

SELSYNC
INTERDISCIPLINARY PROJECT

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

MURPHY SURYA R (41120117)



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

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **MURPHY SURYA R (41120117)** who carried out the project entitled "**selfSync**" under my supervision from **JANUARY 2024 to MAY 2024**.


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I, **MURPHY SURYA R (41120117)**, hereby declare that the Project Report entitled "**SELSYNC**" done by me under the guidance of **Ms. S. Sageengrana, M.E.**, is submitted in partial fulfillment of the requirements for the award Bachelor of Technology degree in **Information Technology**.

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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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CERTIFICATION OF COMPLETION



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CERTIFICATE FOR INTERNSHIP

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During the internship, **Murphy Surya R** has closely worked as a part of the **Flutter** by carrying out the project entitled "**SelfSync**"

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



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ABSTRACT

In the age of information overload, staying organized and keeping track of daily tasks can be a challenge. selfSync emerges as a user-centric mobile application designed to streamline personal information management. This application empowers users to effortlessly create and manage memos, securely store passwords, and meticulously plan their schedules – all within a single, intuitive interface.

Developed using the versatile Flutter framework, selfSync guarantees a smooth and native-like experience across a wide range of Android and iOS devices. By leveraging the power of a local SQLite database, selfSync ensures the safe and secure storage of sensitive data, be it personal notes, confidential passwords, or crucial appointment details.

This comprehensive report delves into the core functionalities of selfSync, shedding light on its architectural design and the underlying technologies that orchestrate its operations. Furthermore, the report meticulously examines the user experience facilitated by selfSync, emphasizing the potential benefits it offers for individuals seeking to optimize their personal information management strategies.

Beyond core functionalities, selfSync presents itself as a potential tool for enhancing personal productivity. By consolidating various organizational tasks within a single application, selfSync eliminates the need to juggle between disparate tools and platforms. This streamlined approach fosters improved focus and time management, empowering users to navigate their daily lives with greater efficiency. The following sections of this report will explore these aspects in greater detail, providing a deeper understanding of the value proposition offered by selfSync.

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CHAPTER 1

INTRODUCTION

This chapter serves as the foundation for understanding the selfSync mobile application. It introduces the core technologies that underpin the application's development and explores the problem statement that selfSync aims to address. Additionally, the chapter outlines the key objectives that guided the creation of this application.

1.1 Flutter

Flutter is a revolutionary open-source framework developed by Google for crafting beautiful, high-performance applications for mobile, web, desktop, and embedded devices. Introduced in 2015, Flutter has garnered immense popularity due to its exceptional features and capabilities.

One of the most compelling aspects of Flutter is its utilization of the Dart programming language, offering developers a single codebase for creating applications across diverse platforms. This eliminates the need for separate codebases for Android and iOS development, streamlining the development process and ensuring consistency across platforms.

Beyond platform unification, Flutter boasts a robust widget-based UI (User Interface) paradigm. Widgets are the building blocks of Flutter applications, serving as reusable components that encapsulate UI elements and their behaviors. This modular approach fosters code reusability, promotes efficient development, and facilitates the creation of visually stunning and interactive user interfaces.

Furthermore, Flutter empowers developers with a rich set of built-in widgets that cater to various UI elements like buttons, text fields, layouts, and more. This comprehensive library minimizes the need for third-party dependencies, simplifying development and reducing the application's overall footprint.

1.1.1 Advantages of Flutter for selfSync

The decision to leverage Flutter for developing selfSync was a strategic one, capitalizing on the framework's numerous advantages. Here's a closer look at how Flutter specifically benefited selfSync,

Cross-platform development: By employing a single codebase, Flutter enabled the creation of a seamless user experience for both Android and iOS users. This broadened the application's reach and ensured a consistent look and feel across different devices.

Performance and Efficiency: Flutter applications are known for their exceptional performance and smooth animations. This characteristic was crucial for selfSync, as it guarantees a responsive and enjoyable user experience when interacting with various features like scheduling events or managing notes.

Rich UI and Widgets: Flutter's extensive widget library provided the building blocks for crafting selfSync's intuitive and user-friendly interface. The pre-built widgets simplified the development process and allowed for the creation of a visually appealing application.

1.1.2 Future-proofing with Flutter

Selecting Flutter as the development framework positions selfSync for future scalability and growth. As Flutter continues to evolve and gain traction, it opens doors for potential expansion to web and desktop platforms. This cross-platform capability allows selfSync to adapt to changing user needs and preferences, ensuring its continued relevance in the ever-evolving mobile landscape.

1.2 Dart

Dart is a versatile, object-oriented programming language specifically designed for client-side development, particularly web and mobile applications. Developed by Google, Dart seamlessly integrates with the Flutter framework, offering a robust and efficient platform for crafting interactive applications.

One of the defining characteristics of Dart is its strong emphasis on readability and maintainability. The language enforces a clean syntax and utilizes features like type safety to minimize errors and enhance code clarity. This focus on code quality streamlines development, facilitates collaboration, and simplifies future maintenance efforts.

In addition to readability, Dart boasts a Just-in-Time (JIT) compilation process. This translates Dart code into machine code at runtime, enabling the application to execute efficiently on the target platform. This JIT compilation contributes to the exceptional performance and responsiveness associated with Flutter applications.

Furthermore, Dart offers a rich set of libraries and tools that streamline the development process. These tools include a robust package manager (pub) for dependency management, a state management solution (Provider) for handling application state, and a comprehensive testing framework (test) for ensuring code quality.

1.2.1 Suitability of Dart for selfSync

For the development of selfSync, Dart proved to be an apt choice due to its alignment with Flutter and its inherent strengths,

Readability and Maintainability: Dart's emphasis on clean code facilitated the creation of a well-structured and understandable codebase for selfSync. This characteristic is essential for long-term maintenance and potential future enhancements.

Performance and Efficiency: The JIT compilation process of Dart ensures that selfSync executes efficiently on various devices. This contributes to the application's responsiveness and overall user experience.

Integration with Flutter: The seamless integration between Dart and Flutter eliminates the need for context switching between different languages. This fosters a smooth development workflow and simplifies the process of building cross-platform applications.

1.2.2 A Language for the Future

Dart's ongoing evolution and growing popularity position it as a language with a promising future. As the Flutter framework gains wider adoption, Dart is expected to play an increasingly important role in the development of cross-platform applications. Google's continued investment in both Dart and Flutter signifies a strong commitment to the future of this technology stack.

Furthermore, Dart's focus on features like hot reload functionality further enhances developer productivity. Hot reload allows for near-instantaneous updates to the application UI during development, eliminating the need for lengthy recompile cycles. This feature significantly reduces development time and fosters a more iterative development approach.

In conclusion, Dart's readability, performance, integration with Flutter, and focus on developer productivity make it an ideal choice for building modern, cross-platform applications like selfSync. As both Dart and Flutter continue to mature, they hold immense potential for shaping the future of mobile and web development.

1.3 SQLite

SQLite is a lightweight, embeddable, relational database management system that boasts a compact size and a self-contained nature. Unlike traditional client-server database systems, SQLite operates directly on the device, eliminating the need for a dedicated server or complex network configurations.

One of the primary advantages of SQLite is its portability. The database engine itself has a minimal footprint and can be easily integrated into various applications, including mobile apps like selfSync. This portability makes SQLite a compelling choice for developers seeking to implement offline data storage functionality within their applications.

Furthermore, SQLite offers a robust set of features that cater to the needs of modern applications. It supports a variety of data types, including text, integers, floating-point numbers, and BLOBs (Binary Large Objects), allowing for the storage of diverse data types within the application. Additionally, SQLite provides functionalities for performing complex queries and data manipulation operations.

