-in state. This session/token management ensures secure and seamless user interactions throughout their session on the platform.

2.4.3 EFFICIENT UTILIZATION

Efficient utilization in a Flutter EMI calculator app involves optimizing various aspects of the application to ensure it runs smoothly, consumes minimal resources, and provides a responsive user experience, enhancing personalization and user control.

Algorithm:

UI Optimization Keeps the UI simple and intuitive to minimize rendering overhead. Avoid unnecessary animations or complex layouts that could impact performance. Utilize Flutter's built-in widgets and layout mechanisms efficiently to create responsive UIs. Optimize image assets by compressing them appropriately to reduce app size and loading times. Network Optimization Minimize network requests by caching data locally whenever possible, reducing the need for frequent server calls. Background Processing Offload long-running tasks such as data fetching or computations to background isolates using Flutter's compute function or isolates API. Use asynchronous programming techniques such as async/await to perform non-blocking operations, keeping the UI responsive. Code Optimization Profile your code using Flutter Dev Tools or other profiling tools to identify performance bottle necks Optimize critical code paths by eliminating unnecessary loops, reducing function calls. Additionally, optimizing user experience through responsive design principles ensures that the EMI calculator widget adapts seamlessly to various screen sizes and orientations, enhancing usability across different devices. Furthermore, employing Flutter's state management solutions like Provider or Riverpod can enhance efficiency by managing the widget's state in a structured manner, preventing unnecessary re-renders and optimizing performance. Furthermore, employing Flutter's state management solutions like Provider or Riverpod can enhance efficiency by managing the widget's state in a structured manner, preventing unnecessary re-renders and optimizing performance.

2.4.4 FLUTTER OVERVIEW:

Learning Flutter is an exciting journey that opens up a world of possibilities in mobile app development. Here's a comprehensive survey of Flutter, covering its key features, advantages, learning resources, and best practices.

Algorithm:

Hot Reload is Flutter's hot reload feature that allows developers to instantly see the changes they make to the code reflected in the app's UI, speeding up the development process significantly. Flutter offers a wide range of customizable widgets and rich animation support, enabling developers to create visually stunning and highly interactive user interfaces. Flutter's hot reload and single codebase streamline the development process, allowing developers to build and iterate on features quickly. Flutter apps offer excellent performance and fluid animations, thanks to its compiled-to-native approach. Flutter ensures consistent UI across different platforms, providing a native-like experience for users on both iOS and Android.

Community and Ecosystem in Flutter has a vibrant and growing community of developers, along with a rich ecosystem of packages and plugins that extend its functionality.

Follow the Material Design Guidelines: Design your Flutter app according to the Material Design principles for a consistent and intuitive user experience.

Use Stateless and Stateful Widgets Wisely to Choose between stateless and stateful widgets based on whether your UI components need to maintain state.

Real-Time Assistance Integrate a chat support feature to assist users in their mentor selection process, answering questions, providing guidance, and addressing concerns in real time.

Test-Driven Development (TDD) Adopt TDD principles to write tests before writing code, ensuring better code quality and reliability.

Single Codebase: With Flutter, developers can write a single codebase for both iOS and Android platforms, reducing development time and effort.

2.4.5 PATH OF APP CREATION :

Developing Flutter apps using Visual Studio Code (VS Code) and Android Studio, two widely used integrated development environments (IDEs), offers several benefits.

1. VS Code:

Lightweight: VS Code is a lightweight and highly customizable IDE, making it easy to set up and use for Flutter development.

Adapt to Different Platforms: Customize your app's behavior and appearance for different platforms (iOS and Android) Handle the Platform specific features and APIs using conditional statements or platform channels.

Extensible: VS Code supports a wide range of extensions, including Flutter and Dart extensions, which provide features like syntax highlighting, code completion, and debugging tools tailored for Flutter development.

Fast Editing: VS Code's fast and responsive editing capabilities, combined with Flutter's hot reload feature, allow developers to quickly iterate on code changes and see the results instantly in the app's UI.

Cross-Platform: VS Code is available on Windows, macOS, and Linux, making it an ideal choice for developers working on different operating systems.

Optimize Performance: Profile your app for performance issues using Flutter DevTools. Optimize UI rendering, memory usage.

2. Android Studio:

Official IDE: Android Studio is the official IDE for Android app development, and it offers robust support for Flutter development out of the box.

