UNIVERSITI MALAYSIA TERENGGANU (CENTRE)

FAKULTI SAINS KOMPUTER DAN MATEMATIK

CSM3114
FRAMEWORK-BASED MOBILE APPLICATION
DEVELOPMENT

Project 2

Haulify: Haulier Tracking Application

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SEMESTER I 2023/2024

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1.0 Executive Summary

Haulify, the haulier tracking application, seeks to streamline and optimize the haulage industry's logistics and tracking procedures. The major purpose is to provide hauliers with a comprehensive solution that improves efficiency, transparency, and overall administration of truck movements.

The haulage business frequently encounters difficulties due to manual and inefficient tracking systems, which cause delays, mismanagement, and increased operational costs. Haulify addresses these difficulties by providing a digital platform that allows haulier to manage their trucks, schedule, and update movements more precisely. The application aims to improve haulier's decision-making and remove manual bottlenecks.

Haulify was developed using an integrated approach that blends solid backend technology with a user-friendly Flutter-based interface. The apps use safe authentication procedures to allow hauliers to register and log in. Hauliers may easily add and manage their trucks within the apps with 'Register Truck' functionality. The 'Truck Scheduling' features facilitates effective resource planning and allocation. 'Update Truck Movement' offers status updates on the percentage of trucks to reach the destination. For optimizing the operations, the 'Truck Utilization' provides informative information.

A responsive and dynamic user interface is also developed by utilizing the flexible widget library provided by Flutter as part of the process. To ensure the integrity and dependability of the data transmitted inside the application, the Firebase serves as backend incorporated databases for safe data storage and retrieval.

Haulify is a state-of-the-art response to the difficulties hauliers in the logistics industry encounter. Through the combination of an intuitive user interface and strong backend features, the application enables hauliers to better manage their fleets, plan routes more effectively, and obtain real-time insights into truck movements. By launching a digital platform that not only solves current problems but also establishes the groundwork for future developments in logistics management, Haulify seeks to transform the haulage sector.

2.0 Use Case

The use case diagram, which shows the several interactions and functionalities available to the user within the application. Use cases offers a high-level overview of the intended user interface and possible interactions between application and the user. **Figure 1** shows the use case diagram of Haulify application.
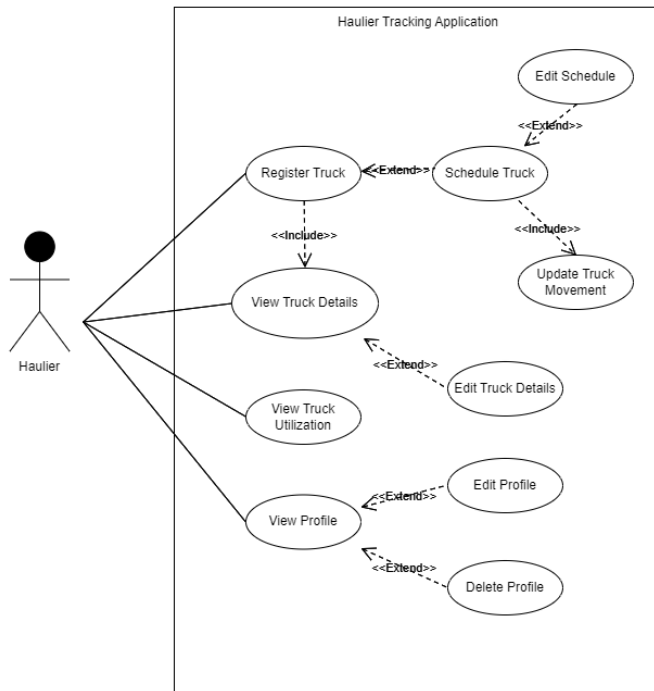

Figure 1 *Use Case Diagram of Haulify*

The Haulier is the primary user of the Haulify application, and they engage with several key features. The haulier can utilize the "Register Truck" to add new trucks to their account. The "Schedule Truck" function simplifies the process of planning and arranging routes for their trucks, and "Edit Schedule allows haulier to make any changes to the truck scheduled. "Update Truck Movement" feature allows the haulier to adjust the percentage of trucks destined for a specific location. Haulier can view list and details of trucks registered, scheduled, and moving. In case there are changes or updates needed, haulier allowed to make changes in "Edit Truck Details".

