ANKARA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

COM4061 Research Techniques

Smart-Shopping

Ibraheem R N Hamdan

20290947

Ribhi Bishtawi

20290078

Prof. ENVER BAĞCI

January 2024

Abstract

This project is a cross-platform application built with Flutter, seamlessly integrates with Firebase and NodeJS as its backend powerhouse. Designed as a solution for store owners, this app redefines the retail industry by simplifying store management, creating engaging offers, and ensuring secure authentication. Users, on the other hand, benefit from an opportunity of smart shopping and real-time tourism experience, discovering nearby stores, exclusive deals, and local attractions. Our project doesn't just streamline store management; it creates an immersive experience where users explore, shop, and engage.

GitHub Repository

https://github.com/ribhy-bishtawi/Graduation-Project

Contents

Introduction

In the constantly-growing landscape of the retail and tourism industries, Smart-Shopping emerges as an avant-garde solution, a beacon of innovation reshaping traditional paradigms. This comprehensive report aims to unravel the intricacies of Smart-Shopping, downloadable on both Google Play and the App Store. Far beyond the confines of conventional shopping apps, Smart-Shopping stands as a multifaceted platform seamlessly integrating store management, user engagement, and real-time tourism exploration.

As commerce pivots towards the digital frontier, store owners grapple with a complex landscape, juggling the expectations of tech-savvy consumers and the imperatives of effective business management. Smart-Shopping is conceived as a dynamic tool, a response to this evolving dilemma. It empowers store owners not only to streamline operations and enhance online visibility but also to engage with clientele in novel and innovative ways. However, its utility doesn't stop at serving store owners; it extends to users, offering a curated experience that fuses smart shopping with immediate tourism exploration.

At its core, Smart-Shopping aspires to transcend the limitations of traditional shopping applications. It envisions a symbiotic ecosystem where store owners effortlessly manage their establishments, users discover enticing offers from nearby stores, and tourists seamlessly explore attractions in their vicinity. This report delves into the technical foundations, user-centric features, development methodologies, and strategic decisions underpinning Smart-Shopping's creation, offering a nuanced understanding of its transformative potential in the realms of retail and tourism.

This comprehensive report seeks to provide an exhaustive understanding of Smart-Shopping, encompassing its technical architecture, user-centric features, development

methodologies, and the strategic decisions underpinning its creation. As we traverse through the subsequent pages, we will unravel the layers of this innovative application, exploring how it leverages technologies like Flutter and Node.js, embraces multilingual inclusivity, and adopts industry-standard tools for version control and project management. The report serves as a guide for developers, stakeholders, and enthusiasts alike, offering insights into the intricacies of Smart-Shopping's creation and its potential to redefine the way we shop and explore the world around us.

Description

Smart-Shopping, a pioneering mobile application, redefines the paradigms of retail and tourism. Downloadable on Google Play and the App Store, the app seamlessly merges store management and user engagement, providing a curated blend of smart shopping and real-time tourism exploration. This transformative project leverages technologies such as Flutter and Node.js, prioritizing a multilingual interface for inclusivity. The objective is clear: simplify store management, redefine the shopping experience, and facilitate dynamic tourism exploration.

Setup

The technological foundation of Smart-Shopping is a meticulously crafted ensemble of cutting-edge tools, ensuring efficiency, responsiveness, and a seamless user experience. Flutter, a versatile UI toolkit developed by Google, forms the mobile app's interface, offering a unified codebase compatible with both iOS and Android. This is complemented by the robust MySQL database management system, serving as the backbone for data storage with its reliability and scalability features.

For backend development, Node.js takes center stage, renowned for its efficiency in building scalable and real-time applications. Firebase Authentication plays a pivotal role in securing the application through One-Time Password (OTP) authentication, aligning with Smart-Shopping's commitment to adopting state-of-the-art technologies for user authentication. This comprehensive technological setup underscores our commitment to delivering a sophisticated, user-friendly, and secure Smart-Shopping experience to our users.