Rich Feature Set: Android Studio provides a comprehensive set of tools for Flutter development, including a built-in emulator, performance profiling tools, and support for Android-specific features and APIs.

Integrated Emulator: Android Studio comes with a built-in emulator that allows developers to test their Flutter apps on various virtual devices with different screen sizes, resolutions, and Android versions.

Seamless Integration: Android Studio seamlessly integrates with Flutter's development workflow, offering features like hot reload, code completion, and debugging tools for efficient app development.

Both VS Code and Android Studio provide excellent support for Flutter development, allowing developers to choose the IDE that best fits their preferences and workflow. Whether you prefer the lightweight and customizable experience of VS Code or the feature-rich environment of Android Studio, you can leverage the power of Flutter to build high-quality cross-platform apps with ease

2.5 FIREBASE CONFIGURATION:

Firebase project created and configured for the application. Firebase Hosting used for deploying the Flutter web application. and the Firebase configuration is shown in figure

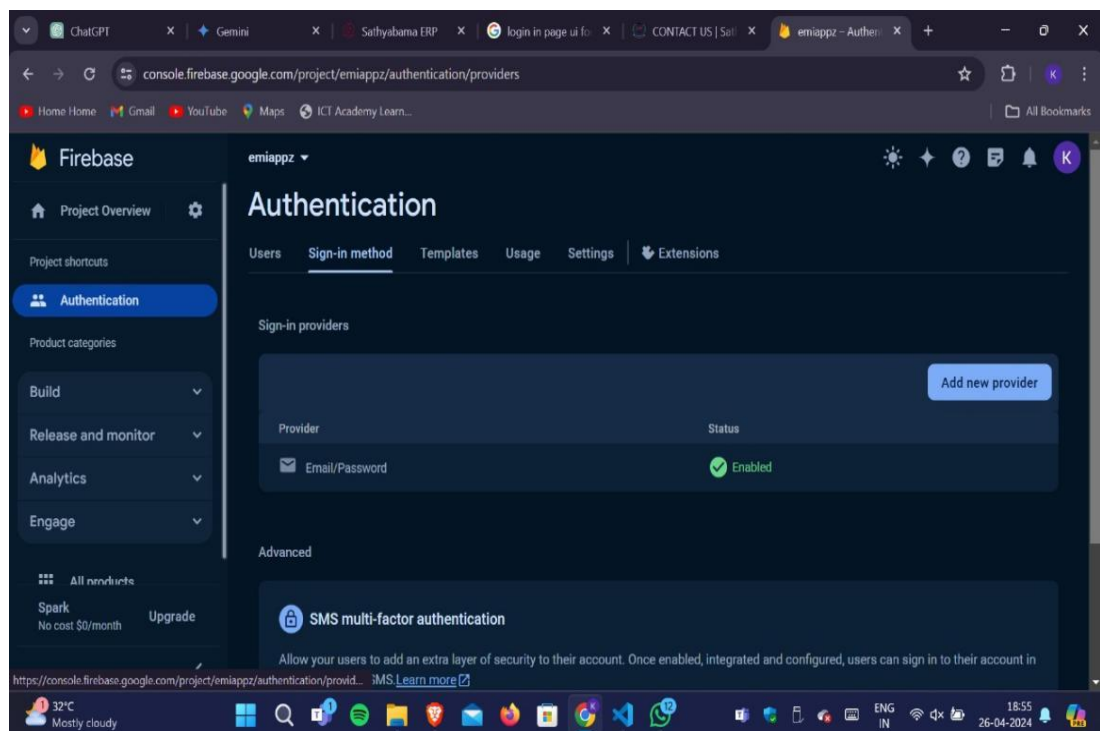


Fig:2.5: Firebase Connection

2.5.1 FIREBASE AUTHENTICATION:

Firebase Authentication set up for secure user login and identity verification. and the firebase authentication is shown in figure 2.6