Security is another crucial aspect of SQLite. The database engine enforces access control mechanisms and utilizes encryption to safeguard sensitive data stored within the application. This ensures the privacy and integrity of user information managed by selfSync, such as notes, passwords, and scheduled events.

1.3.1 Benefits of Using SQLite in selfSync

The decision to leverage SQLite for data storage in selfSync stemmed from its suitability for mobile app development,

Offline Functionality: SQLite's ability to operate directly on the device empowers selfSync to function seamlessly even in the absence of an internet connection. This ensures users can access and manage their data, such as viewing notes or editing passwords, regardless of their online status.

Lightweight and Efficient: The compact size and efficient nature of SQLite minimize the application's overall footprint and optimize its performance on mobile devices. This is crucial for ensuring smooth user experience without compromising on device storage or processing power.

Data Security: SQLite's built-in security features safeguard sensitive user information stored within selfSync. This includes access control mechanisms and encryption capabilities, protecting user privacy and mitigating potential security risks.

1.3.2 Future Considerations for Data Storage

While SQLite provides a solid foundation for data storage in selfSync, future enhancements might explore alternative solutions based on evolving user needs and application requirements. Cloud-based storage solutions could be considered

to facilitate data syncing across multiple devices or enable collaborative features within the application. However, such an approach would necessitate careful consideration of data privacy and security implications.

1.4 Problem Statement

In today's digital age, individuals grapple with an ever-increasing volume of information. Managing personal notes, appointments, and confidential credentials can be a cumbersome task, often leading to disorganization and missed deadlines. Traditional methods, such as relying on physical notebooks or scattered digital files, prove to be inefficient and cumbersome.

This information overload can lead to several challenges,

Inefficiency and Time Wastage: The scattered nature of information across disparate tools and platforms necessitates constant context switching, hindering productivity and leading to wasted time searching for specific notes or passwords.

Missed Deadlines and Forgotten Tasks: The lack of a centralized system for managing appointments and tasks can result in missed deadlines and overlooked commitments, potentially causing personal and professional inconveniences.

Security Concerns: The use of unsecured methods for storing confidential information, such as passwords or sensitive notes, poses a significant security risk. In the event of a device loss or unauthorized access, such information could be compromised.

selfSync emerges as a potential solution to address these challenges by offering a comprehensive and user-centric approach to personal information management.

1.5 Objectives

The development of selfSync was guided by a set of core objectives aimed at empowering users to manage their information effectively,

Centralized Organization: To establish a unified platform for managing notes, appointments, and passwords, eliminating the need to juggle between various tools and applications. This fosters improved organization and simplifies information retrieval.

Enhanced Productivity: To streamline workflows and minimize time spent searching for information. By providing a central location for all crucial details, selfSync empowers users to focus on tasks rather than wasting time navigating through scattered data sources.

Improved Time Management: To equip users with the tools necessary to effectively manage their schedules and deadlines. SelfSync's calendar and reminder features help users stay on top of appointments and commitments, promoting better time management and reducing the risk of missed deadlines.

Robust Security: To prioritize the security of sensitive user information. selfSync leverages SQLite's built-in security features to safeguard notes, passwords, and other confidential data. This ensures user privacy and mitigates potential security vulnerabilities.

By achieving these objectives, selfSync aspires to transform the way users manage their personal information, fostering a more organized, productive, and secure approach to daily tasks.

CHAPTER 2

METHODOLOGY

In this chapter, we delve into the methodology adopted for the development of the selfSync application. This includes outlining the requirements, illustrating the data flow, discussing the architecture, detailing the various modules, and addressing the development and deployment processes.

2.1 Requirements

The requirements section outlines the functional and non-functional aspects necessary for the successful implementation of the selfSync application. These requirements serve as the foundation upon which the entire development process is built.

2.1.1 Functional Requirements

Functional requirements define the specific functionalities that the application must possess to meet the needs of its users. These requirements are derived from the desired features and capabilities of the application as outlined in the problem statement and objectives.

Functional requirements encompass various aspects of the application, including user interactions, data management, security measures, and integration with external services. For example, the application should allow users to create, edit, and delete memos and passwords. It should also provide features such as sorting, searching, and categorizing data to enhance usability. Additionally, the application must ensure data integrity and security by implementing encryption algorithms and access control mechanisms.

Moreover, functional requirements may include specific user interface elements, such as buttons, forms, menus, and dialogs, to facilitate user interactions. These elements should adhere to design principles and guidelines to ensure consistency and usability across different platforms and devices. Furthermore, the application should support accessibility features to accommodate users with disabilities and provide a seamless experience for all users.

In addition to core functionalities, functional requirements may also encompass optional features and enhancements that enhance the overall user experience and provide added value to users. These features may include synchronization with cloud storage services, integration with other applications and platforms, and support for multiple languages and locales. By incorporating these features, the application can cater to a wider range of users and adapt to their diverse needs and preferences.

Overall, functional requirements play a crucial role in shaping the design and development of the selfSync application, ensuring that it meets the expectations and requirements of its users while delivering a seamless and intuitive user experience.

2.1.2 Non-Functional Requirements

Non-functional requirements specify the quality attributes and constraints that the application must adhere to. These include aspects such as performance, security, usability, scalability, and reliability. They ensure that the application not only meets its functional requirements but also provides a satisfactory user experience and complies with industry standards and best practices.

Non-functional requirements define the criteria by which the success of the application is measured in terms of its performance, reliability, and usability. For example, the application should respond promptly to user interactions and provide smooth and fluid animations and transitions to enhance user engagement and satisfaction. Additionally, the application should be robust and resilient to failures, ensuring uninterrupted operation and data integrity.

Moreover, non-functional requirements dictate the security measures and protocols implemented to protect user data and privacy. This includes encryption of sensitive information, secure communication protocols, and access control mechanisms to prevent unauthorized access and misuse of data. Furthermore, the application should comply with relevant regulations and standards related to data protection and privacy, such as GDPR and HIPAA.

In addition to performance and security, non-functional requirements also encompass usability and accessibility aspects to ensure that the application is intuitive and easy to use for all users, including those with disabilities. This includes providing clear and concise instructions, minimizing cognitive load, and designing an intuitive user interface that caters to the diverse needs and preferences of users.

Furthermore, non-functional requirements may also address scalability and extensibility aspects, ensuring that the application can handle increasing user loads and accommodate future enhancements and expansions. This includes designing a modular and flexible architecture that supports easy integration with third-party services and extensions, as well as efficient utilization of resources to optimize performance and scalability.

Overall, non-functional requirements are essential for ensuring the overall quality, reliability, and usability of the selfSync application, enabling it to deliver a seamless and satisfying user experience while meeting the highest standards of performance, security, and compliance.

2.2 Data Flow

The data flow section outlines how information is processed and transmitted within the selfSync application. It encompasses the flow of data from its creation or input through various stages of processing, manipulation, storage, and retrieval until its final consumption or output.

2.2.1 Data Input

Data input refers to the process of capturing and recording information into the application. This includes user inputs such as text, images, and other multimedia content, as well as data imported from external sources such as files, sensors, and APIs.