Authentication

The authentication process in the Smart-Shopping mobile app was constructed by Firebase, providing a strong and secure framework for user verification. The procedure starts on the app's first page, serving as the key to personalized experiences. Users encounter a login interface featuring a text-field for their phone number, a button to initiate login, and an option to sign up.

After entering a phone number and initiating login, Firebase Authentication sends a One-Time Password (OTP) via SMS, enhancing the login process with an additional layer of security. The user is then redirected to an OTP entry page, where they input the received code. Upon pressing login, Firebase Authentication validates the OTP, granting access if the verification was successful.

Choosing to sign up redirects customers to a thorough registration page with text fields for username and phone number, guaranteeing a smooth onboarding process. . A select field offers the options of Male or Female for gender selection. There are two alternatives available to the user: sign up and login. In order to guarantee a smooth transition between authentication phases, a login button reroutes to the original login page.

Firebase Authentication's integration highlights the commitment to data security and user verification within Smart-Shopping. Using Firebase not only streamlines the authentication process but also ensures that user data is handled with the extreme care and security. This robust authentication mechanism contributes to a trustworthy, secure, and seamless Smart-Shopping experience.

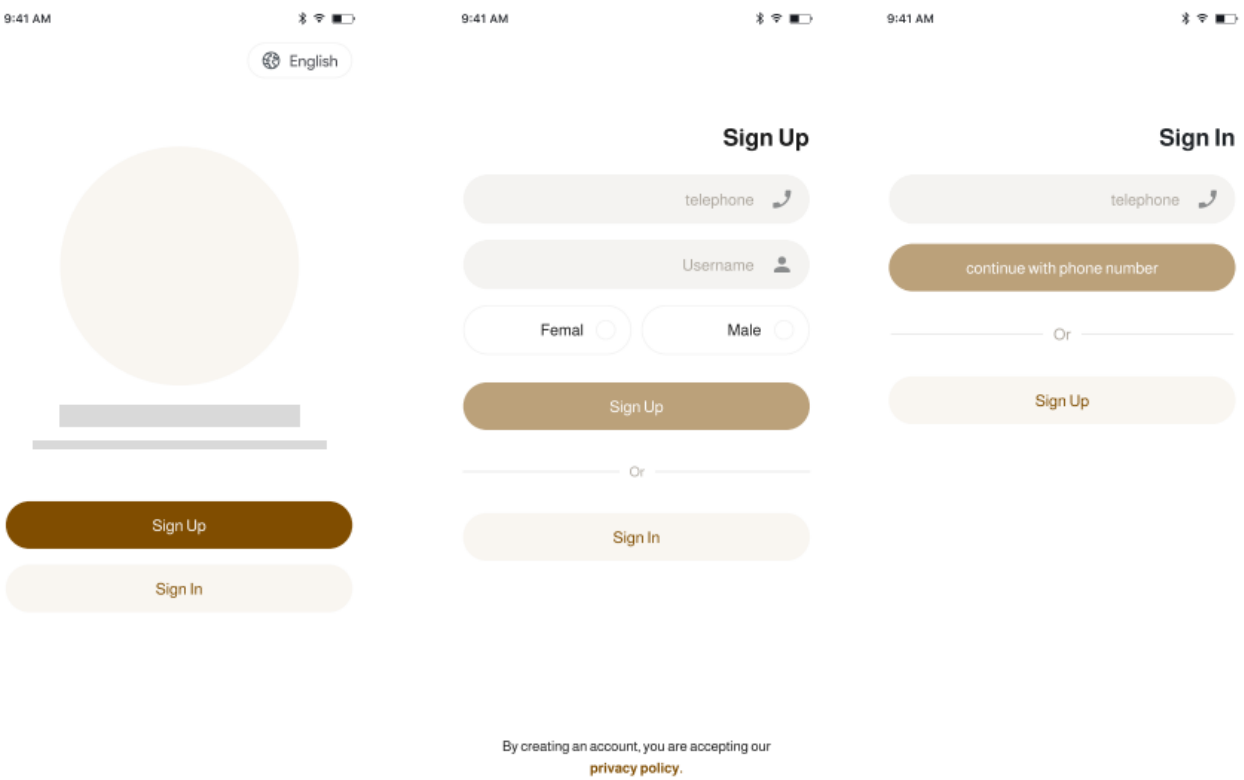

Figure 4.1 Authentication Process

Backend

The dynamic backend of Smart-Shopping's mobile application is a result of thorough development using Node.js, supported by Prisma for database migration, and enhanced with API integration.