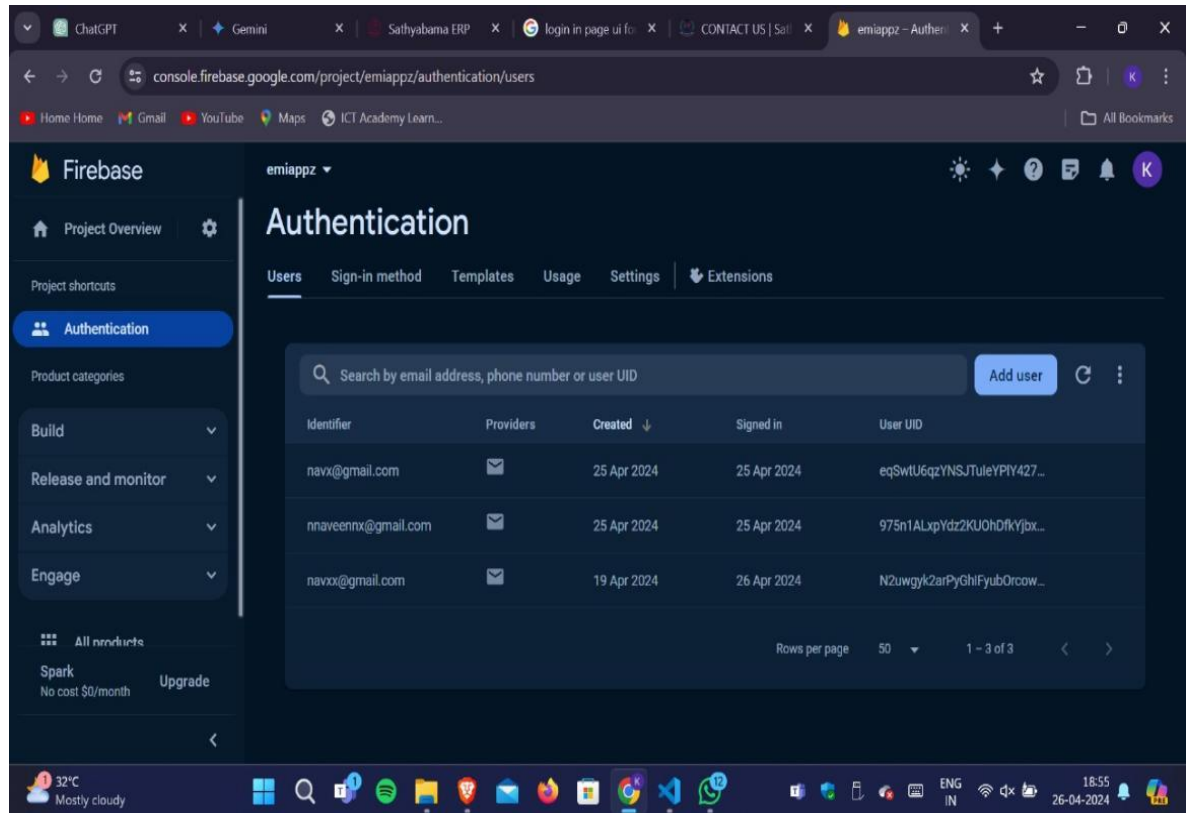


Fig:2.6: Firebase Authentication

CHAPTER 3

RESULTS AND DISCUSSION

DARD CODES:

i)Main.dart: This file is typically the entry point of a Flutter application. It initializes the app, sets up necessary configurations, and runs the main application widget.

ii)Login Page dart: This file likely contains the UI and logic for user login and It includes form fields for entering credentials and mechanism.The login page interface is shown in figure 3.1

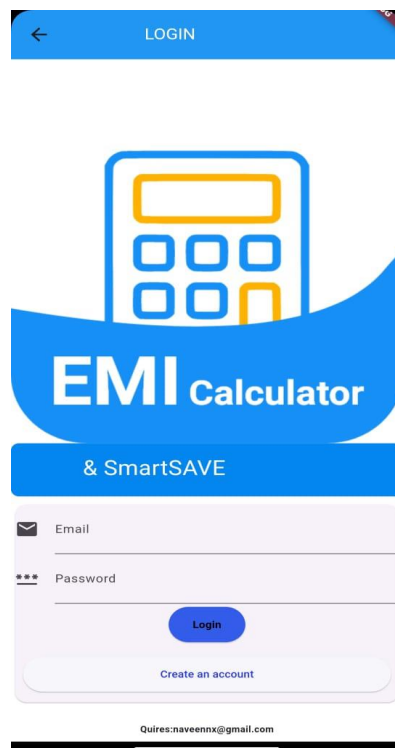


Fig:3.1: Login Page Interface

iii)signupPage.dart: Similar to the login file, signupPage.dart is likely responsible for handling user registration. It includes form fields for users to create accounts.

iv)homepage.dart: The homepage plays a crucial role in creating the first impression of the application to users. It should provide relevant information and functionality that align with the app's purpose and goals.

v)profilepage.dart: The file is likely responsible for displaying and editing user profiles. It includes information about the user, such as their name, and additional details.