Additionally, the "View Truck Utilization" feature provides the haulier with valuable insights into how their trucks are being utilized, offering a clear overview of their truck's usage patterns. Hauliers can access and customize their profile information through the "View Profile" module, with the option to "Edit Profile" for any necessary updates. Together, these functionalities streamline the haulier's experience in managing and optimizing their trucking operations through the Haulify application.

In summary, Haulify streamlines the truck tracking process by offering a cohesive set of features, including truck registration, scheduling, updates, utilization analysis, and profile management, ultimately enhancing the overall efficiency in tracking trucks.

3.0 Common Structure of Tree Widgets

The Haulify application boasts a well-defined hierarchical structure of widget tree such as **Figure 2,** the widget tree of Haulify's main page, optimizing the user interface for seamless interactions and efficient navigation.
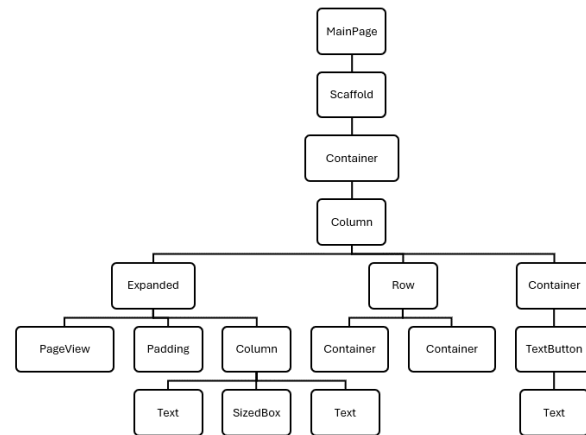
The common structure of widgets tree is at the top level, there is root widget, can be seen in **Figure 3** which is typically an instance of 'MaterialApp'. This widget

Figure 2 *Widget Tree of HomePage*

defines the basic configuration for the app, the theme, title, and home screen (GeeksforGeeks, 2023). The same structure is used in most screens of Haulify which are the Scaffold – Background, which displays the background consistency used to these screens.
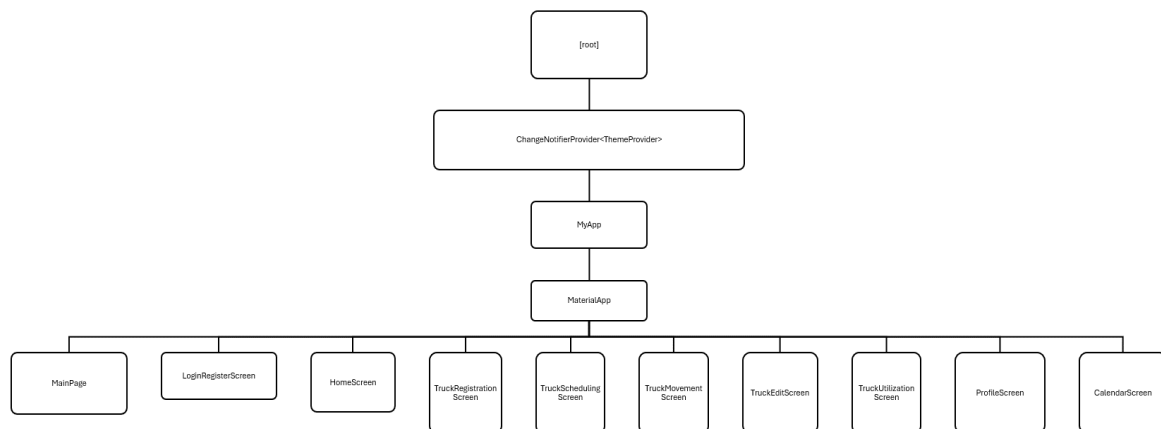