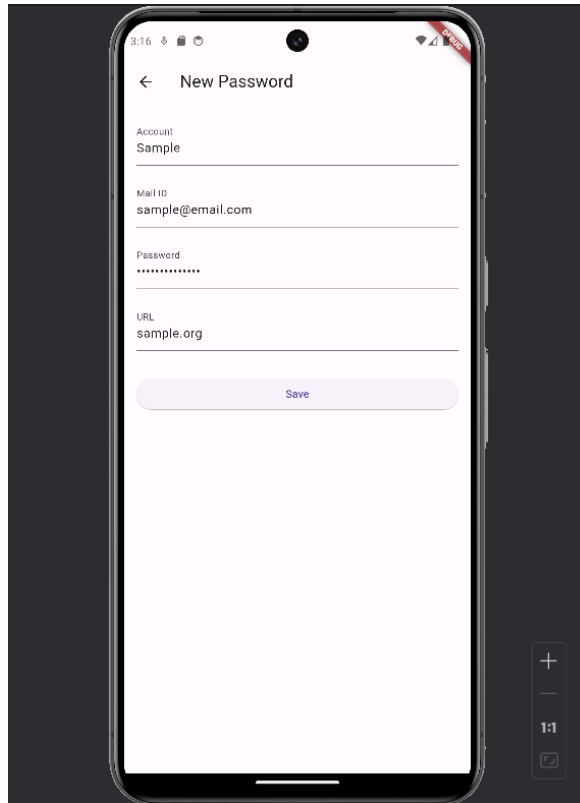


Fig 2.1 New Password Page

The selfSync application supports various methods of data input, including manual entry through user interfaces, import from external files or services, and automatic generation through integrated features such as voice recognition and image scanning. Each input method is designed to provide flexibility, convenience, and efficiency for users, allowing them to easily input and manage their data according to their preferences and requirements.

2.2.2 Data Processing

Data processing involves the manipulation and transformation of raw data into meaningful information within the application. This includes tasks such as parsing, validation, normalization, aggregation, and analysis, depending on the nature and purpose of the data.

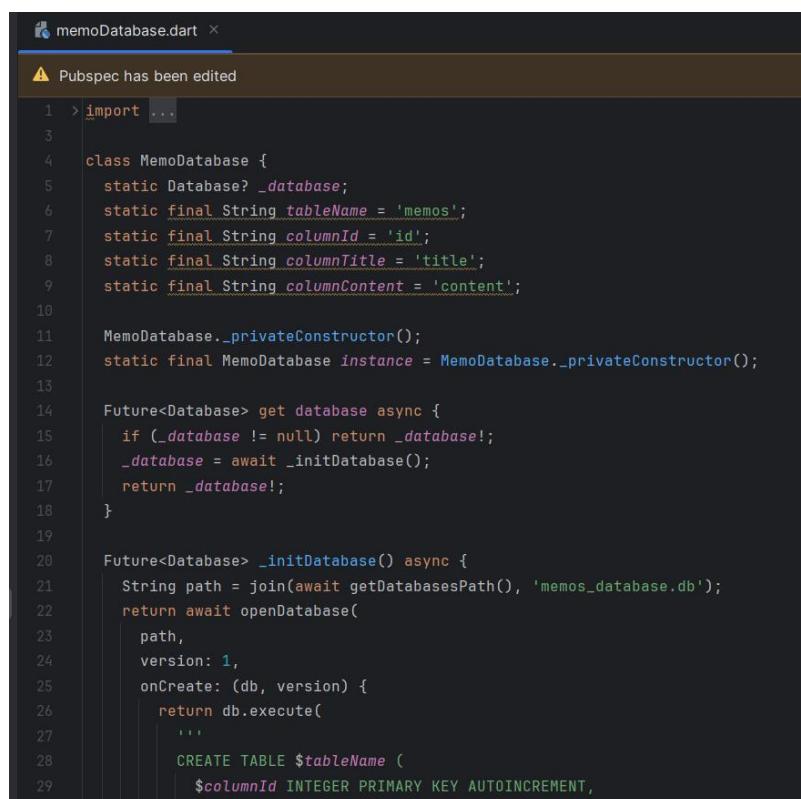
In the selfSync application, data processing tasks are performed asynchronously and efficiently to ensure optimal performance and responsiveness. This includes leveraging background threads, caching mechanisms, and optimization algorithms to minimize processing overhead and latency while maximizing throughput and scalability. Additionally, error handling and validation mechanisms are

implemented to ensure data integrity and reliability throughout the processing pipeline.

2.2.3 Data Storage

Data storage encompasses the mechanisms and structures used to persistently store and retrieve information within the application. This includes databases, file systems, cloud storage services, and other storage mediums, each optimized for specific use cases and requirements.

In the selfSync application, data is stored in a secure and reliable manner using SQLite databases for structured data such as passwords, memos, and schedules. This allows for efficient querying, indexing, and retrieval of information while ensuring data integrity and consistency. Additionally, data encryption and access control mechanisms are employed to protect sensitive information from unauthorized access and misuse.



```
memoDatabase.dart
Pubspec has been edited

1 > import ...
2
3
4 class MemoDatabase {
5   static Database? _database;
6   static final String tableName = 'memos';
7   static final String columnId = 'id';
8   static final String columnName = 'title';
9   static final String columnContent = 'content';
10
11   MemoDatabase._privateConstructor();
12   static final MemoDatabase instance = MemoDatabase._privateConstructor();
13
14   Future<Database> get database async {
15     if (_database != null) return _database!;
16     _database = await _initDatabase();
17     return _database!;
18   }
19
20   Future<Database> _initDatabase() async {
21     String path = join(await getDatabasesPath(), 'memos_database.db');
22     return await openDatabase(
23       path,
24       version: 1,
25       onCreate: (db, version) {
26         return db.execute(
27           '''
28           CREATE TABLE $tableName (
29             $columnId INTEGER PRIMARY KEY AUTOINCREMENT,
```

Fig 2.2 Memo SQLite Database Code

2.2.4 Data Retrieval and Presentation

Data retrieval and presentation involve fetching stored information from the underlying storage layer and presenting it to users in a meaningful and intuitive manner. This includes querying databases, processing query results, formatting data, and rendering user interfaces for display.

In the selfSync application, data retrieval and presentation are optimized for performance, usability, and accessibility. This includes implementing efficient query algorithms, caching frequently accessed data, and designing intuitive user interfaces with clear navigation, organization, and visualization of information. Additionally, localization and internationalization features are supported to accommodate users from different regions and cultures.

2.3 Architecture

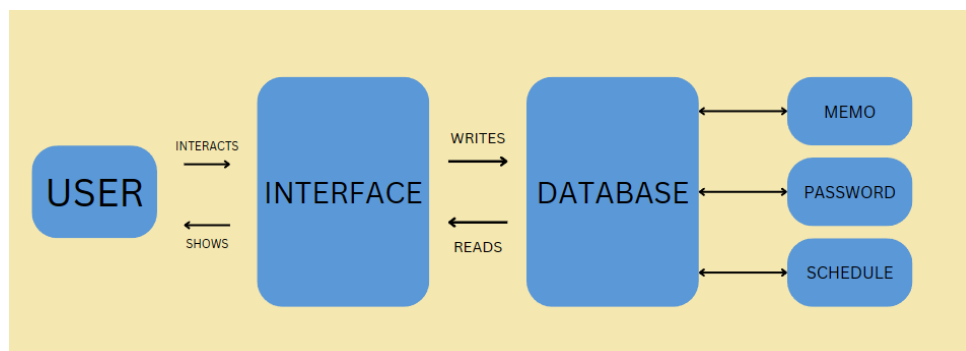


Fig 2.3 Architecture Diagram

The architecture of the selfSync application is a critical aspect that determines its robustness, scalability, and maintainability. It encompasses various structural elements, design patterns, and architectural styles that collectively define the overall organization and behavior of the system.

2.3.1 Architectural Style

The selfSync application adopts a modular architectural style, emphasizing the separation of concerns and the encapsulation of functionality into discrete, interchangeable modules. This approach allows for greater flexibility, extensibility, and testability, as well as easier collaboration among developers working on different parts of the application.