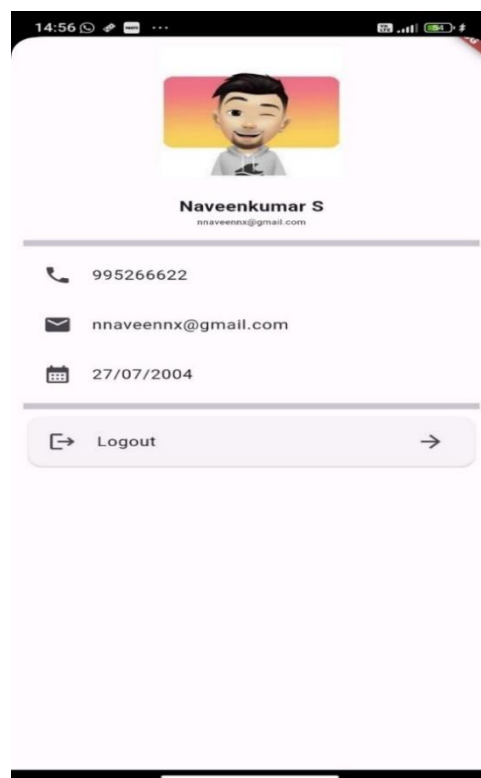


Fig:3.2: Dashboard Screen Display

FIREBASE:

i)Create a Firebase Project:

- 1.Go to the Firebase Console.
- 2.Click on "Add Project" and follow the setup instructions.

ii)Configure Flutter Project:

1. Add the Firebase configuration files to your Flutter project.
2. Follow the instructions provided in the Firebase Console to add google-services.json for Android and GoogleService-Info.plist for iOS.
3. These files contain configuration details needed for your app to connect to Firebase services.The firebase configurations are shown in figure 3.5

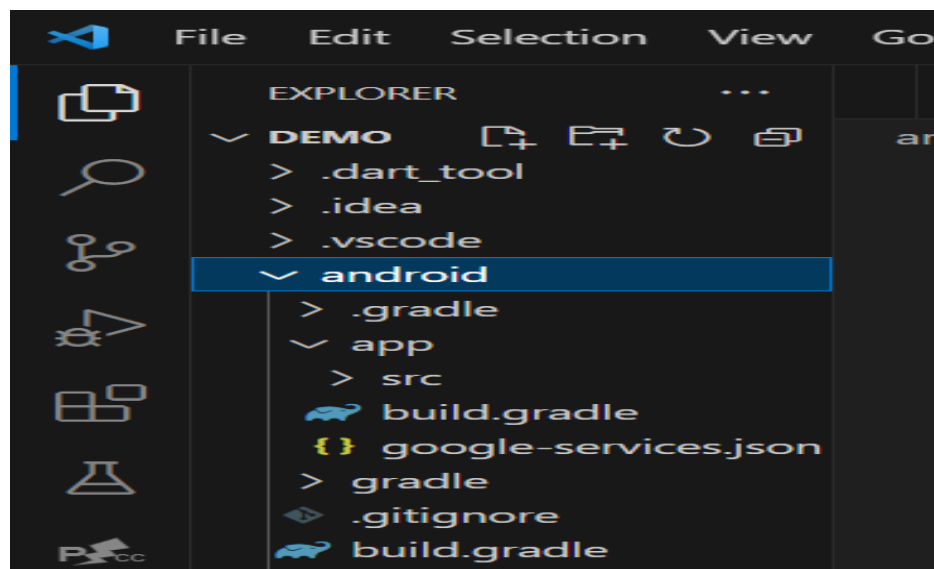


Fig:3.5: Firebase Configurations

i)Add Firebase Dependencies:

open the pubspec.yaml file and add the following dependencies:

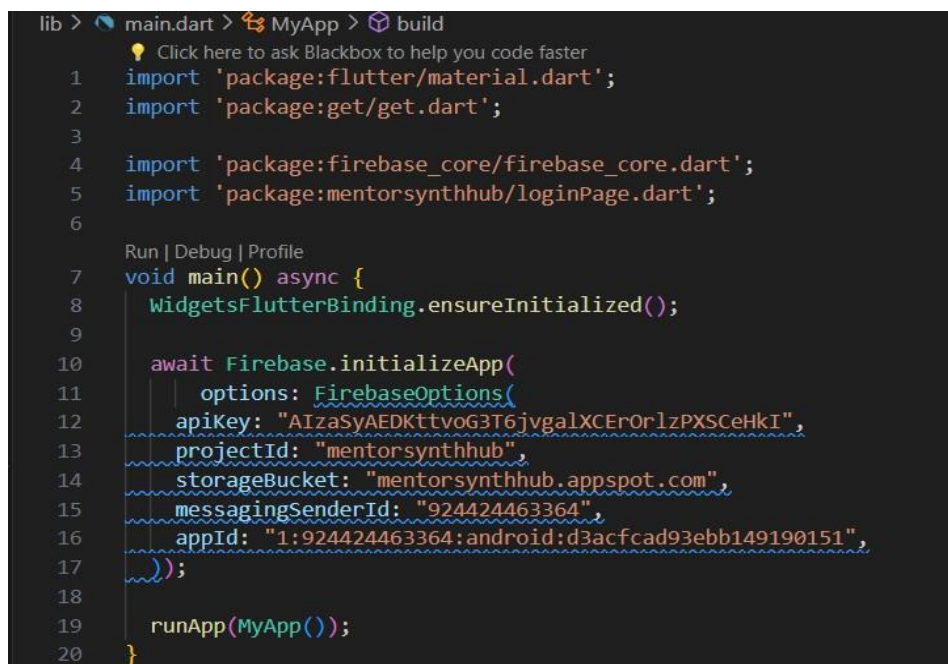
yaml code:dependencies:

firebase_core: ^2.25.3 firebase_auth: ^4.17.5

ii)Initialize Firebase:

In your main.dart or wherever you initialize your Flutter app, make sure initialize Firebase. If you want to implement user authentication, Firebase provides the firebase_auth package. You can use it to sign in users using various methods like email/password, Google Sign-In, etc.The initializing firebase are shown in figure 3.6

Dart code:



```
lib > main.dart > MyApp > build
Click here to ask Blackbox to help you code faster
1 import 'package:flutter/material.dart';
2 import 'package:get/get.dart';
3
4 import 'package:firebase_core/firebase_core.dart';
5 import 'package:mentorsynthhub/loginPage.dart';
6
7 Run | Debug | Profile
8 void main() async {
9   WidgetsFlutterBinding.ensureInitialized();
10
11   await Firebase.initializeApp(
12     options: FirebaseOptions(
13       apiKey: "AIzaSyAEDKttvoG3T6jvgalXCErOrlzPXSCeHkI",
14       projectId: "mentorsynthhub",
15       storageBucket: "mentorsynthhub.appspot.com",
16       messagingSenderId: "924424463364",
17       appId: "1:924424463364:android:d3acfcad93ebb149190151",
18     ));
19   runApp(MyApp());
20 }
```

Fig:3.6: Initializing Firebase

CHAPTER 4

CONCLUSION AND FUTURE WORK

4.1 CONCLUSION

In conclusion, building an EMI calculator with Flutter offers a streamlined and efficient development process, leveraging the framework's features for cross-platform compatibility, expressive UI design, and robust performance. By following the steps outlined in the overview, you can create a feature-rich EMI calculator app that provides users with a convenient tool for calculating loan repayments.

Flutter's rich widget library allows for the creation of a visually appealing and intuitive user interface, while its hot reload feature enables rapid iteration and testing during the development process. Additionally, Flutter's single codebase approach ensures consistent behavior across different platforms, reducing development time and effort.

With Flutter, you can implement essential functionalities such as user input validation, EMI calculation logic, interactive features, and data visualization with ease. The platform's support for state management solutions like Flutter Bloc or Provider enables efficient handling of application state, ensuring smooth performance and responsiveness.

Furthermore, Flutter's robust testing framework allows for comprehensive testing of your EMI calculator app, ensuring the correctness of calculations and the reliability of user interactions across various devices and screen sizes.