Figure 3 *Haulify's Project Structure*

'BottomNavigationBar' is used in the Home, TruckRegistration, TruckUtilization, and Profile screen to define the navigation route with icon and text. This can help to switch between the screens available quickly. Another common structure would be the 'DropdownButtonFormField' which has 'DropdownMenuItem' as in **Figure 4**, commonly used in forms to allow hauliers to select an option from a dropdown menu. It provides a convenient way to include dropdown functionality within a form, and it's often used when we need to collect user input for a specific field.

'Positioned' widget is used to position the Image widget within the stack. This structure is also commonly used in this application to display images.

Using common structures and widely adopted widgets ensures a consistent user interface across app. Hauliers quickly become familiar

Figure 4 *Widget Tree of TruckRegistrationScreen*

with patterns like 'MaterialApp' and 'DropdownButtonFormField', enhancing the overall user experience and making navigation more intuitive.

Leveraging common structures in Flutter will also accelerates development by providing pre-built, customizable components. Adopting common structures aligns codebase with Flutter best practices and benefits from extensive community support. With well-documented widgets, I can efficiently troubleshoot issues, and the community knowledge base aids in overcoming challenges during development.
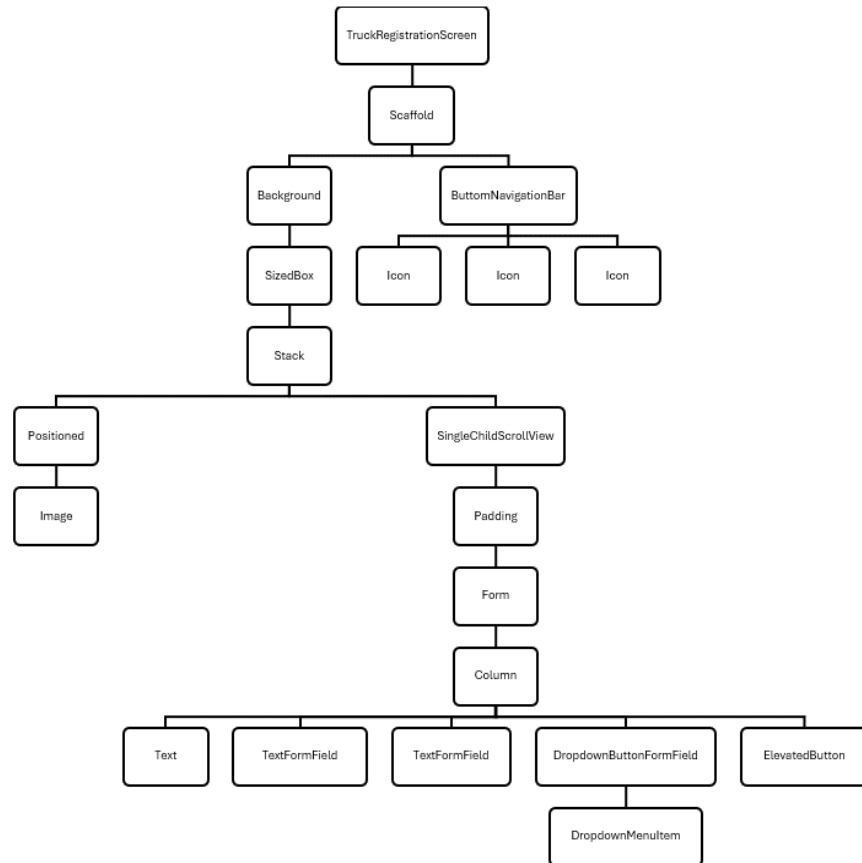
4. 0 Flutter Widget and Features Adopted in the Application

Haulify uses a range of Flutter capabilities and widgets to provide a smooth and intuitive user experience. Using Flutter's stateful widgets, which enable dynamic and responsive user interfaces, is one of the essential elements. By allowing the programme to adjust to shifting data and user interactions, these widgets guarantee hauliers managing their transportation operations have a seamless experience.