Node.js

Smart-Shopping's backend is powered by Node.js, a versatile and efficient runtime built on the V8 JavaScript engine. Node.js excels in building scalable and real-time applications. In the context of Smart-Shopping, Node.js takes center stage as the server-side technology, managing critical functionalities such as API endpoints, user authentication, and seamless integration with the MySQL database.

Node.js is an excellent option for applications that require responsiveness and real-time interactions because of its ability to manage connections. Smart-Shopping's backend achieves optimal performance by using Node.js's event-driven architecture, guaranteeing an effortless and effective user experience.

Prisma for Database Migration

Prisma plays an essential role in Smart-Shopping's backend architecture, specifically focusing on the crucial process of database migration. Database migration ensures the continuous evolution of the database schema, allowing for structural changes without losing existing data integrity.

Prisma is an advanced database toolkit that makes database migrations and interactions easier. By introducing a type-safe database access layer, it reduces the possibility of runtime errors and increases developer productivity. Prisma's capabilities are employed by Smart-Shopping to enable database schema changes that are both efficient and version-controlled.

The data modeling syntax of Prisma easily aligns with the data requirements of Smart-Shopping, allowing for predictable and controllable database migration procedures. Prisma's integration shows Smart-Shopping's ability to maintain a scalable and organized database, which is necessary for the long-term sustainability of the application.

API Integration

In order to improve the functionality of the application, Smart-Shopping carefully integrates an API to complement the backend architecture. By acting as a pathway for smooth communication between multiple components, the API enables Smart-Shopping to dynamically access external services or data sources.

API integration expands the capabilities of Smart-Shopping, providing access to external data or services that enrich the user experience. Whether retrieving real-time information about store reviews, accessing the latest tourism data, or incorporating dynamic content, API integration amplifies the application's versatility.

Because of the effective implementation of APIs, Smart-Shopping is able to stay flexible and responsive to the changing retail and tourism industries. The effort of Smart-Shopping to providing a dynamic and feature-rich user experience is demonstrated by this strategic integration.

In addition to providing a solid basis for current features, Smart-Shopping's backend's efficient integration of Node.js, Prisma, and API integration sets the application up for future growth and improvement. This selection of backend technologies, which adds to the overall efficiency, and adaptability of Smart-Shopping's backend infrastructure, demonstrates the commitment to the best development.

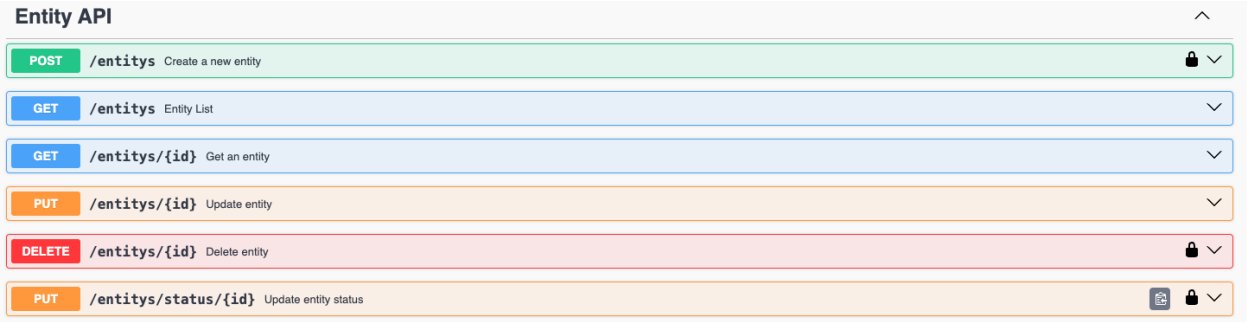

Figure 5.1 Documentation for the API using Swagger

Application Flow

After successful authentication, the business owner is directed to the main page, which serves as the hub for managing shops, offers, notifications, and account settings. The user interface is designed with a bottom navigation bar providing access to key functionalities.