4.2 FUTURE WORK

i)Enhanced User Profiles:

Implement additional fields and customization options in user profiles, allowing users to showcase more details about their skills, interests, and experiences.

ii)Advanced Mentor Matching Algorithm:

Develop a more sophisticated algorithm for mentor-student matching, considering factors like specific expertise, project interests, and availability to enhance the quality of mentorship connections.

iii)Real-time Collaboration Tools:

Integrate real-time collaboration tools, such as collaborative document editing, code sharing, or video conferencing, to facilitate more interactive mentor-student sessions.

iv)Mobile App Accessibility:

Ensure the app's accessibility by incorporating features like voiceover support, larger text options, and other accessibility improvements to cater to a diverse user base.

v)Feedback and Rating System:

Implement a comprehensive feedback and rating system for both mentors and students, allowing users to provide reviews and ratings after mentorship sessions to build a reputation system.

REFERENCES

1.Journals:

[1] Geng, Y., Li, X., Li, Y., & Su, X. (2019). Design and Implementation of flutter projects In 2019 IEEE International Conference on Service Operations and Logistics, and Informatics (SOLI) (pp. 20-24). IEEE.

[2] Kim, J., Chung, H., & Kim, S. (2017). A Study on the Development of an App Based on Web 2.0 Technologies. Indian Journal of Science and Technology, 10(1), 1-7.

[3] Lee, J., Song, Y., & Park, J. (2019). Development of Cross-platform Mobile Application for IoT System Using Flutter. In 2019 16th International Conference on Ubiquitous Robots (UR) (pp. 16-21). IEEE.

2.Books:

[1] Beginning App Development with Flutter by Marco L. Napoli: Geared towards beginners, this book offers a step-by-step approach to learning Flutter development. It covers Flutter basics, UI design, navigation, state management, and building real-world applications.

[2] Flutter in Action by Eric Windmill: This book provides practical, hands-on guidance for building mobile applications with Flutter. It covers fundamental concepts, UI development, state management, testing, and deployment.

[3] Flutter Complete Reference by Alberto Miola and Divyanshu Bhargava: This comprehensive guide covers everything you need to know about

Flutter, from basics to advanced topics, including widgets, animations.

[4] Flutter Cookbook by Brian Egan and Fitz Clymer: If you're looking for a collection of practical recipes and solutions for common Flutter development tasks, this book is for you. It covers a wide range of topics, including UI elements, animations, networking, and platform integration

[5] Flutter Projects by Simone Alessandria: This book provides hands-on projects to help developers apply their Flutter skills in real-world scenarios. It covers topics such as building a weather app, chat application, cryptocurrency tracker, and more.

[6] Flutter for Mobile Development: Harness the Power of Mobile Development with Google's Latest Cross-Platform Programming Framework, Flutter" by Scott Stoll: This book offers a comprehensive introduction to Flutter development, covering topics such as UI design, navigation, state management, and platform-specific integration.

APPENDICES

A.SAMPLE CODE

```
lib > main.dart > MyApp > build
  Click here to ask Blackbox to help you code faster
1  import 'package:flutter/material.dart';
2  import 'package:get/get.dart';
3
4  import 'package:firebase_core/firebase_core.dart';
5  import 'package:mentorsynthhub/loginPage.dart';
6
  Run | Debug | Profile
7  void main() async {
8    WidgetsFlutterBinding.ensureInitialized();
9
10   await Firebase.initializeApp(
11     options: FlutterOptions(
12     apiKey: "AIzaSyAEDKttvoG3T6jvga1XCErOrlzPXSCeHkI",
13     projectId: "mentorsynthhub",
14     storageBucket: "mentorsynthhub.appspot.com",
15     messagingSenderId: "924424463364",
16     appId: "1:924424463364:android:d3acfcad93ebb149190151",
17   ));
18
19   runApp(MyApp());
20 }
```