Haulify employs Flutter's 'PageView' widget dominates the app's home screen and acts as a dynamic showcase for its features. With the help of this widget, hauliers can quickly and easily explore an educational summary of Haulify's features, laying the groundwork for a fun and intuitive experience.

The 'BottomNavigationBar' widget to provide a cohesive and user-friendly navigation experience (BottomNavigationBar class - material library - Dart API, n.d.). It ensures easy access to key section of the application. 'ExpansionTile' play an important part in Haulify's user interface, showing nested material behind a header. This is useful for showing specific trucks and schedule information. The intuitive design allows hauliers to easily access substantial information without overloading the interface.

'ListViews' serves as the foundation, providing a streamlined display of registered, scheduled, and moving trucks. This widget excels at giving a linear list of objects, making critical information easily accessible to hauliers. In addition, Haulify carefully adds unique Flutter widgets to improve the overall user experience. 'AnimatedPositioned', used to transition from the login to the register screen, ensures a smooth and visually appealing transition between two critical authentication phases. The 'Stack' widget is used to create a tiered interface, which allows for the efficient organization of numerous components on the screen.

Haulify employs a scroll snap list to enhance the user experience when displaying scheduled truck dates. This feature ensures seamless and intuitive navigation through the dates, allowing hauliers to quickly locate and access specific scheduling information. The scroll snap list offers a visually appealing and user-friendly way to interact with the scheduled dates,

making it easy for hauliers to stay organized and efficiently manage their trucking operations within the app.

'Key' widgets play pivotal roles in the application's functionality. The authentication widget ensures secure access to the application, allowing hauliers to log in or register. The truck management widget encompasses features like registering trucks, scheduling movements, and updating truck statuses. Utilization analysis is driven by a dedicated widget that provides insightful data on fleet usage patterns. Profile management widgets empower hauliers to customize and update their personal information seamlessly.

Haulify also enhances user experience by providing support for dark mode. Flutter's 'Theme' and 'Provider' are leveraged to dynamically switch between light and dark themes based on user preferences.

Firebase Realtime Database is used in the application to store and synchronize haulier-related data in real-time. This cloud-hosted NoSQL database ensures that information instantly updated across all connected devices, providing a seamless and up-to-date user experience.

In summary, Haulify utilizes a range of Flutter capabilities and widgets to ensure a smooth and intuitive user experience for hauliers managing transportation operations. Overall, Haulify prioritizes Flutter's versatile features to create a seamless and user-friendly platform for hauliers.

5.0 Sample of Interface

The user interface of Haulify application is designed with a clean and intuitive layout, as illustrated in the following screenshots. When hauliers first open the app, they will be presented with 'PageView' of app's functionality brief introduction as per **Figure 5**.

Next, haulier will be navigating to authentication page, **Figure 7**, where they can securely log in or register a new account. Once
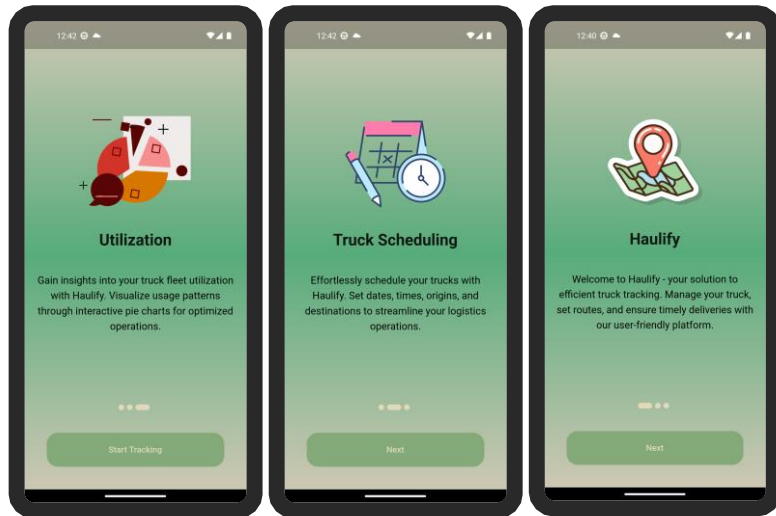
Figure 5 *Interface of MainPage*