I. Shops:

- Shop Management Overview:
  - The "Shops" page provides an overview of all the shops managed from the business owner's account.
  - Each shop entry displays basic information, such as the shop name and location.
  - The list is dynamically updated as the business owner adds or removes shops.

- Add New Shop:
  - The business owner can easily add a new shop by pressing the "Add New Shop" button.
  - A form appears for the user to input details such as the shop name, category, location, and contact information.
  - Upon submission, the new shop is integrated into the list of shops on the user’s account.

- Edit and Delete Shops:
  - For existing shops, the business owner can initiate edits to update information or make corrections.
  - A straightforward editing interface allows modifications to multiple fields.
  - Deletion of a shop is facilitated through a secure confirmation process, preventing accidental removal.

II. Offers:

- Create and Manage Offers:
  - The "Offers" page is the control center for creating and managing promotions and offers.
  - The “Add Offer” button, used for the addition of new offers, generates an offer creation form.
  - Each existing offer is showcased with details such as the offer name, duration, and current status (Running or Expired).

- Offer Details:
  - Tapping on a specific offer provides details, including the offer description and relevant dates.
  - The interface allows quick modifications for ongoing offers, while expired offers are removed.

III. Notifications:

- Notification Overview:
  - The "Notifications" page keeps a history of notifications sent by the business owner to customers.
  - Each entry displays the sender's name and message details.

- Sending Notifications:
  - The business owner can compose and send notifications directly from the interface using the “Add Notification” button.
  - Notifications undergo an approval process by administrators before being sent to the application users.

IV. Account:

- Account Management:
  - The "Account" page enables the business owner to manage many settings including personal details and language settings.
  - A user-friendly interface allows for a simple editing process to the user's profile information.

- Application Settings:
  - Business owners can customize application settings, including language preferences for a tailored experience.
  - Options for signing out or deleting the account are also included.

This design of the application flow prioritizes simplicity, providing business owners with an efficient platform to manage their shops, create offers, send notifications, and personalize account settings. The bottom navigation bar ensures seamless navigation between these core functionalities, ensuring a simple, user-friendly experience.

