

PROBLEM STATEMENT

- Buying furniture and home décor online often leads to uncertainty because users cannot accurately visualize how an item will look or fit in their space. Traditional e-commerce platforms only provide static images, making it difficult for customers to judge size, color, placement, and overall room compatibility. This results in confusion, hesitation, and even returns after purchase.
- Businesses also struggle to showcase their products in an interactive way, and many lack a digital platform where they can easily upload 3D models or sell items effectively. At the same time, admins need a streamlined system to manage vendors, products, and platform activity.
- Spacia solves these challenges by combining e-commerce with real-time 3D models, AR visualization, and a complete multi-role system for users, businesses, and admins.

PROJECT OVERVIEW

- Spacia is a modern mobile e-commerce application designed for purchasing furniture, wall art, and home décor. Unlike traditional shopping apps, Spacia enhances the buying experience by integrating interactive 3D product models and an AR feature that allows users to visualize items directly in their own homes. This helps users make more confident purchasing decisions by seeing how products fit and look in their actual living spaces.
- The platform also supports a complete business ecosystem, enabling sellers to register, upload products, manage inventory, and track orders. Admins have dedicated tools to manage businesses, approve listings, handle orders, and monitor platform-wide performance. With its combination of immersive technology, smooth user flow, and robust business management features, Spacia delivers a seamless end-to-end marketplace experience for both customers and businesses.

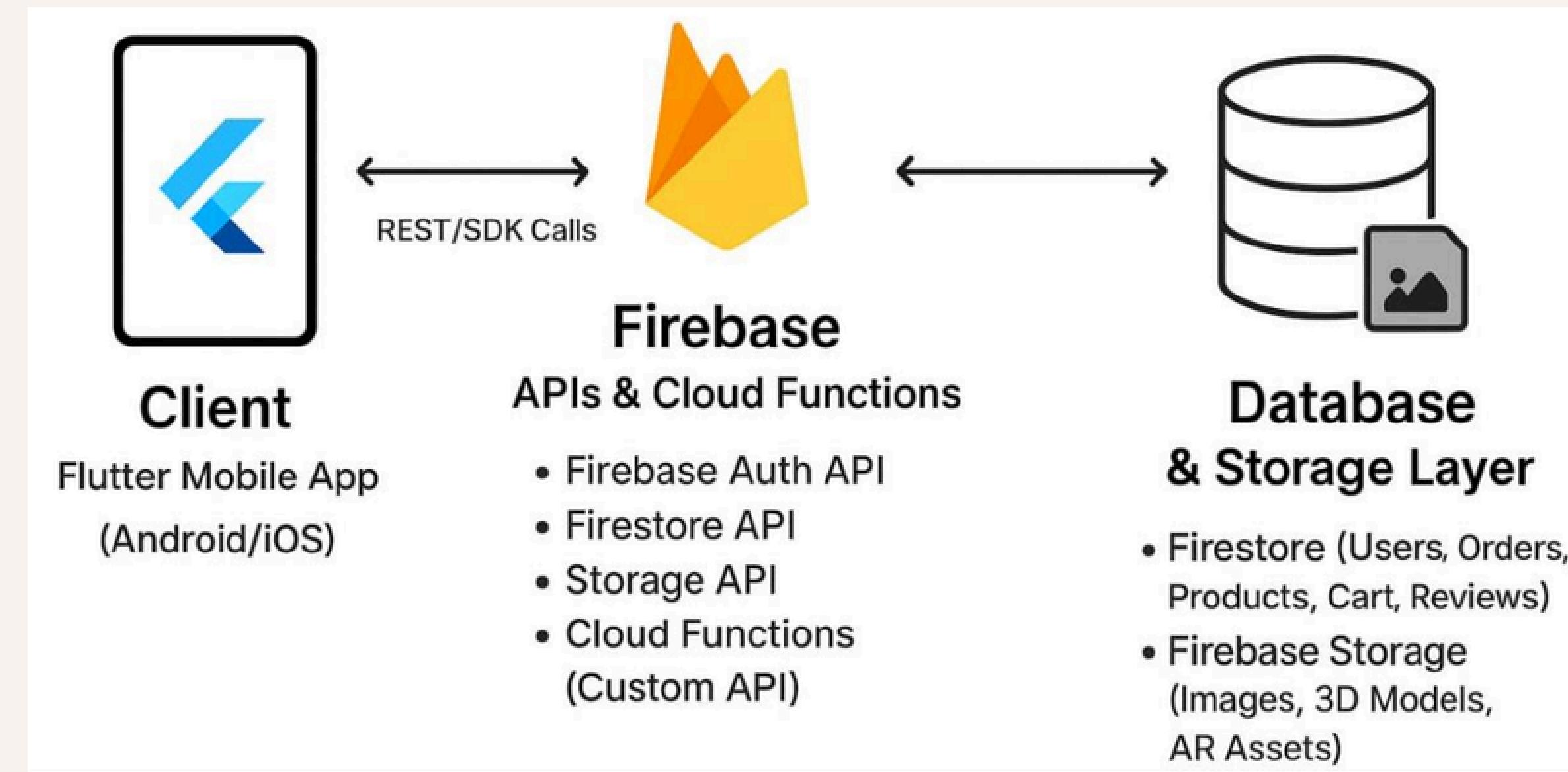
KEY FEATURES

- **3D Product Models:** Users can view products in interactive 3D, rotate them, zoom in, and inspect every detail.
- **Augmented Reality (AR) View:** Allows customers to place furniture inside their real environment using their device camera.
- **User Shopping Experience:** Browsing categories, searching, viewing products, adding to cart, checkout, order tracking, and profile management.
- **Business Module:** Businesses can add products, upload images/3D models, manage orders, track revenue, and edit their profiles.
- **Admin Panel:** Admins can approve businesses, manage products, monitor orders, review requests, and maintain the overall platform.
- **Firebase Backend:** Real-time Firestore database, secure Firebase Auth, media storage, and cloud functions power the entire system.
- **Stripe Payment Integration:** Seamless card-based payments directly within the app.

PROJECT SCOPE

Spacia covers a complete end-to-end e-commerce ecosystem with role-based modules for users, businesses, and admins. The user module includes browsing, searching, 3D viewing, AR visualization, cart, checkout, and order tracking. The business module allows vendors to upload products, manage inventory, track orders, and view revenue. The admin module supervises all activity, including business approvals, product oversight, and order monitoring. The backend scope includes Firebase Authentication, Firestore Database, Firebase Storage, and Stripe payments, ensuring a fully functional, scalable mobile platform.