logged in, hauliers are greeted with **Figure 6**, a dashboard that provides at-a-glance information and details about their registered, scheduled, and moving trucks. The main navigation menu, conveniently located at the bottom of the screen, allows hauliers to easily access key features such as "Home", "Register Truck", "Utilization", and "Profile". Each section is designed with an
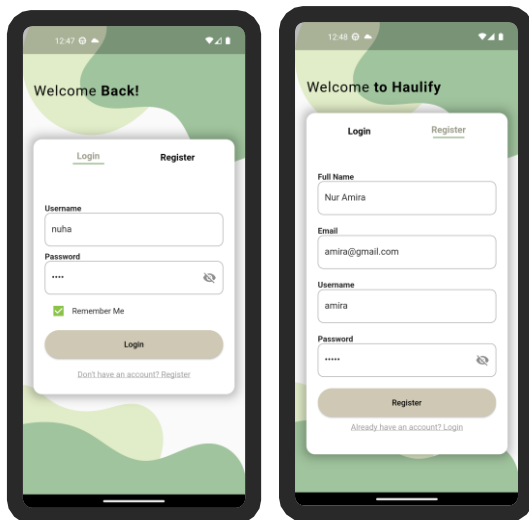
Figure 7 *Interface of LoginRegisterScreen*

emphasis on simplicity and clarity, allowing hauliers to navigate seamlessly through the app.

Figure 8 shows screen to hauliers register truck. Once a haulier registers a truck on the Haulify application, they gain the ability to easily edit or delete the registered
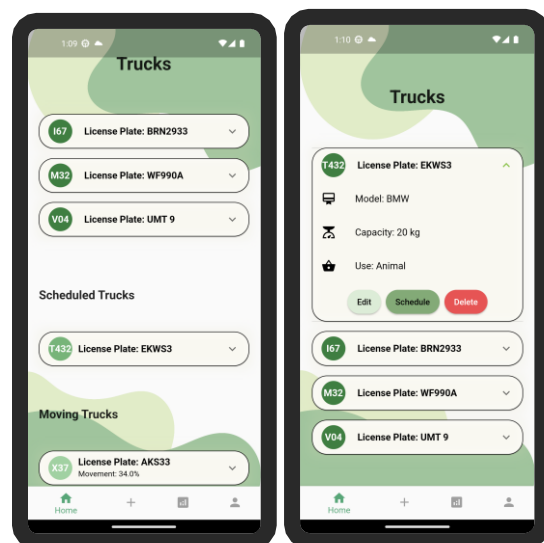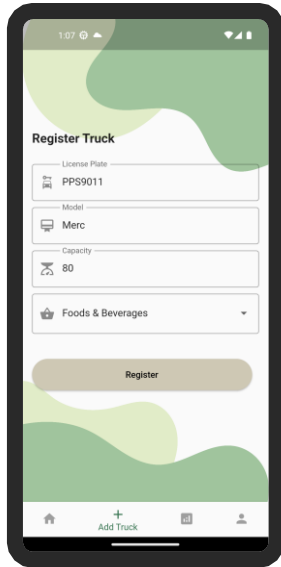
Figure 6 *Interface of HomeScreen*

Figure 8 Interface of TruckRegistrationScreen

vehicle. This ensures that their fleet information remains accurate and up to date. In the truck list, hauliers can select a specific truck to edit its details (see **Figure 9**). This feature allows for quick updates, such as changes in license plate information or other details. The option to delete a truck is also available for hauliers who need to remove a truck.