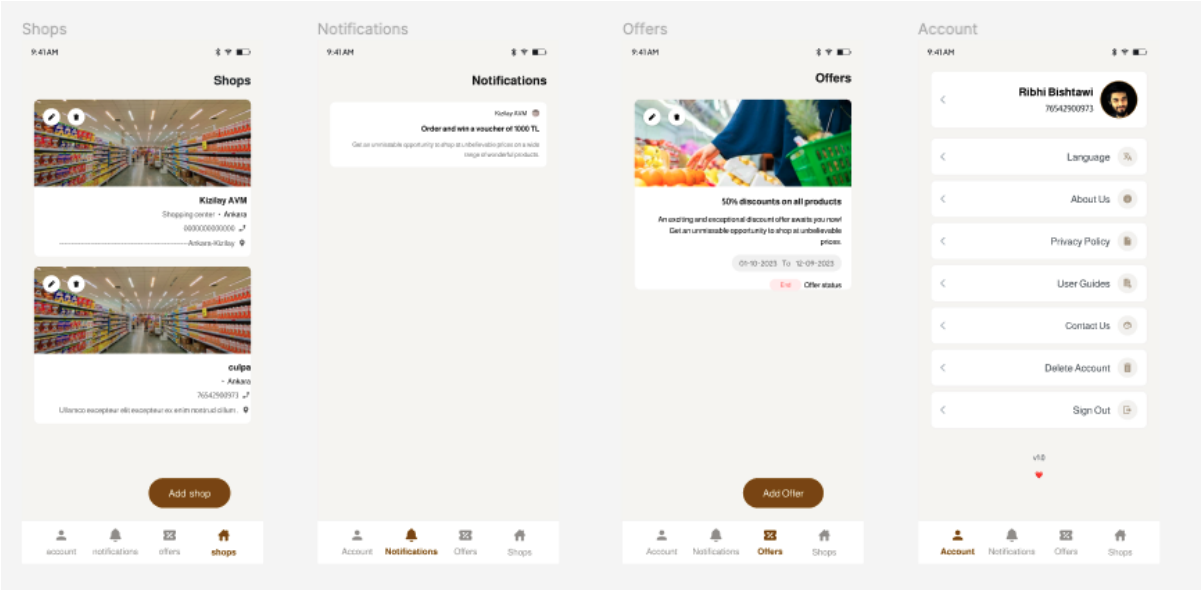

Figure 6.1 Main pages of the application

Shop Creation Process

The Smart-Shopping application offers a straightforward and thorough shop creation process that enables business owners to quickly enter essential details about their establishments. Here is a detailed explanation of the fields and steps involved:

I. Initiating Shop Creation:

- After navigating to the "Shops" screen, the business owner taps the "Add New Shop" button, triggering the shop creation process.
- This action redirects the user to a dedicated screen designed for entering the information of the new shop.

II. Data Entry Fields:

The shop creation form includes the following fields, for basic information about the establishment:

- Store Name (in Turkish and English):
  The business owner inputs the name of the establishment in both Turkish and English.
- Categories:
  Users can select one or more categories that best represent the type of services offered by the establishment.
- Keywords (Tags):
  Limited selection of keywords or tags allows the business owner to associate specific attributes with the shop.
- Commercial Registration Number:
  The commercial registration number is a unique identifier that helps establish the legal identity of the shop.

- City:
  The city field allows the business owner to specify which city the shop is located in.
- Working Days/Hours:
  Input fields for working days and hours provide information on the schedule of the shop.
- Location:
  The exact location of the shop is specified, to provide accurate and easy navigation.
- Addresses for Multiple Branches:
  If there are multiple branches, the business owner can provide addresses for each branch, enabling a complete overview.
- Social Media Links:
  Facebook, Instagram, and TikTok links offer an opportunity for enhanced online visibility and engagement.
- Contact Information:
  The business owner includes the contact number and the name of the person to contact for inquiries.
- Store Image:
  An image of the store is uploaded to create a visual appeal, contributing to an attractive and informative shop profile.

III. Submission and Confirmation:

After completing the form, the business owner submits the information.

IV. Validation and Approval:

The entered information undergoes validation to ensure accuracy and compliance with any specified guidelines.

V. Shop Integration:

- Once approved, the new shop integrates into the list of managed shops on the "Shops" screen.
- Users can immediately access and manage the newly added shop, enhancing the set of features offered by the Smart-Shopping application.

By structuring the shop creation process with a user-friendly form and wide-ranging fields, Smart-Shopping enables business owners to efficiently showcase their establishments within the application.