PROJECT ARCHITECTURE



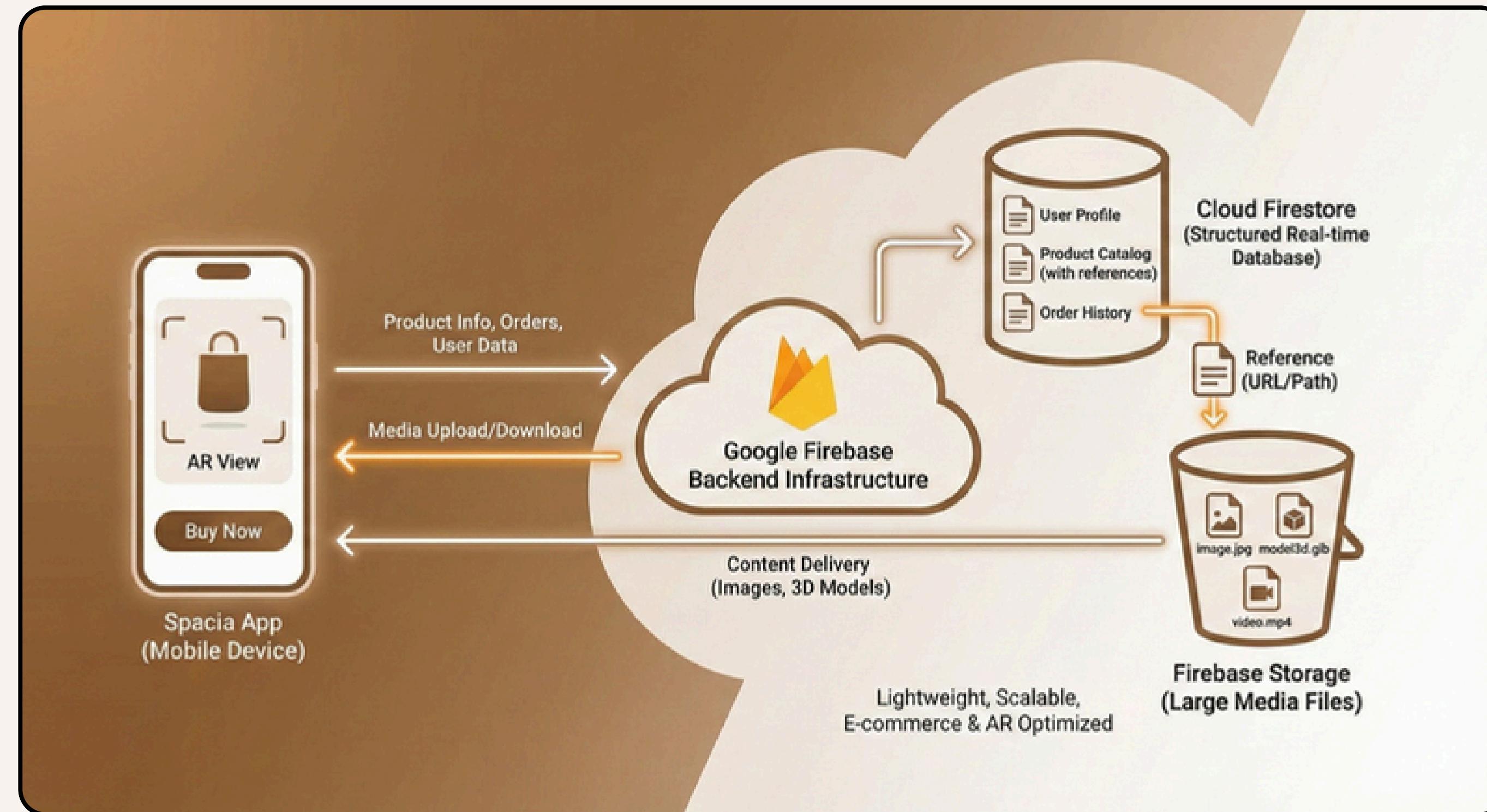
PROJECT ARCHITECTURE

The architecture of Spacia is built using a Flutter mobile client that connects directly to Firebase for all backend operations. Firebase Authentication manages user, business, and admin login, while Firestore stores all application data such as products, orders, businesses, carts, and reviews. Firebase Storage is used to store images, 3D models, and AR assets. Cloud Functions handle automated tasks like business approvals and notifications. This architecture keeps Spacia fast, scalable, and real-time across all devices.

TECH STACK

- **Frontend – Flutter (Dart):** Used to build a cross-platform mobile app with a single codebase, fast Hot Reload, and flexible, customizable UI components.
- **Backend – Firebase Cloud Functions:** Handles serverless business logic, processes requests, and supports authentication workflows.
- **Database – Firebase Firestore (NoSQL):** Chosen for real-time syncing, high scalability, and a flexible document-based structure that fits both structured product data & dynamic data.
- **Storage – Firebase Storage:** Stores large media assets such as product images, 3D model files (.glb, .usdz), AR resources, and other uploads.
- **Authentication – Firebase Auth:** Provides secure sign-in/sign-up using email, password, and social login options like Google.