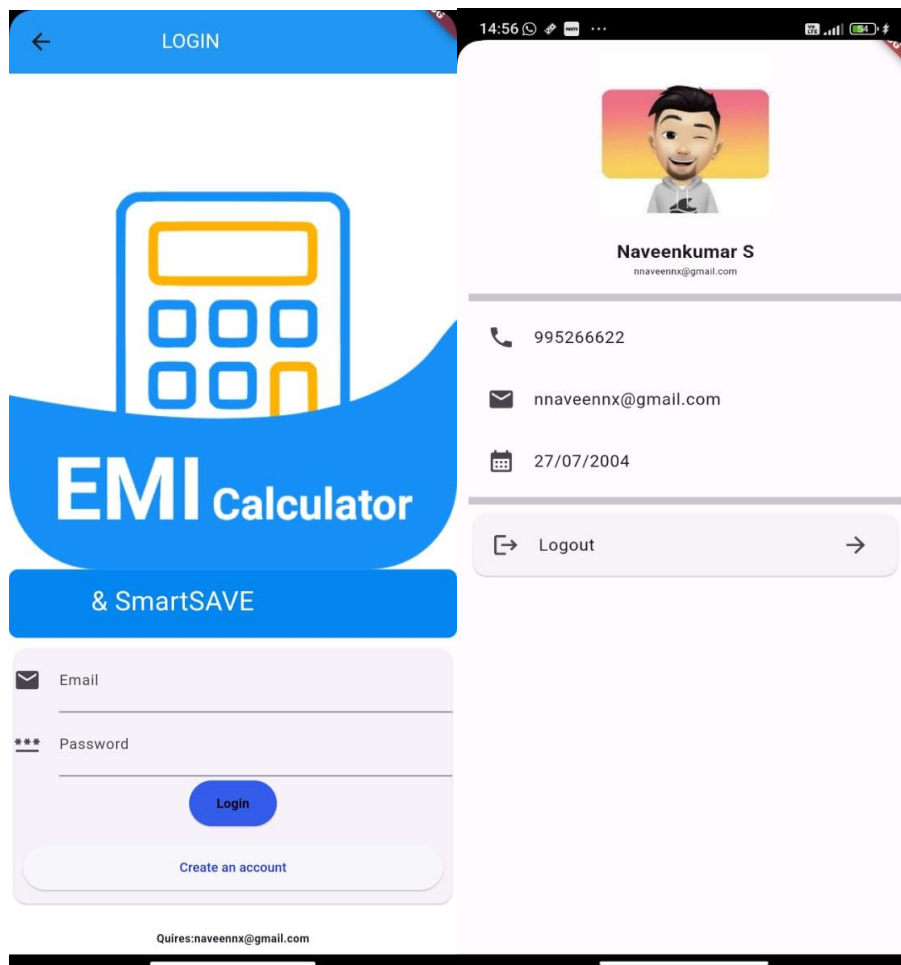
Main code:

i) pubspec.yaml

```
! pubspec.yaml ●
D: > MentorSynthHub > mentorsynthhub > ! pubspec.yaml
  🔦 Click here to ask Blackbox to help you code faster
1  name: mentorsynthhub
2  description: "A new Flutter project."
3  publish_to: 'none'
4  version: 1.0.0+1
5  environment:
6    sdk: '>=3.2.6 <4.0.0'
7  dependencies:
8    flutter:
9      sdk: flutter
10   cupertino_icons: ^1.0.2
11   get: ^4.6.6
12   firebase_core: ^2.25.3
13   firebase_auth: ^4.17.3
14   cloud_firestore: ^4.15.3
15   cloud_firestore_web: ^3.10.3
16   firebase_auth_web: ^5.9.3
17   firebase_core_web: ^2.11.3
18   google_sign_in: ^5.2.1
19   toast: ^0.3.0
20   fluttertoast: ^8.0.7
21   image_picker: ^1.0.7
22   permission_handler: ^11.2.0
23   provider: ^6.1.1
24   flutter_rating_bar: ^4.0.0
25 dev_dependencies:
26   flutter_test:
27     sdk: flutter
28   flutter_lints: ^3.0.1
29 flutter:
30   uses-material-design: true
31   assets:
32     - asset/
33     - asset/R (1).jpg
34     - asset/profile_photo.png
35     - asset/image.jpg
36
```

B.SCREEN SHOTS

i)Login page And Signup Page



ii) Calculation page

The image displays two side-by-side screenshots of a mobile application titled "Smart EMI Advisor". Both screenshots show the same interface, which is a form for calculating EMI. The form has five input fields: "Loan Amount", "Interest Rate (in %)", "Loan Term (in years)", "Income", and "Savings". Below these fields is a blue "Calculate" button. The left screenshot shows the form with empty input fields. The right screenshot shows the form with pre-filled values: "Loan Amount" is 500000, "Interest Rate (in %)" is 2, "Loan Term (in years)" is 5, "Income" is 50000, and "Savings" is 23000. The status bar at the top of both screenshots shows the time as 19:44 and 19:45, data usage as 0.2KB/s and 0.0KB/s, and battery level as 94%.

Field	Left Screenshot Value	Right Screenshot Value
Loan Amount		500000
Interest Rate (in %)		2
Loan Term (in years)		5
Income		50000
Savings		23000

3)results and fincheck page