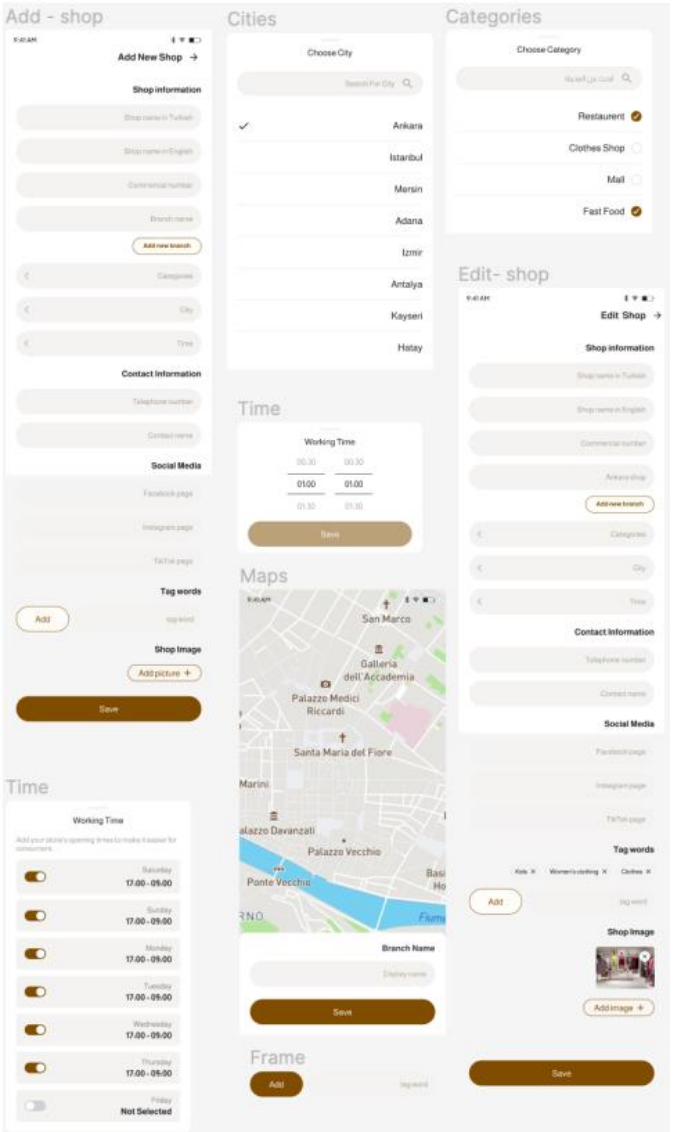

Figure 6.2 Add new shop interface

Notification System Overview

Through the addition of a strong notification system, the Smart-Shopping application enables business owners to interact with customers in an efficient and effective way. This system makes sure that crucial announcements, promotions, and updates are delivered within a regulated and efficient process. Here is a quick overview of the notification process:

I. Initiation:
   Business owners create messages within a specific character limit on the "Notifications" page, to announce promotions, special deals, or relevant information.

II. Sender's Information:
   The sender's name is included, providing users with clear information about the notification.

III. Submission to Administrator:
   Messages are submitted for administrator review after pressing the "Send Notification" button, ensuring content aligns with the specified guidelines of the application.

IV. Administrator Approval:
   The administrator reviews and approves messages, acting as a quality control measure to prevent spam or inappropriate content from being sent to the customers.

V. Delivery to Users:
Approved notifications are delivered to application users, ensuring controlled communication.

Key Features:

I. Efficiency and Transparency:
This process, combined with transparent sender information, guarantees efficient communication.

II. Character Limit:
The character limit encourages clear and precise communication with the customer, optimizing the user's experience.

III. Quality Control:
The administrator's approval step adds a layer of security, ensuring that notifications follow the application's standards.

In summary, the notification system in Smart-Shopping enhances user engagement, helps efficient communication, and maintains a standard of quality through the approval process. This feature contributes to a positive user experience within the Smart-Shopping community.