Truck scheduling in **Figure 10** enables hauliers to efficiently plan and organize their truck routes. Hauliers can set up truck routes and specify departure date and times. As trucks embark on scheduled journeys, hauliers can utilize the "Update Movement" (**Figure 11**) feature to provide real-time information on the truck's location and progress.
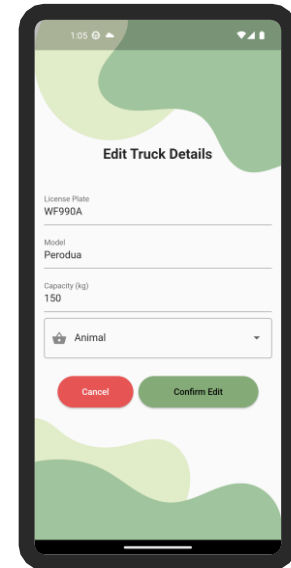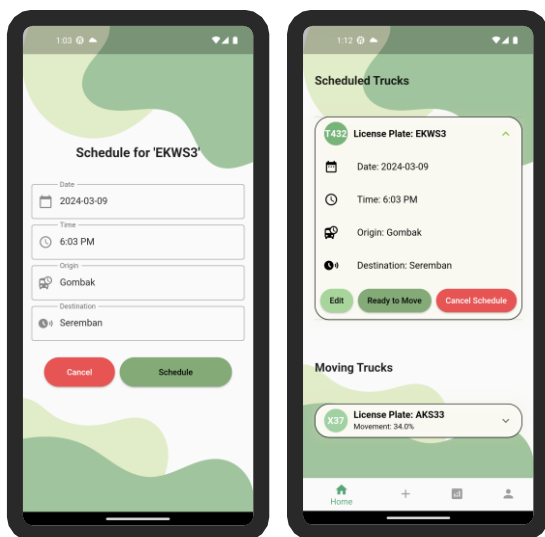

Figure 9 Interface of TruckEditScreen

This streamlined process enhances the flexibility and responsiveness of the Haulify application, allowing hauliers to stay in control of their truck movements with ease.

The Truck Utilization show in **Figure**

Figure 10 Interface of TruckSchedulingScreen

12 screen features a comprehensive pie chart that calculates the usage of each registered truck category. This visual representation allows hauliers to quickly assess the utilization of their trucks across various categories such as animals, foods, medicine,
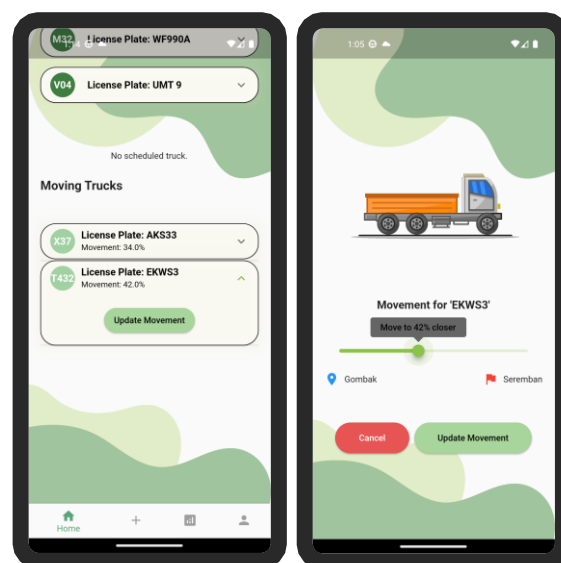