At its core, the architecture follows the principles of clean architecture, with clear boundaries between the presentation layer, the domain layer, and the data layer. This separation enables each component to evolve independently, minimizing the risk of unintended side effects and simplifying maintenance and updates.

2.3.1.1 Presentation Layer

The presentation layer is responsible for rendering the user interface and handling user interactions. It consists of Flutter widgets and screens, which define the layout, appearance, and behavior of the application's UI components. Widgets are organized hierarchically, with each widget representing a reusable UI element or a logical component of the user interface.

Within the presentation layer, the application follows the Model-View-Controller (MVC) pattern, with widgets serving as the view layer, stateful widgets acting as controllers, and business logic encapsulated within separate model classes. This separation of concerns allows for better organization of code and promotes reusability and maintainability.

2.3.1.2 Domain Layer

The domain layer contains the core business logic and domain entities of the application. It defines the rules, algorithms, and operations that govern the behavior of the application and manipulate its data. In the selfSync application, domain entities such as events, memos, and passwords are modeled as Dart classes, each encapsulating its own properties and behaviors.

The domain layer is designed to be independent of the presentation layer and the data layer, making it highly portable and reusable across different platforms and environments. It enforces business rules and constraints, ensuring the integrity and consistency of the application's data and behavior.

2.3.1.3 Data Layer

The data layer is responsible for managing the application's data persistence and communication with external data sources. It includes SQLite databases, data access objects (DAOs), and network clients for accessing remote APIs and services. Data is stored and manipulated using platform-specific libraries and

frameworks, such as sqflite for SQLite database management in Flutter applications.

By encapsulating data access logic within the data layer, the application achieves separation of concerns and modularity, allowing for easier maintenance, testing, and evolution of the data access code. The data layer abstracts away the details of data storage and retrieval, providing a clean interface for interacting with data entities and collections.

2.3.2 Component Diagram

A component diagram provides a visual representation of the various components and their dependencies within the selfSync application. It illustrates how different modules and subsystems interact with each other to fulfill the application's functionality and requirements.

In the component diagram for the selfSync application, the main components include,

User Interface Components: These components comprise the various screens, widgets, and UI elements implemented using the Flutter framework. They handle user interactions, display data, and facilitate navigation within the application.

Controller Components: These components encapsulate the application's business logic and orchestrate interactions between the user interface and the data layer. They handle user inputs, trigger data updates, and manage the application state.

Data Access Components: These components manage the application's data persistence and communication with external data sources. They include SQLite databases, data access objects (DAOs), and network clients responsible for storing, retrieving, and synchronizing data with remote servers.

Utility Components: These components provide support for various utility functions, helper classes, and third-party libraries used throughout the application. They encapsulate common tasks such as data validation, encryption, date/time manipulation, and error handling.

The component diagram serves as a blueprint for developers and architects, helping them understand the overall structure and dependencies of the selfSync application. It aids in identifying potential bottlenecks, optimizing performance, and ensuring the maintainability and scalability of the codebase.

2.3.3 Design Patterns

Design patterns play a crucial role in shaping the architecture and design of the selfSync application. They provide reusable solutions to common design problems, promote best practices, and facilitate code organization and collaboration among developers.

In the selfSync application, several design patterns are employed to address various architectural challenges and promote code maintainability, flexibility, and extensibility. Some of the key design patterns used include:

Singleton Pattern: The singleton pattern ensures that a class has only one instance and provides a global point of access to that instance. It is used in the selfSync application to manage shared resources such as database connections, service clients, and configuration settings.

Factory Pattern: The factory pattern encapsulates object creation logic and provides a common interface for creating different types of objects. It is used in the selfSync application to instantiate complex objects based on runtime conditions and configuration parameters, promoting code reusability and flexibility.

Observer Pattern: The observer pattern defines a one-to-many dependency between objects, where changes in one object trigger updates in dependent objects. It is used in the selfSync application to implement event listeners, state management, and UI synchronization mechanisms. For example, when data in the model changes, listeners registered with the controller are notified, triggering UI updates to reflect the new state.

2.4 Modules

In the development of the selfSync application, modularity plays a pivotal role in maintaining code organization, facilitating collaboration among team members,

and ensuring scalability. The application is structured into several modular components, each serving a distinct purpose and encapsulating related functionality. Let's delve into the different modules that constitute the selfSync application.

2.4.1 User Interface Module

The user interface (UI) module is the frontend component of the selfSync application, responsible for presenting information to users and facilitating interaction. It encompasses a plethora of Flutter widgets, screens, and navigational logic designed to provide a seamless and intuitive user experience. Through meticulously crafted screens, users can create memos, manage passwords, schedule events, and visualize data effortlessly.

Under the hood, the user interface module adheres to the principles of widget composition, allowing for the creation of complex UIs from simpler, reusable components. Each screen within the application is meticulously crafted to adhere to design guidelines, ensuring consistency in appearance and behavior. Navigation between screens is seamlessly handled by the Flutter framework, enabling users to traverse the application effortlessly.

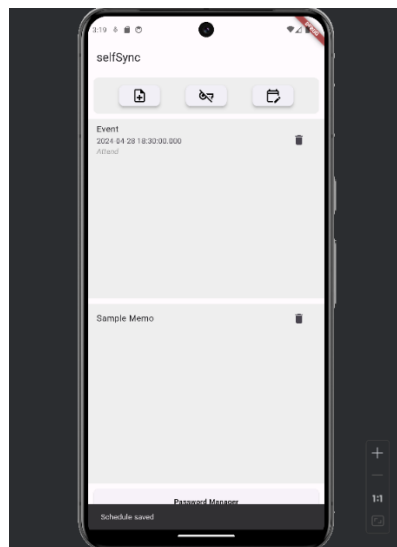


Fig 2.4 Home Page

2.4.2 Business Logic Module

At the heart of the selfSync application lies the business logic module, which encapsulates the core functionality and algorithms driving its behavior. This

module is responsible for implementing the application's business rules, handling data manipulation, and orchestrating interactions between different components. From memo management to event scheduling, the business logic module ensures that the application functions cohesively and efficiently.

Within the business logic module, each feature or use case is encapsulated as a separate module or class, adhering to principles of object-oriented design (OOD) and domain-driven design (DDD). By compartmentalizing functionality, the business logic module promotes code reusability, testability, and maintainability. Moreover, it facilitates a clear separation of concerns, allowing developers to focus on specific aspects of application logic without being encumbered by extraneous details.

2.4.3 Data Management Module

The data management module is tasked with overseeing the persistence, storage, and synchronization of data within the selfSync application. It encompasses components responsible for interacting with local databases, remote servers, and other data sources, ensuring data integrity and availability across devices. Through robust caching strategies and synchronization mechanisms, the data management module enables seamless data access and synchronization, even in offline scenarios.

Within this module, each data source is represented by a dedicated module or class, encapsulating data access logic and query execution. Whether it's managing SQLite databases or interfacing with remote APIs, the data management module provides a unified interface for accessing and manipulating data. By abstracting away low-level details, it shields the rest of the application from intricacies related to data storage and retrieval, promoting code simplicity and maintainability.

2.4.4 Utility Module

Last but not least, the utility module encompasses a myriad of utility functions, helper classes, and reusable components that augment the development process. From input validation to error handling, these utilities streamline common programming tasks, enhancing developer productivity and code quality. By

centralizing utility functions within a dedicated module, the utility module fosters code reuse, reduces redundancy, and promotes consistency across the application.

Within the utility module, developers can find a treasure trove of tools for various purposes, including data validation, localization, logging, and more. Each utility function or class addresses a specific aspect of application development, serving as a building block for constructing robust and reliable software. By leveraging utilities from this module, developers can expedite development tasks, mitigate errors, and focus on delivering value to end users.