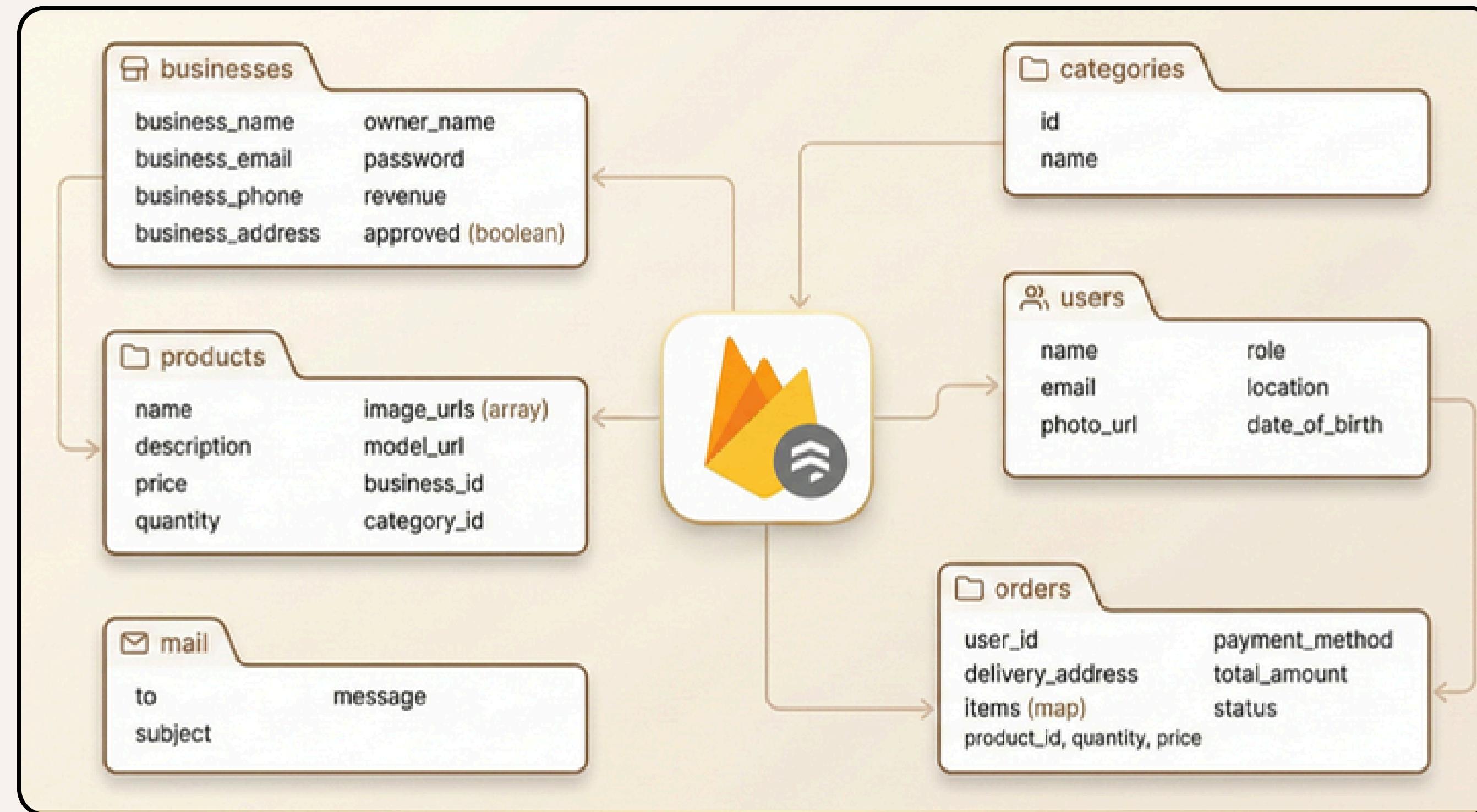
DATABASE & STORAGE ARCHITECTURE



DATABASE & STORAGE ARCHITECTURE

- Spacia uses Firebase as its backend, combining Cloud Firestore for structured data and Firebase Storage for large media files. Firestore stores users, products, orders, and business data, while only saving references (URLs) to media stored in Firebase Storage—such as product images, 3D GLB models, and profile photos.
- The app communicates with Firebase through secure SDK calls for authentication, data updates, and media upload/download, creating a fast, scalable, and AR-friendly backend.

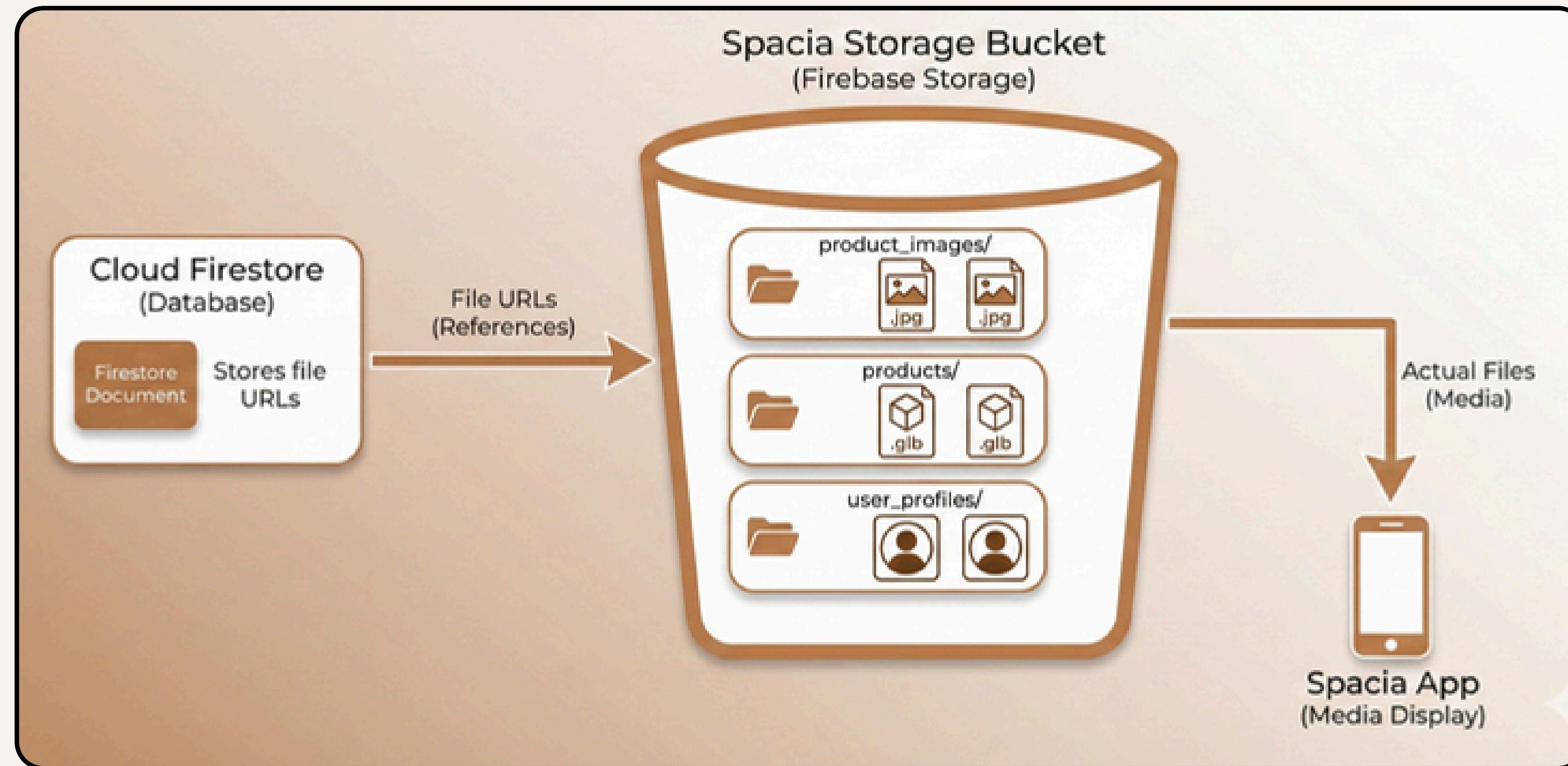
FIREBASE DATABASE SCHEMA



FIREBASE DATABASE SCHEMA

- Spacia uses Cloud Firestore as a NoSQL database to store structured, real-time application data. Each feature of the app is organized into dedicated collections such as users, businesses, products, orders, categories, and reviews.
- Every collection contains documents with unique IDs, holding fields like names, prices, emails, order details, and references to media stored in Firebase Storage. This schema keeps the data lightweight, scalable, and easy to query across different user roles—consumer, business, and admin.