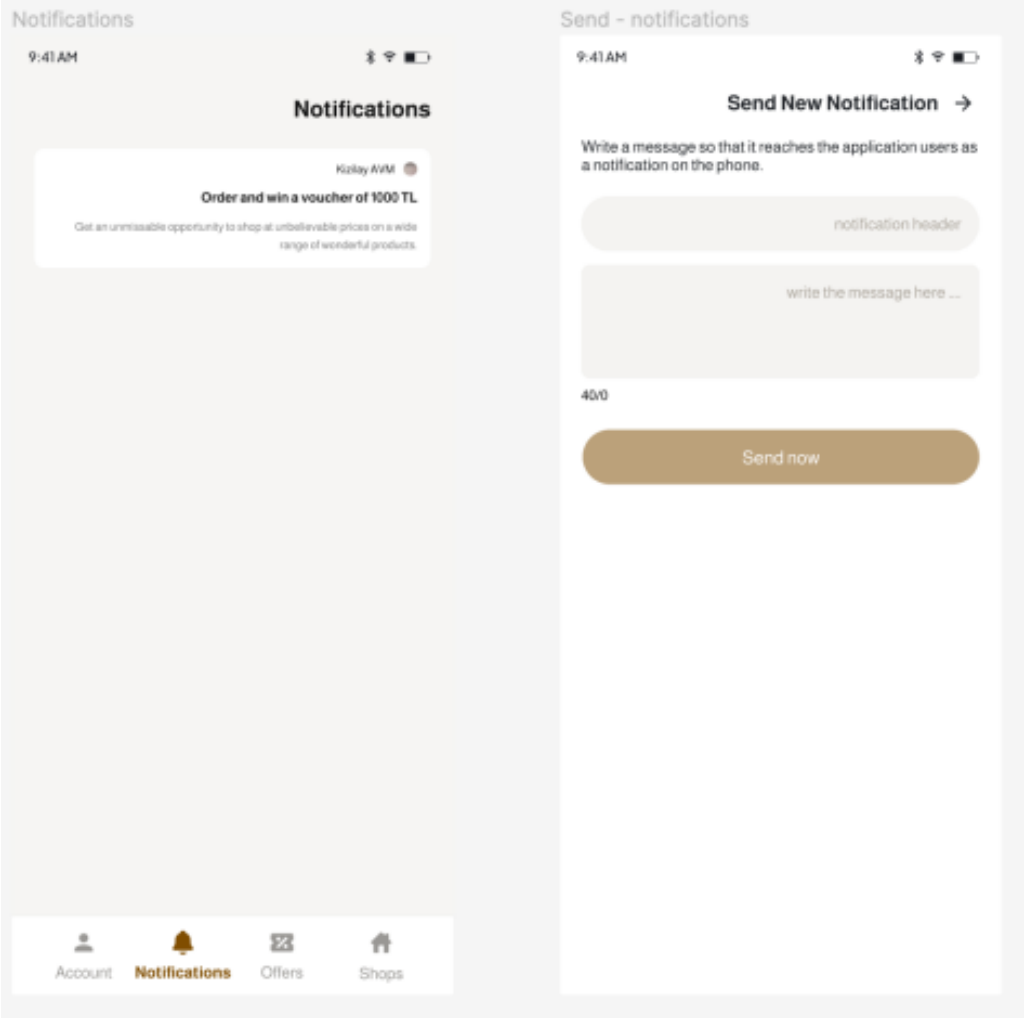

Figure 6.3 Notification and Send New Notification interface

Offers and Offer Creation

Creating a new offer on the Smart-Shopping application is an easy and straightforward process designed for maximum simplicity. Here's a step-by-step explanation on how offer are created:

I. Initiation:
   Tap "Add Offer" on the Offers Page to start crafting a new promotion.

II. Offer Input Page:
   User is redirected to a dedicated page for entering offer details.

III. Essential Details:
   Input offer name, upload an image, and provide a description with the details of the offer.

IV. Time Frame:
   Set the offer start and end dates of the offer.

V. Confirmation:
   Confirm details and submit the offer for it to be displayed on the application.

Key Advantages:

I. User-Friendly:
Simplified and easy steps.

II. Visual Appeal:
Boost attractiveness with an image for the offer.

III. Time-Sensitivity:
Announce start and end dates of the offer.

This process ensures that businesses can efficiently create and showcase captivating offers, promoting engagement and boosting their presence on the application.