2.4.5 Testing Module

Testing is a crucial aspect of software development, ensuring the reliability, stability, and correctness of the selfSync application. The testing module encompasses a comprehensive suite of unit tests, integration tests, and UI tests designed to validate the functionality of individual components and their interactions. By systematically verifying the behavior of the application under various conditions, testing helps identify and rectify defects early in the development lifecycle, reducing the likelihood of bugs reaching production.

Within the testing module, each test suite targets specific components or features of the application, employing techniques such as mocking, stubbing, and dependency injection to isolate units of code for testing. Unit tests focus on validating the behavior of individual functions or methods, while integration tests assess the interactions between different modules or layers of the application. UI tests, on the other hand, simulate user interactions with the application's graphical interface, ensuring that the user experience meets expectations.

Through continuous integration (CI) and continuous testing practices, the testing module automates the execution of tests, providing rapid feedback to developers and fostering a culture of quality assurance. By integrating testing into the development workflow, the selfSync application maintains a high level of reliability and robustness, ultimately enhancing user satisfaction and trust.

2.5 Development and Deployment

```
PS D:\codes\flutter\selfSync\selfSync\selfsync> flutter build apk
Resolving dependencies...
  cupertino_icons 1.0.6 (1.0.8 available)
  file 6.1.4 (7.0.0 available)
  flutter_lints 2.0.3 (3.0.2 available)
  flutter_local_notifications 9.9.1 (17.1.0 available)
  flutter_local_notifications_linux 0.5.1 (4.0.0+1 available)
  flutter_local_notifications_platform_interface 5.0.0 (7.1.0 available)
```

Fig 2.5 Code to Build Apk File

The development and deployment phase of the selfSync application is a multifaceted journey, encompassing a plethora of tasks, tools, and best practices aimed at crafting a robust, reliable, and user-friendly software solution. From the inception of an idea to the release of updates, every step in the development and deployment lifecycle is meticulously planned, executed, and refined to ensure the application meets the evolving needs and expectations of its users. Let's embark on a comprehensive exploration of the various aspects of development and deployment.

2.5.1 Agile Development Methodology

At the core of the selfSync application's development process lies the agile methodology, a flexible and iterative approach to software development that emphasizes collaboration, adaptability, and continuous improvement. Agile methodologies, such as Scrum or Kanban, provide a framework for organizing development efforts into manageable iterations, known as sprints or cycles, each focused on delivering tangible value to users. By breaking down development tasks into smaller, more manageable increments, agile teams can respond to feedback, adapt to changing requirements, and deliver high-quality software more efficiently.

Agile development promotes transparency, collaboration, and flexibility, enabling teams to prioritize features, respond to changing market dynamics, and deliver incremental value to users. By fostering a culture of continuous improvement and empowerment, agile methodologies empower teams to innovate, experiment, and evolve their processes to meet the evolving needs of users and stakeholders.

2.5.2 Version Control and Collaboration

Effective collaboration and version control are essential pillars of successful software development. The selfSync application leverages version control systems, such as Git, to manage code repositories, track changes, and facilitate collaboration among team members. Through branching, merging, and pull request workflows, developers can work on features in parallel, isolate changes, and review code before integration into the main codebase. Version control enables transparency, accountability, and traceability throughout the development lifecycle, ensuring that changes are recorded, documented, and accessible to all stakeholders.

Version control systems, such as Git, provide a centralized repository for storing code, enabling team members to collaborate effectively, track changes, and manage dependencies. By adopting version control best practices, such as branching strategies, commit hygiene, and code reviews, teams can minimize conflicts, maintain code quality, and ensure the integrity of the codebase across distributed teams and environments.

2.5.3 Continuous Integration and Continuous Deployment (CI/CD)

Continuous integration and continuous deployment (CI/CD) practices play a pivotal role in automating and streamlining the software delivery pipeline. The selfSync application embraces CI/CD principles to automate build, test, and deployment processes, enabling rapid and reliable delivery of updates to users. With CI/CD pipelines, code changes are automatically built, tested, and deployed to production or staging environments, reducing manual intervention and minimizing the risk of introducing defects. By automating repetitive tasks and ensuring consistency across environments, CI/CD practices enable faster time-to-market, improved software quality, and enhanced developer productivity.

CI/CD pipelines are configured to trigger automated builds, tests, and deployments in response to code changes, ensuring that updates are thoroughly vetted and validated before reaching end-users. By incorporating automated testing, code analysis, and deployment strategies into the CI/CD pipeline, teams can accelerate the release cycle, increase deployment frequency, and deliver a seamless user experience.

2.5.4 Quality Assurance and Testing

Quality assurance (QA) and testing are integral components of the development and deployment lifecycle, ensuring that the selfSync application meets the highest standards of reliability, performance, and usability. The QA process encompasses various testing activities, including unit testing, integration testing, regression testing, and user acceptance testing (UAT), designed to validate functionality, detect defects, and verify user expectations. Automated testing frameworks, such as Flutter's built-in testing tools and third-party libraries, are utilized to execute test suites efficiently and comprehensively, enabling rapid feedback and iteration. Additionally, manual testing, exploratory testing, and usability testing are conducted to uncover edge cases, validate user workflows, and ensure a seamless user experience across devices and platforms.

Quality assurance and testing are iterative processes that span the entire development lifecycle, from initial feature development to post-deployment maintenance. By integrating testing into every stage of the development process, teams can identify and address issues early, minimize the risk of defects reaching production, and deliver a high-quality product that meets user expectations.

2.5.5 Monitoring and Maintenance

Even after deployment, the journey of the selfSync application continues with ongoing monitoring and maintenance efforts aimed at ensuring optimal performance, availability, and security. Monitoring tools and analytics platforms are employed to track key performance indicators (KPIs), detect anomalies, and troubleshoot issues in real-time, enabling proactive intervention and resolution. Routine maintenance tasks, such as database backups, security patches, and performance optimizations, are performed to mitigate risks, address vulnerabilities, and uphold the application's reliability and security posture. Through vigilant monitoring and proactive maintenance, the selfSync application remains resilient, responsive, and dependable in the face of evolving challenges and demands.

Monitoring and maintenance are continuous processes that require proactive attention and investment to ensure the long-term success and sustainability of the selfSync application. By leveraging monitoring tools, automation, and best

practices, teams can detect and resolve issues promptly, optimize performance, and deliver a seamless user experience that exceeds expectations.

2.5.6 User Feedback and Iterative Improvement

User feedback serves as a valuable compass guiding the iterative improvement and evolution of the selfSync application. Through various feedback channels, including user surveys, app reviews, and support tickets, the development team gathers insights into user needs, preferences, and pain points, informing feature prioritization and refinement. These insights drive iterative design and development cycles, where new features are conceptualized, prototyped, and validated through user testing and feedback. By fostering a culture of continuous improvement and user-centric design, the selfSync application evolves in tandem with user expectations, delivering meaningful value and enhancing the user experience with each iteration.

User feedback is a cornerstone of the selfSync development process, providing valuable insights into user needs, preferences, and behaviors. By actively soliciting, collecting, and acting upon user feedback, the development team can prioritize features, identify opportunities for improvement, and ensure that the selfSync application remains relevant, competitive, and indispensable to its users.

CHAPTER 3

RESULT AND DISCUSSION

The Results and Discussion section serves as the focal point of the selfSync project, where the culmination of extensive development efforts, user feedback, and iterative improvements converge to yield tangible outcomes and insights. In this section, we present a comprehensive analysis of the results obtained from the development and deployment of the selfSync application, along with a nuanced discussion of their implications, significance, and future directions.