FIREBASE STORAGE STRUCTURE



FIREBASE STORAGE STRUCTURE

- Firebase Storage is used to handle all large media files, such as product images, 3D model files (.glb), and user profile pictures. The storage bucket is organized into folders like `product_images`, `products`, and `user_profiles`, keeping assets grouped and easy to reference.
- Firestore only stores the URL paths of these files, allowing the app to efficiently download images and 3D models while keeping the database fast and optimized for AR performance.

FOLDER STRUCTURE

Directory	Key Contents	Description / Responsibility
lib/admin	screens/, widgets/	Admin Portal: Dashboard, User/Biz Management
lib/business	screens/ (dashboard, products...), widgets/	Business Portal: Vendor tools, Order mgmt
lib/consumer	screens/ (auth, cart, home, orders...), widgets/	Consumer App: Shopping UI, User Profile
lib/services	auth_service.dart, stripe_service.dart...	Backend Services: Auth, Payments, Email
lib/models	user_model.dart, product_model.dart...	Data Models: Data structure definitions
lib/providers	cart_provider.dart	State Management: App state logic
lib/constants	app_colors.dart, theme.dart...	Configuration: Styling and constants
lib/widgets	custom_topbar.dart...	Shared Components: Reusable UI widgets

FOLDER STRUCTURE

The Spacia app uses a simple and well-organized folder structure that separates code based on user roles and core functionality. The main modules—admin, business, and consumer—each contain their own screens and widgets, making the project easy to navigate and maintain. This separation ensures that features for different user types remain independent, scalable, and easy to extend.

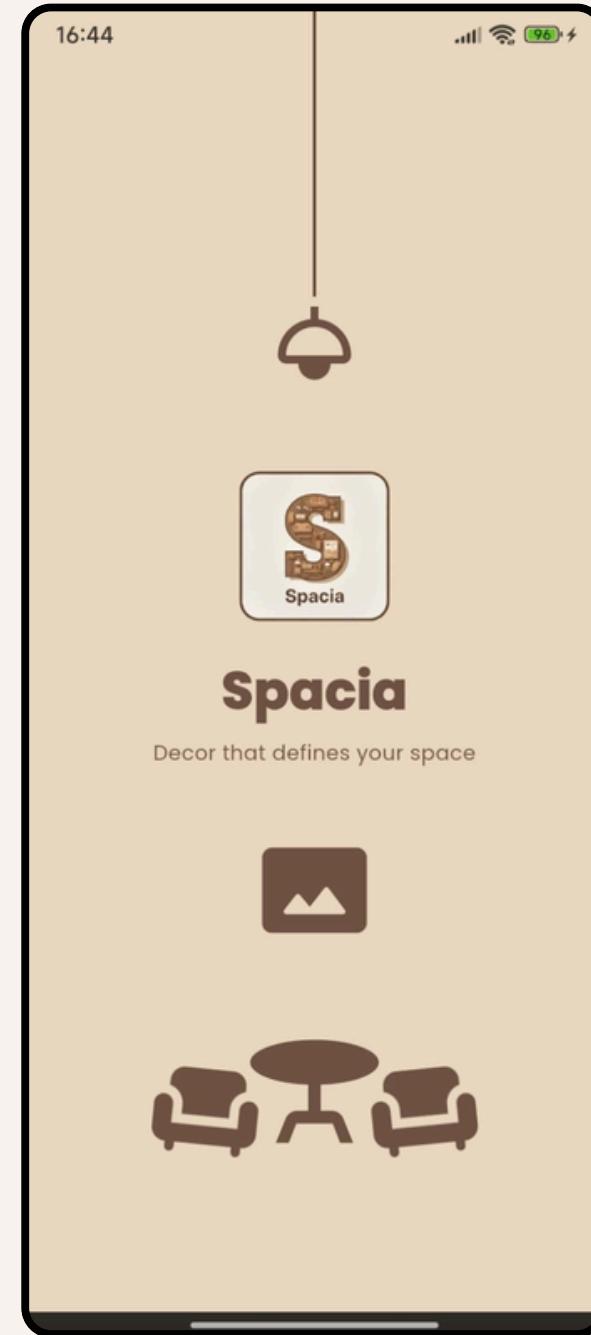
Shared logic is placed in dedicated folders such as services, models, providers, and constants, which hold backend integrations, data structures, state management, and global styling. This modular approach keeps the codebase clean, reusable, and aligned with Flutter best practices, resulting in a structure that is both easy to understand and efficient for long-term development.