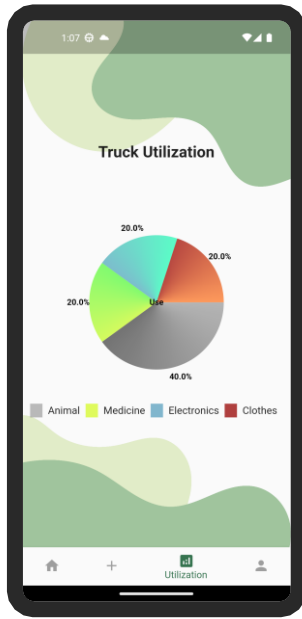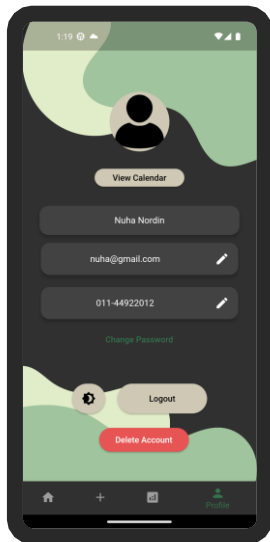*Figure 11 Interface of TruckMovementScreen*

vehicles, and more. The pie chart provides an insightful overview, enabling efficient decision-making and strategic planning.

The "Profile" shows in **Figure 13** section allows hauliers to update personal details and configure notification preferences. Hauliers can view the list of routes in schedule in "View Calendar".

Haulify's user-friendly design extends to its accessibility features, including a convenient dark mode (**Figure 14**). This feature allows switching to a darker colour scheme, provide comfortable and energy-efficient option, especially in low-light environments. Hauliers can easily change between the traditional light mode and the dark mode in the app settings, ensuring a personalized and adaptable user experience based on their preferences and environmental conditions.
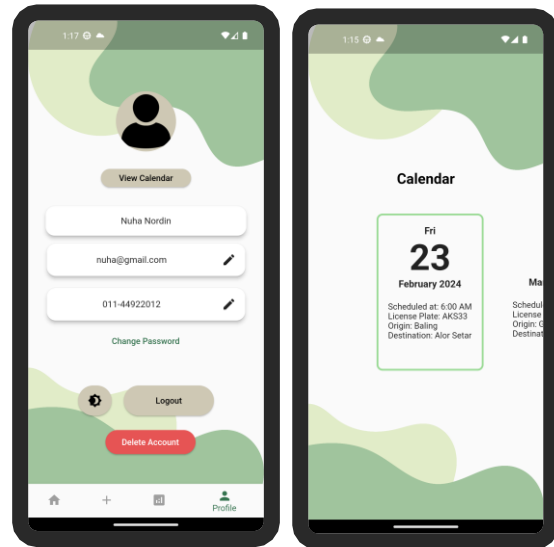

Figure 12 Interface of *TruckUtilizationScreen*

Figure 13 *Interface of ProfileScren and CalendarScreen*

Figure 14 *Dark Mode Features*

Overall, the Haulify application's user interface combines aesthetics with functionality, creating an engaging and efficient platform for hauliers to manage their operations seamlessly. The clean and intuitive design ensures that hauliers can focus on their core tasks without unnecessary distractions, making Haulify a user-friendly tool for the logistics and transportation industry.

6.0 Conclusion

The creation and application of Haulify is a significant step towards transforming the transportation sector's tracking. The application's primary objective, which was to enhance truck movement efficiency, transparency, and overall management, was effectively accomplished by carefully fusing cutting-edge technology with an intuitive user interface.

When considering the development process, it becomes clear that Haulify not only solves the problems that carriers are currently facing, but also establishes the groundwork for further advancements in logistics management. It's critical to recognise the insightful knowledge that came from building Haulify. Utilising Flutter's flexible capabilities, shared structures, and widgets has helped to create applications that are both user-friendly and effective while also streamlining the development process. Going forward, lessons acquired from the creation of Haulify can be the basis for additional innovation and improvement in logistics and tracking solutions.

In summary, Haulify is an outstanding instance of how technology can be used to solve practical issues, and it has the potential to have a revolutionary effect on the transportation sector. Through continual learning, adaptation, and innovation, Haulify is well positioned to shape the future of transportation management.

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