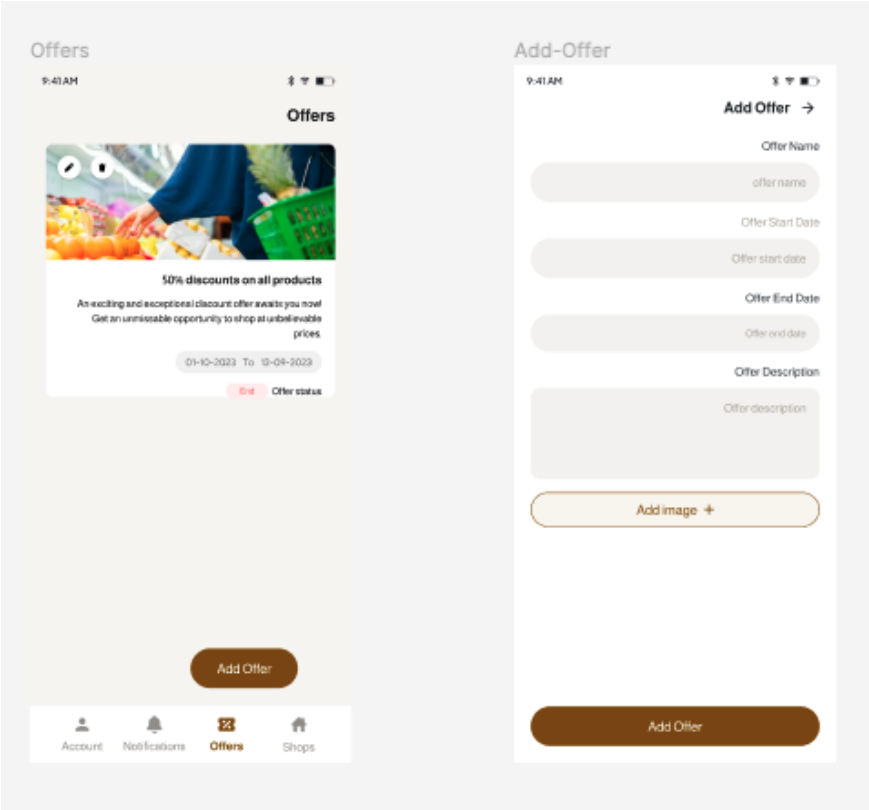

Figure 6.4 Offers and Add New Offer interface

Conclusion

In conclusion, Smart-Shopping stands as a beacon of innovation, poised to redefine the landscape of retail and tourism experiences. The fusion of cutting-edge technology—utilizing Flutter, MySQL, Node.js, and Firebase—positions Smart-Shopping as more than just an application; it's a comprehensive solution, embodying reliability, security, and feature-rich capabilities.

For business owners, Smart-Shopping isn't a complex tool; it's a user-friendly ally streamlining store management, simplifying offer creation, and ensuring a secure login process. Its strength lies in simplicity, providing a hassle-free experience in the dynamic realm of digital commerce.

The application's appeal extends beyond businesses, offering users a seamless blend of smart shopping and real-time tourism exploration. With instant updates on offers, visually appealing promotions, and a multilingual interface, Smart-Shopping promises an accessible and enjoyable experience for all.

As we conclude this chapter, Smart-Shopping isn't reaching a final destination; it's embarking on a journey of continuous improvement. With a commitment to enhancing user experiences and incorporating valuable feedback, Smart-Shopping anticipates not just keeping up with but staying ahead in the ever-evolving digital commerce and exploration domain. In essence, it's not just an app; it's a transformative force, simplifying how we shop and explore, shaping a more connected, accessible, and enjoyable future for retail and tourism.

References

- [Coding With T]. (2022, February 11). Flutter Firebase Phone Number OTP Authentication - Flutter Firebase 2023 [Video]. YouTube. https://www.youtube.com/watch?v=dGwr66EkJKk&ab_channel=CodingWithT

- Firebase. (n.d.). Flutter. https://docs.flutter.dev/development/data-and-backend/firebase

- Flutter - Build apps for any screen. (n.d.). https://docs.flutter.dev/docs

- Node.js. (n.d.). Node.js Documentation. https://nodejs.org/en/docs/

- Prisma. (n.d.). Prisma Documentation. https://www.prisma.io/docs/

- [Rivaan Ranawat]. (2022, October 19). Flutter, Firebase & Riverpod Master Class - Build a COMPLETE Reddit Clone App [Video]. YouTube. https://www.youtube.com/watch?v=B8Sx7wGiY-s&ab_channel=RivaanRanawat

- Swagger. (n.d.). Swagger Documentation. https://swagger.io/docs/specification/about/

- TypeScript. (n.d.). TypeScript Documentation. https://www.typescriptlang.org/docs/