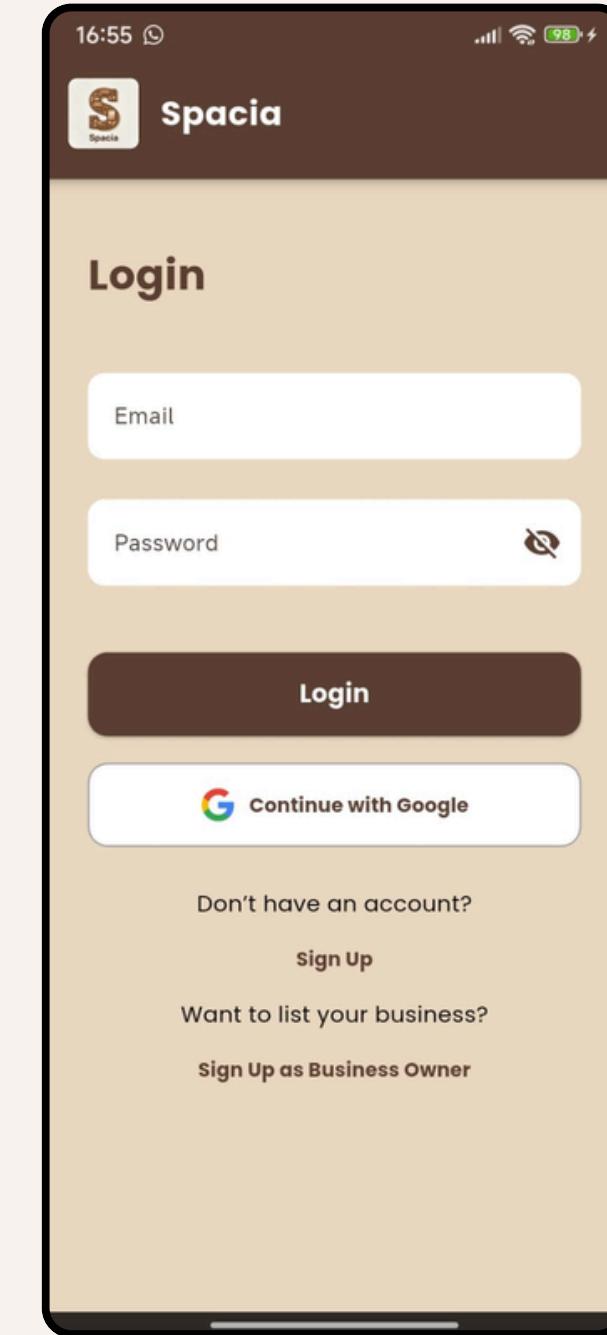
SPACIA

USER INTERFACE

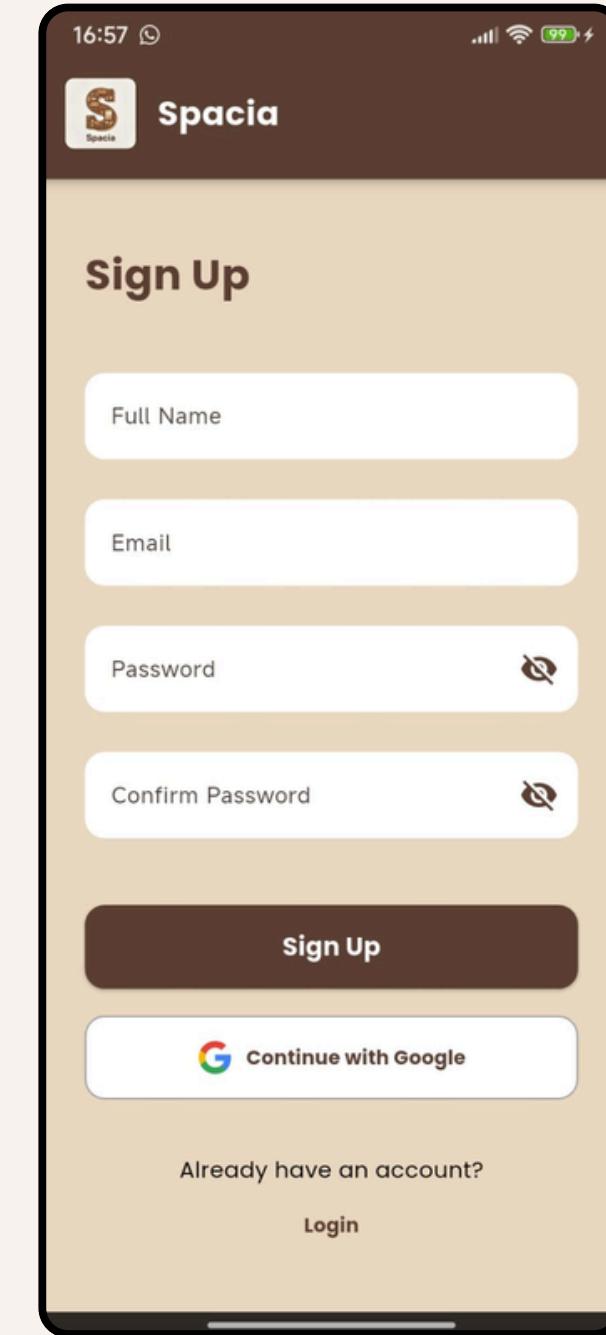
AUTHENTICATION SYSTEM



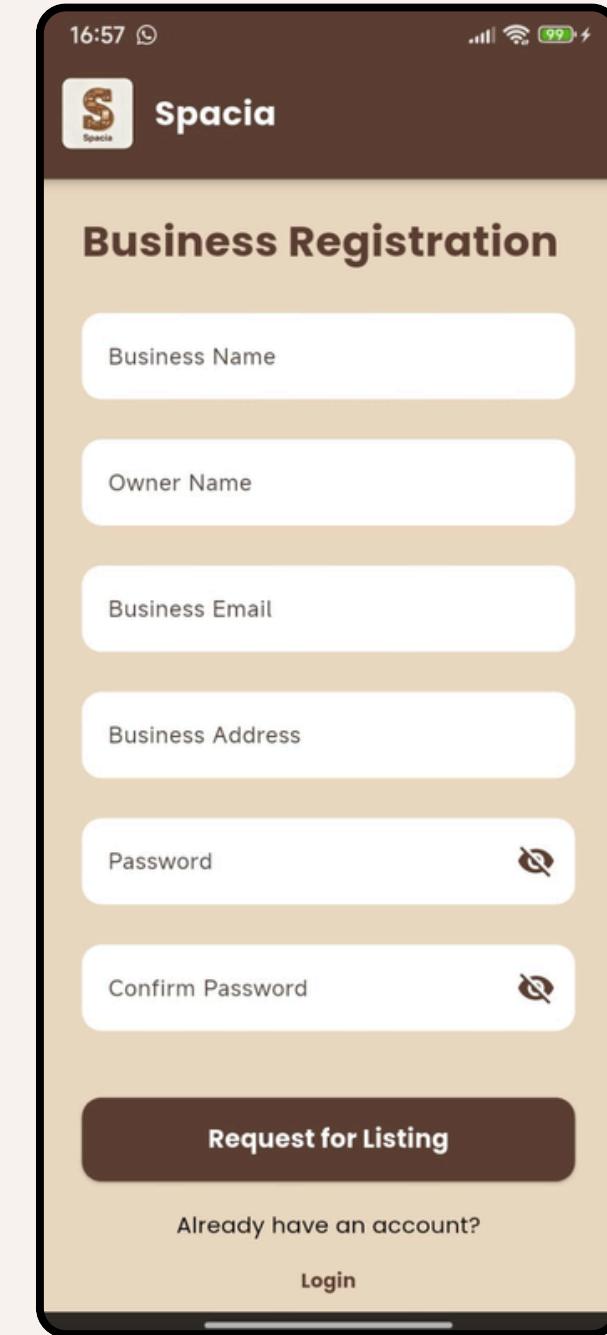
SPLASH SCREEN



LOGIN SCREEN



USER SIGNUP



BUSINESS REGISTRATION

AUTHENTICATION SYSTEM FLOW

- **Splash Screen**

When the user launches the Spacia application, a splash screen is displayed for 3 seconds.

- **Login Flow**

After the splash screen, users arrive at the login screen where authentication can be completed either by entering their email and password or by choosing the faster Continue with Google option. Google sign-in enables instant access without the need to manually create credentials.