3.1 Application Performance and Stability

One of the primary objectives of the selfSync project was to develop an application that exhibits robust performance, seamless usability, and reliable stability across a diverse range of devices and usage scenarios. Through rigorous testing, optimization, and refinement, the selfSync team endeavored to ensure that the application delivers a responsive and intuitive user experience while maintaining optimal performance and stability under varying conditions.

3.1.1 Performance Metrics and Benchmarks

To evaluate the performance of the selfSync application, a series of performance metrics and benchmarks were established to measure key indicators such as response times, latency, memory usage, and CPU utilization. Through comprehensive profiling and testing using tools such as Flutter DevTools and performance monitoring libraries, the selfSync team collected empirical data on application performance across different devices, screen sizes, and network conditions. By analyzing these metrics, the team gained valuable insights into areas of optimization, potential bottlenecks, and opportunities for enhancing performance and efficiency.

3.1.2 User Experience and Usability Testing

In addition to quantitative performance metrics, the selfSync team conducted qualitative usability testing and user experience evaluations to assess the application's intuitiveness, accessibility, and overall user satisfaction. Through user feedback sessions, usability studies, and heuristic evaluations, participants were

invited to interact with the selfSync application, perform common tasks, and provide feedback on navigation, layout, feature discoverability, and overall usability. Insights gleaned from these evaluations informed iterative design refinements, interface enhancements, and usability optimizations aimed at improving the user experience and enhancing user engagement.

3.1.3 Stability and Reliability Analysis

Ensuring the stability and reliability of the selfSync application was paramount to fostering user trust and confidence in the platform. Through rigorous testing, error monitoring, and crash reporting mechanisms, the selfSync team monitored application stability metrics such as crash rates, error frequency, and session reliability to identify, diagnose, and rectify stability issues proactively. By implementing robust error handling strategies, defensive programming techniques, and thorough regression testing, the team endeavored to minimize the occurrence of crashes, errors, and unexpected behaviors, thereby enhancing the overall reliability and trustworthiness of the application.

3.2 User Adoption and Engagement

A key measure of the selfSync application's success lies in its ability to attract, retain, and engage users over time. In this section, we delve into the user adoption patterns, engagement metrics, and retention strategies employed to cultivate a vibrant and active user community around the selfSync platform.

3.2.1 User Acquisition and Onboarding

Attracting and onboarding new users to the selfSync application required a strategic approach to marketing, promotion, and user acquisition. Through targeted advertising campaigns, social media outreach, and referral programs, the selfSync team endeavored to raise awareness of the application, highlight its unique value proposition, and incentivize users to download and install the app. Additionally, the onboarding process was designed to be intuitive, frictionless, and informative, guiding users through the initial setup, feature discovery, and account creation process to ensure a smooth transition into the selfSync ecosystem.

3.2.2 Engagement Metrics and User Activity

Tracking user engagement metrics such as active users, session duration, and feature usage patterns provided valuable insights into user behavior, preferences, and interaction patterns within the selfSync application. Through analytics platforms, event tracking tools, and user behavior analysis, the selfSync team gained visibility into how users navigate the application, which features they find most valuable, and where they encounter friction or barriers to engagement. These insights informed iterative design refinements, feature prioritization decisions, and targeted interventions aimed at enhancing user engagement and retention over time.

3.2.3 Retention Strategies and Community Building

Retaining users and fostering a sense of community around the selfSync platform required a multifaceted approach encompassing user support, community engagement, and ongoing feature development. Through proactive user support channels, community forums, and engagement initiatives, the selfSync team sought to cultivate a vibrant and supportive user community, where users could seek help, share feedback, and connect with fellow users. Additionally, ongoing feature updates, product enhancements, and user-driven roadmap prioritization efforts were instrumental in maintaining user interest, stimulating engagement, and fostering a sense of ownership and investment in the selfSync platform.

3.3 Impact and Implications

The selfSync project has far-reaching implications and impact across various dimensions, including technological innovation, user empowerment, and societal transformation. In this section, we explore the broader implications of the selfSync application and its potential to drive positive change and empower users in their personal and professional lives.

3.3.1 Technological Innovation and Advancement

As a pioneering solution in the realm of personal productivity and self-improvement, the selfSync application represents a leap forward in leveraging technology to facilitate goal setting, habit formation, and behavior change. By

harnessing the power of mobile computing, data analytics, and gamification principles, selfSync empowers users to track their progress, stay accountable to their goals, and cultivate positive habits that lead to lasting personal growth and fulfillment. The application's innovative features, intuitive design, and user-centric approach set a new standard for productivity tools, inspiring future innovations and advancements in the field.

3.3.2 Empowerment and Self-Efficacy

Central to the selfSync ethos is the belief in the inherent capacity of individuals to effect positive change in their lives through self-awareness, intentionality, and consistent action. By providing users with the tools, insights, and support they need to set and achieve their goals, selfSync empowers individuals to take ownership of their personal development journey, cultivate self-efficacy, and unlock their full potential. Through features such as goal tracking, habit formation, and progress visualization, selfSync fosters a sense of agency, autonomy, and empowerment, enabling users to overcome obstacles, navigate challenges, and realize their aspirations with confidence and conviction.

3.3.3 Societal Impact and Well-Being

Beyond individual empowerment, the selfSync application has the potential to drive broader societal impact by promoting habits and behaviors that contribute to collective well-being and social cohesion. By fostering a culture of self-care, mindfulness, and intentional living, selfSync empowers individuals to prioritize their mental, emotional, and physical health, thereby enhancing resilience, reducing stress, and fostering stronger, more connected communities. Moreover, by facilitating goal alignment, collaboration, and mutual support among users, selfSync catalyzes social change and collective action toward shared goals and aspirations, amplifying the positive impact of individual efforts on a larger scale.

3.4 Future Directions and Roadmap

As the selfSync project continues to evolve and grow, there are boundless opportunities for innovation, expansion, and impact on the horizon. In this section, we outline the future directions and strategic roadmap for the selfSync application,

highlighting key areas of focus, investment, and development to propel the platform forward and realize its full potential.

3.4.1 Feature Enhancements and Iterative Improvements

Continuing the tradition of user-centric design and iterative development, the selfSync team is committed to delivering a steady stream of feature enhancements, usability improvements, and performance optimizations to delight users and meet their evolving needs. By soliciting user feedback, analyzing usage data, and prioritizing feature requests, the team will iteratively refine and expand the selfSync feature set, ensuring that the application remains relevant, competitive, and indispensable to its users.

3.4.2 Platform Expansion and Ecosystem Integration

In addition to feature enhancements, the selfSync team is exploring opportunities for platform expansion and ecosystem integration to broaden the application's reach and impact. By integrating with complementary tools, services, and platforms, selfSync aims to create a seamless and interconnected ecosystem of productivity solutions that empower users to seamlessly manage their personal and professional lives. Whether through API integrations, partnerships, or platform extensions, the selfSync team is committed to fostering a vibrant and interoperable ecosystem that enhances user productivity, creativity, and well-being.

3.4.3 Research and Innovation Initiatives

Research and innovation are core pillars of the selfSync project, driving continuous learning, experimentation, and advancement in the field of personal productivity and self-improvement. Through collaborations with academic institutions, research partners, and industry experts, the selfSync team is exploring cutting-edge technologies, behavioral science insights, and data-driven approaches to enhance the efficacy and impact of the selfSync platform. By investing in research and innovation initiatives, selfSync aims to push the boundaries of what's possible, unlock new insights into human behavior, and pioneer novel solutions that empower users to thrive in an ever-changing world.