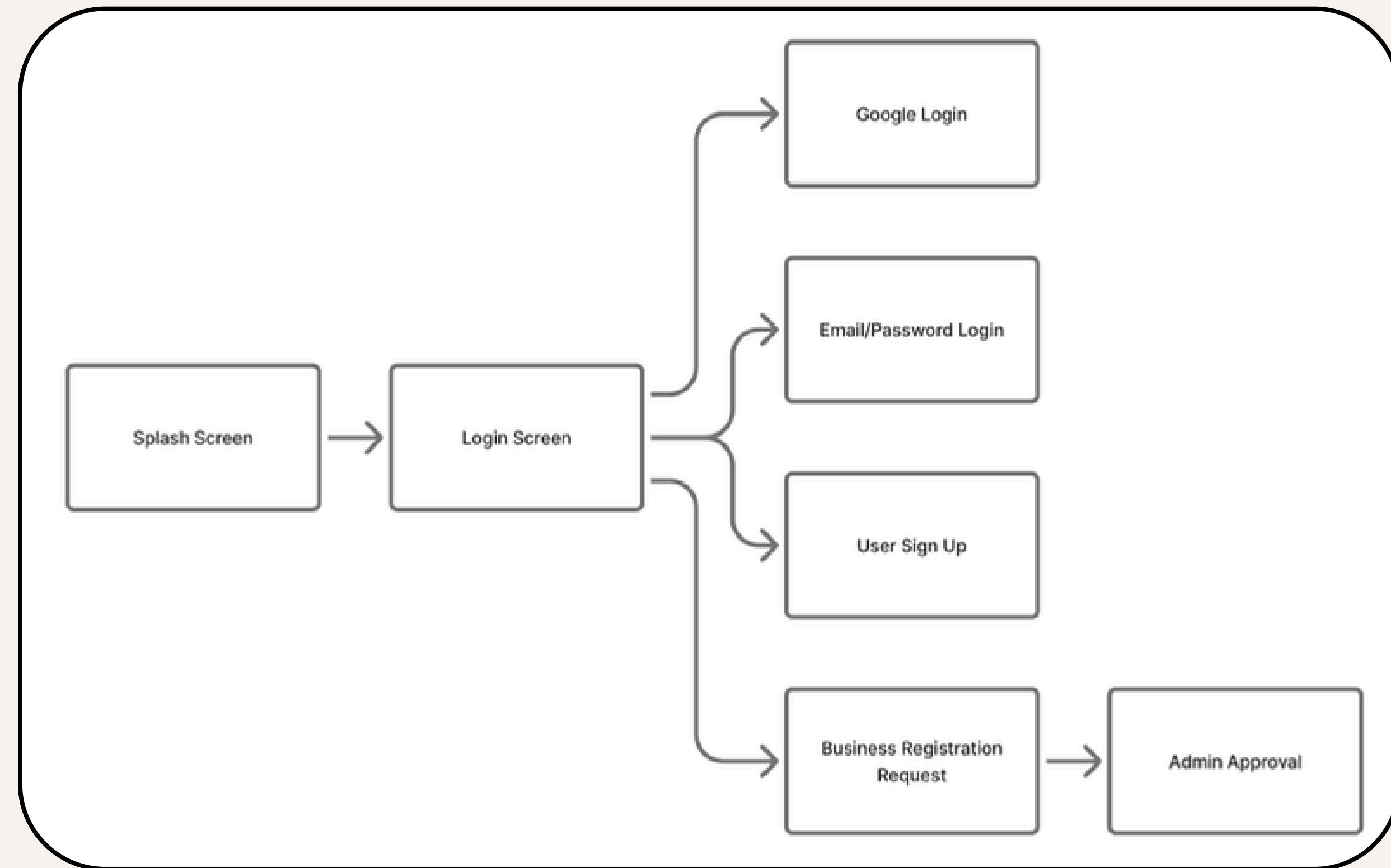
- **User Sign-Up**

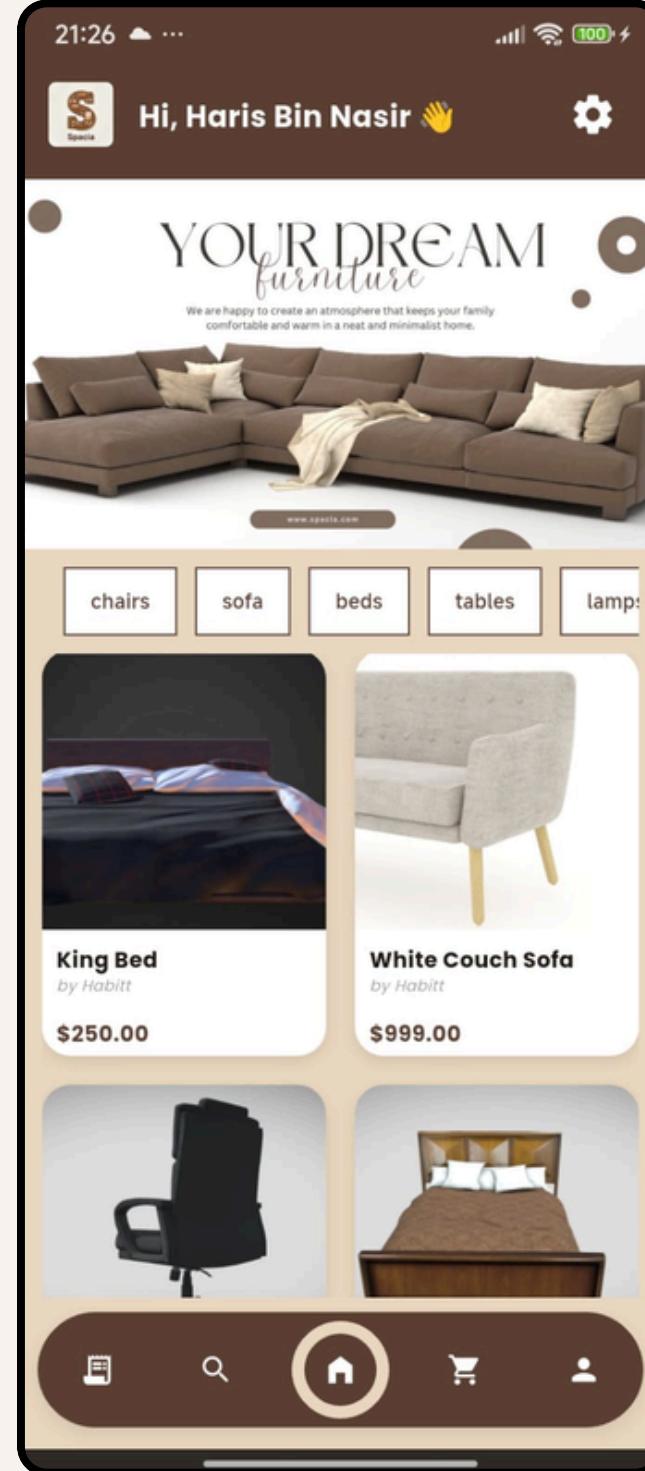
If the user does not already have an account, they can navigate to the sign-up screen. Here, they provide their name, email, and password to create a standard user account, after which they can log in normally.

- **Business Registration**

Business owners follow a separate registration process through the Request for Listing option. They submit business details and login credentials, which are then forwarded to an admin for review. Once the admin approves the listing request, the business account is activated and the owner can log in to their dashboard.

FLOW DIAGRAM

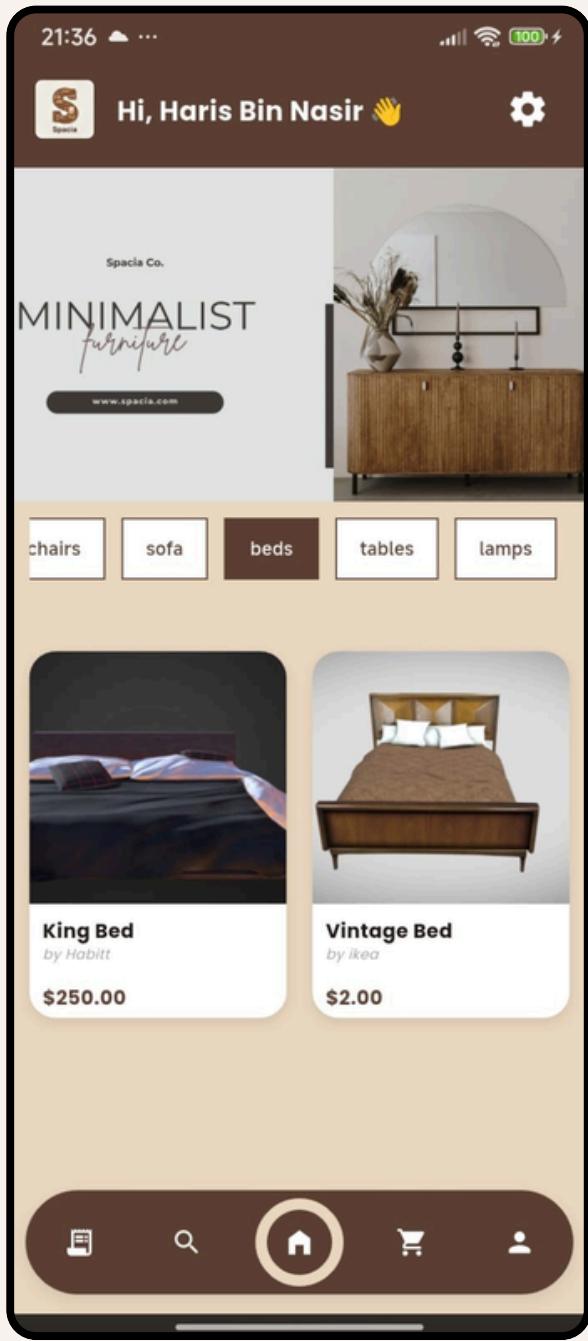




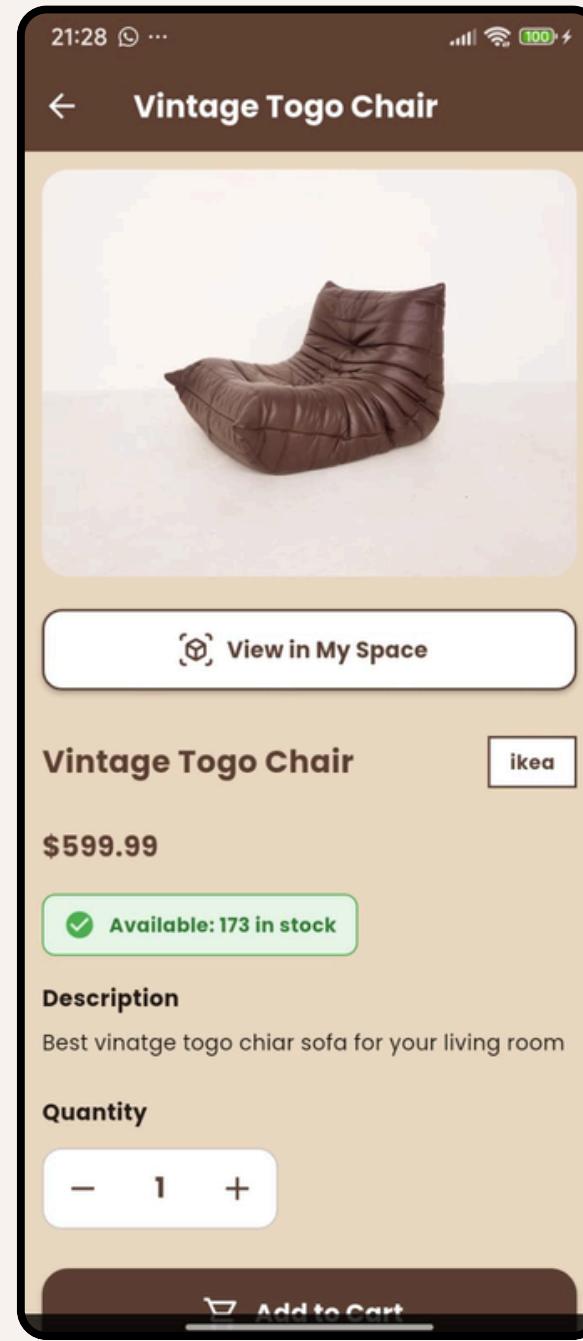
USER DASHBOARD

- The User Dashboard serves as the main home screen where users can browse furniture categories, explore featured products, and navigate to various sections of the app.
- From here, users can quickly access search, cart, profile, and other key features, making it the central point for all user interactions within Spacia.