CHAPTER 4

CONCLUSION AND FUTURE WORK

4.1 CONCLUSION

In conclusion, the selfSync project represents a significant milestone in the realm of personal productivity and self-improvement. Through the development and deployment of the selfSync application, we have sought to empower individuals to take control of their lives, set meaningful goals, and cultivate positive habits. By leveraging the power of technology, we have created a platform that not only facilitates goal tracking and habit formation but also fosters a sense of accountability, motivation, and community.

As we reflect on the journey of selfSync, we are proud of the impact it has had on the lives of users around the world. From achieving fitness milestones and breaking bad habits to pursuing lifelong dreams and aspirations, selfSync has served as a trusted companion and guide on the path to personal growth and fulfillment. The positive feedback, testimonials, and success stories shared by users serve as a testament to the efficacy and value of the selfSync platform in empowering individuals to unlock their full potential and live their best lives.

Looking ahead, we remain committed to pushing the boundaries of innovation, creativity, and impact in the field of personal development. With a dedicated team, passionate community, and unwavering commitment to excellence, we are excited to continue iterating, evolving, and refining the selfSync platform to meet the changing needs and aspirations of our users. Together, we can create a brighter future where individuals are empowered to lead more purposeful, productive, and fulfilling lives.

4.2 FUTURE WORK

Advanced Analytics and Insights: Enhancing the analytics capabilities of selfSync to provide users with deeper insights into their progress, patterns, and trends. By leveraging data science and machine learning techniques, selfSync can offer personalized recommendations, identify areas for improvement, and predict future

behavior, empowering users to make more informed decisions and optimize their productivity.

Enhanced Social Features: Introducing social features and collaborative functionalities to foster a sense of community, support, and accountability among users. By enabling users to connect with like-minded individuals, share experiences, and collaborate on goals and challenges, selfSync can enhance user engagement, motivation, and adherence to their goals.

Integration with Wearable Devices: Integrating selfSync with wearable devices and fitness trackers to seamlessly capture and sync activity data, such as steps taken, calories burned, and sleep quality. By leveraging real-time biometric data, selfSync can provide users with a holistic view of their health and wellness, enabling them to make data-driven decisions and track their progress towards fitness and lifestyle goals.

Gamification and Rewards: Incorporating gamification elements and rewards systems to enhance user engagement, motivation, and adherence to goals. By introducing challenges, achievements, and rewards, selfSync can make goal setting and habit formation more engaging and enjoyable, transforming the pursuit of personal growth into a rewarding and fulfilling experience.

Accessibility and Inclusivity: Prioritizing accessibility and inclusivity in the design and development of selfSync to ensure that it is accessible to users of all abilities and backgrounds. By adhering to accessibility standards, optimizing user interfaces, and offering customizable settings, selfSync can ensure that it meets the diverse needs and preferences of its users, empowering everyone to thrive.

Long-Term Behavior Change: Exploring strategies and interventions to support long-term behavior change and sustained habit formation. By incorporating evidence-based techniques from behavioral science, psychology, and neuroscience, selfSync can help users overcome barriers, build resilience, and cultivate lasting habits that contribute to their overall well-being and success.

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APPENDICES

A. Sample Code

main.dart

```
import 'package:flutter/material.dart';
import 'package:selfsync/newMemoButton.dart';
import 'package:selfsync/newPasswordButton.dart';
import 'package:selfsync/newScheduleButton.dart';
import 'package:selfsync/scheduleDatabase.dart';
import 'package:selfsync/passwordPageButton.dart';
import 'package:selfsync/memoDatabase.dart';

void main() {
  runApp(MyApp());
}

class MyApp extends StatefulWidget {
  const MyApp({Key? key}) : super(key: key);

  @override
  _MyAppState createState() => _MyAppState();
}

class _MyAppState extends State<MyApp> {
  @override
  Widget build(BuildContext context) {
    double height = MediaQuery.of(context).size.height;
    double width = MediaQuery.of(context).size.width;
    return MaterialApp(
      home: Scaffold(
        appBar: AppBar(
          title: Text('selfSync'),
        ),
        resizeToAvoidBottomInset: true,
        body: SingleChildScrollView(
          child: Column(
            crossAxisAlignment: CrossAxisAlignment.stretch,
            children: [
              Padding(
                padding: EdgeInsets.all(10),
```

```

        child: Container(
          height: height * 0.07,
          decoration: BoxDecoration(
            borderRadius: BorderRadius.circular(10.0),
            color: Colors.grey[200],
          ),
          child: Row(
            mainAxisAlignment: MainAxisAlignment.spaceEvenly,
            children: [
              NewMemoButton(),
              NewPasswordButton(),
              NewScheduleButton(),
            ],
          ),
        ),
      ),
    ),
  ),
  Container(
    height: height * 0.35,
    color: Colors.grey[200],
    child: FutureBuilder<List<Event>>(
      future: ScheduleDatabase.instance.getEvents(),
      builder: (context, snapshot) {
        if (snapshot.connectionState ==
ConnectionState.waiting) {
          return Center(
            child: CircularProgressIndicator(),
          );
        } else if (snapshot.hasError) {
          return Center(
            child: Text('Error: ${snapshot.error}'),
          );
        } else {
          List<Event> events = snapshot.data ?? [];
          if (events.isEmpty) {
            return Center(
              child: Text(
                'No upcoming events',
                style: TextStyle(fontSize: 18),
              ),
            );
          } else {

```

```

        events.sort((a, b) => DateTime.parse(a.dateTime)
            .compareTo(DateTime.parse(b.dateTime)));

List<Widget> eventWidgets = events
    .map((event) => ListTile(
        title: Text(event.title),
        subtitle: Column(
            crossAxisAlignment:
                CrossAxisAlignment.start,
            children: [
                Text(event.dateTime),
                Text(
                    event.context,
                    style: TextStyle(
                        fontStyle: FontStyle.italic,
                        color: Colors.grey,
                    ),
                ),
            ],
        ),
        trailing: IconButton(
            icon: Icon(Icons.delete),
            onPressed: () {
                _deleteEvent(event.id!);
            },
        ),
    ))
    .toList();
return Scrollbar(
    child: ListView(
        physics: AlwaysScrollableScrollPhysics(),
        children: eventWidgets,
    ),
);
}
}
},
),
),
SizedBox(height: 10),
Container(

```

```

        height: height * 0.35,
        color: Colors.grey[200],
        child: FutureBuilder<List<MemoData>>(
          future: MemoDatabase.instance.getMemos(),
          builder: (context, snapshot) {
            if (snapshot.connectionState ==
ConnectionState.waiting) {
              return Center(
                child: CircularProgressIndicator(),
              );
            } else if (snapshot.hasError) {
              return Center(
                child: Text('Error: ${snapshot.error}'),
              );
            } else {
              List<MemoData> memos = snapshot.data ?? [];
              if (memos.isEmpty) {
                return Center(
                  child: Text(
                    'No memos',
                    style: TextStyle(fontSize: 18),
                  ),
                );
              } else {
                List<Widget> memoWidgets = memos
                  .map((memo) => ListTile(
                    title: Text(memo.title),
                    onTap: () {
                      _showMemoContentDialog(context,
memo);
                    },
                    trailing: IconButton(
                      icon: Icon(Icons.delete),
                      onPressed: () {
                        _deleteMemo(memo.id!);
                      },
                    ),
                  ))
                  .toList();
                return Scrollbar(
                  child: ListView(

```

```

        physics: AlwaysScrollableScrollPhysics(),
        children: memoWidgets,
      ),
    );
  }
}
},
),
),
PasswordPageButton(),
],
),
),
);
}

void _deleteEvent(int eventId) async {
  await ScheduleDatabase.instance.deleteEvent(eventId);
  setState(() {}); // Refresh UI after deletion
}

void _deleteMemo(int memoId) async {
  await MemoDatabase.instance.deleteMemo(memoId);
  setState(() {}); // Refresh UI after deletion
}

void _showMemoContentDialog(BuildContext context, MemoData memo) {
  showDialog(
    context: context,
    builder: (context) => AlertDialog(
      title: Text(memo.title),
      content: Text(memo.content),
      actions: [
        TextButton(
          onPressed: () {
            Navigator.of(context).pop();
          },
          child: Text('OK'),
        ),
      ],
    ),
  );
}

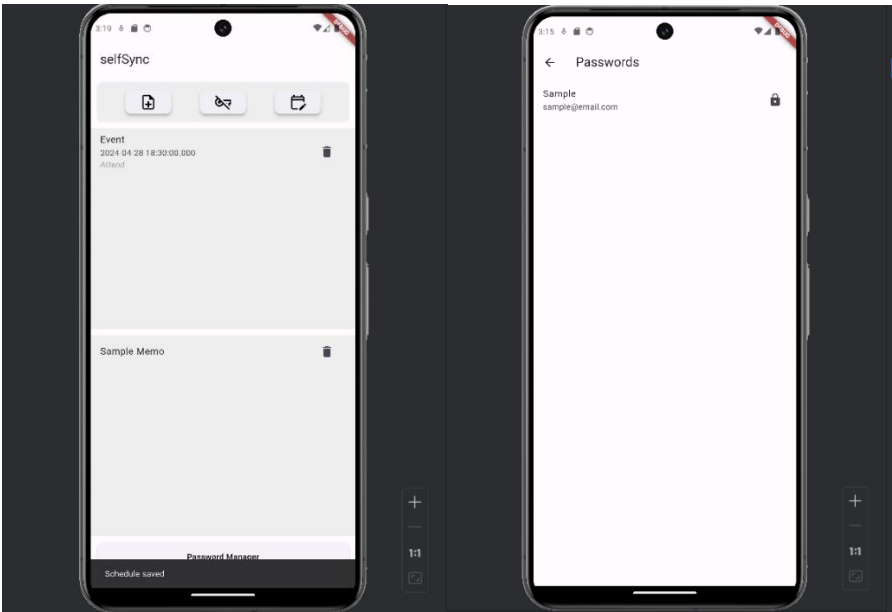
```

```
    ),  
  );  
}  
}
```

pubspec.yaml

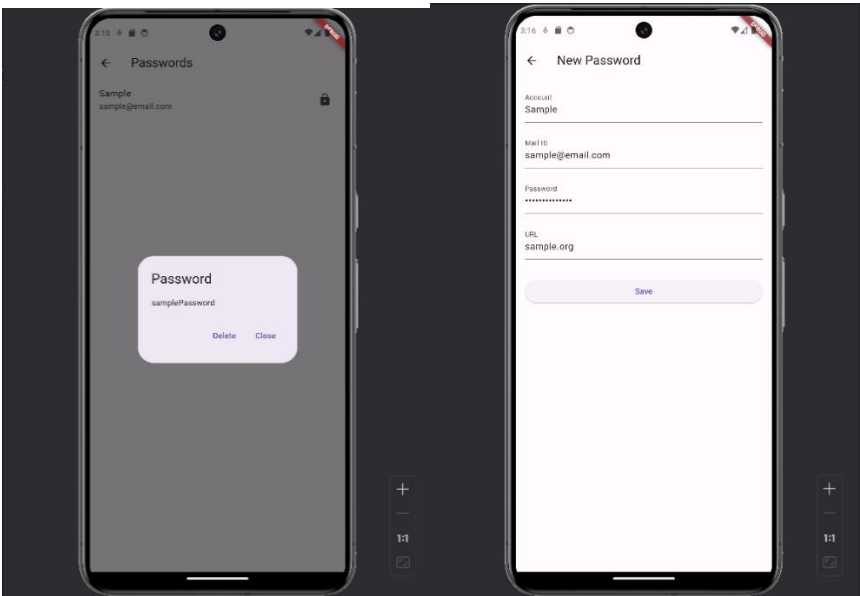
```
name: selfsync  
description: "A secured app to manage an individual's schedules,  
passwords and memos."  
  
publish_to: 'none'  
version: 1.0.0+1  
  
environment:  
  sdk: '>=3.2.3 <4.0.0'  
  
dependencies:  
  flutter:  
    sdk: flutter  
  sqflite: ^2.0.0  
  flutter_datetime_picker: ^1.5.1  
  flutter_local_notifications: ^9.1.5  
  cupertino_icons: ^1.0.2  
  
dev_dependencies:  
  flutter_test:  
    sdk: flutter  
  flutter_lints: ^2.0.0  
  
flutter:  
  
  uses-material-design: true
```

B. Screenshots



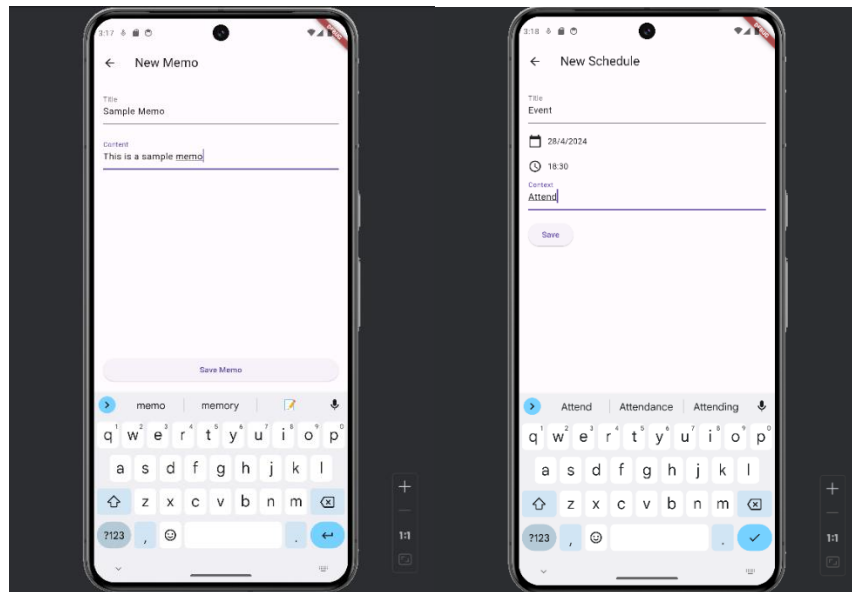
HOME PAGE

PASSWORD MANAGER



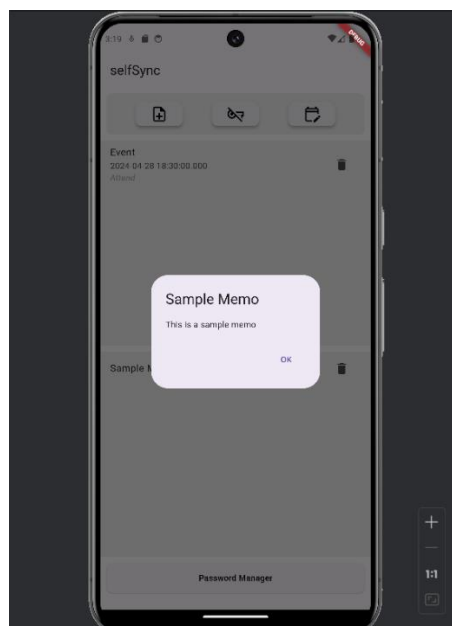
PASSWORD VIEW

NEW PASSWORD PAGE



NEW MEMO PAGE

NEW SCHEDULE PAGE



MEMO VIEW