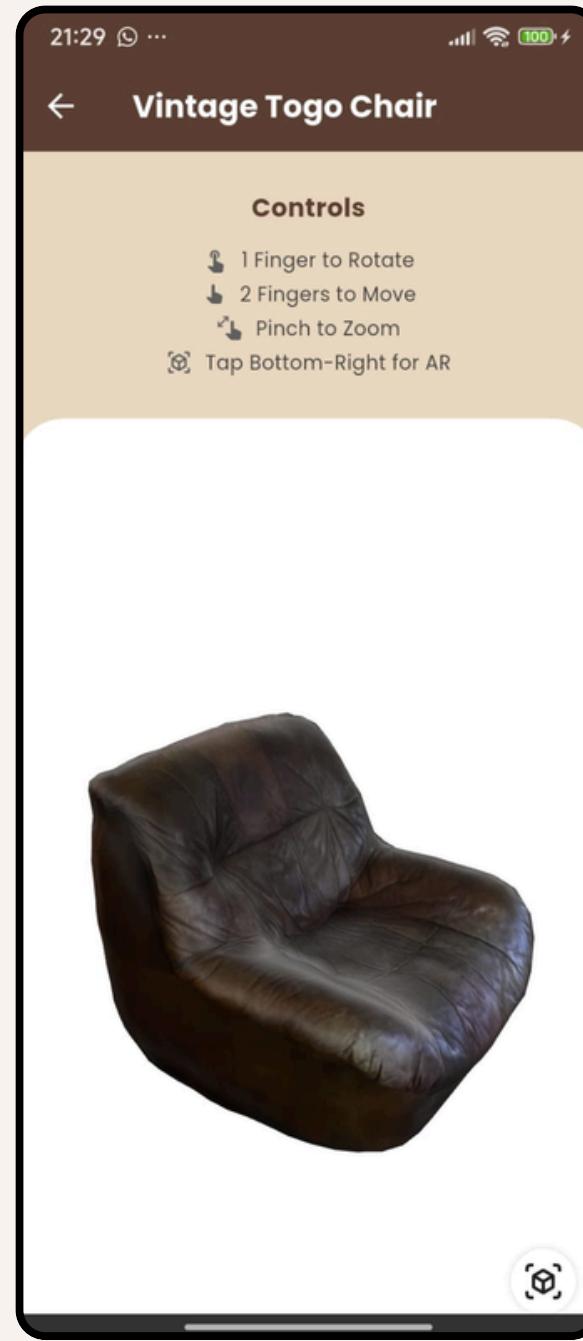
HOME SCREEN



CATEGORY



PRODUCT PAGE



MODEL PAGE



AR SCREEN

HOME SCREEN FLOW

- **Category Screen**

The Home page begins with the Category page, where users can browse different furniture categories.

- **Product Page**

When a user selects a product from a category, they are taken to the Product Page. This screen displays detailed information about the selected item and a “View in My Space” button which enables users to preview the product in 3D and later in AR.

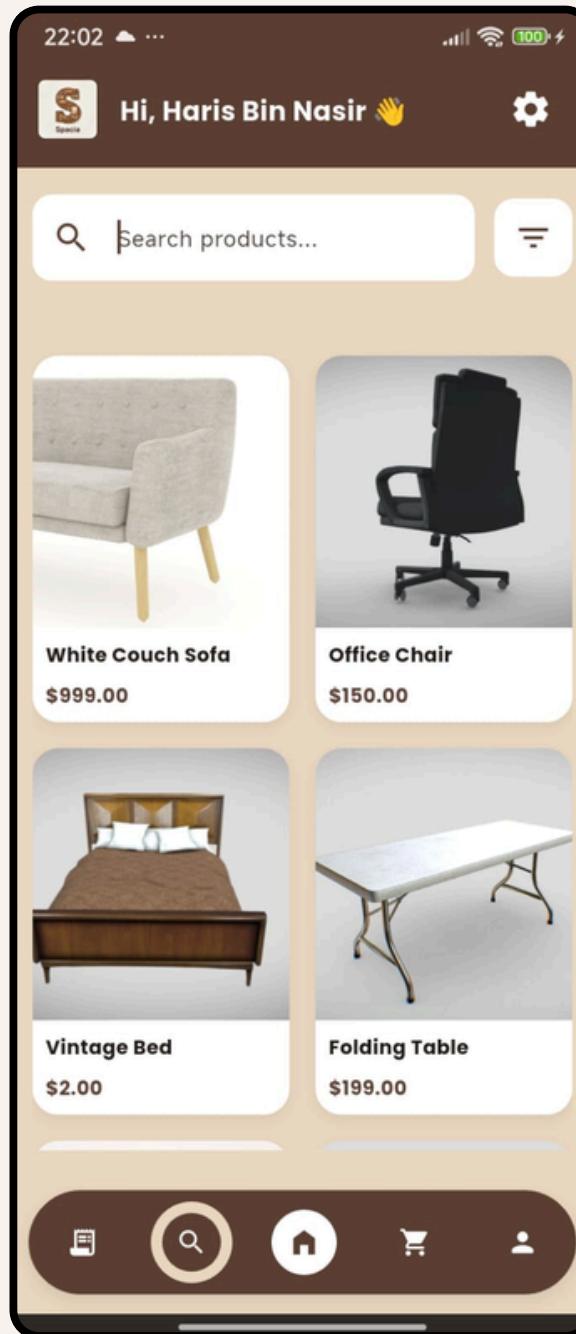
- **3D Model Page**

Upon tapping “View in My Space,” the user is directed to the 3D Model Page. Here, they can interact with the product model using simple gestures. This page helps users visualize the product in a realistic, manipulable 3D environment.

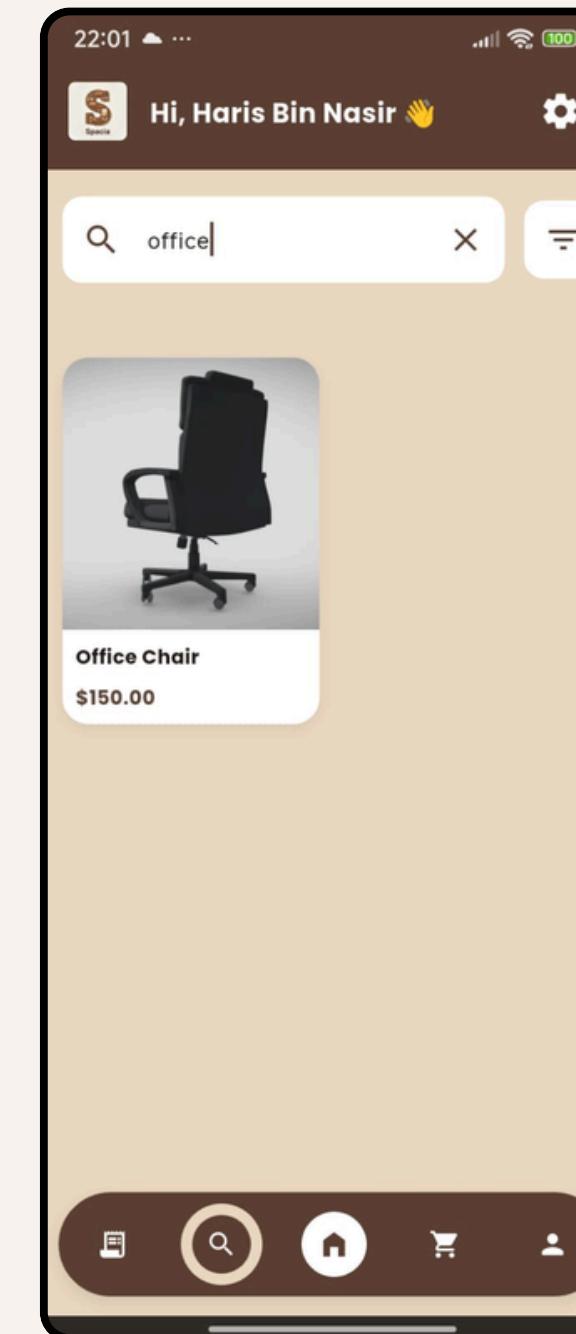
- **AR Screen**

From the 3D Model Page, users can tap the AR button located at the bottom right corner to open the AR Screen. This feature overlays the 3D model into the user’s real-world environment through their device’s camera. The AR Screen helps users understand how the furniture will look and fit within their actual home space, providing an immersive and practical visualization experience.

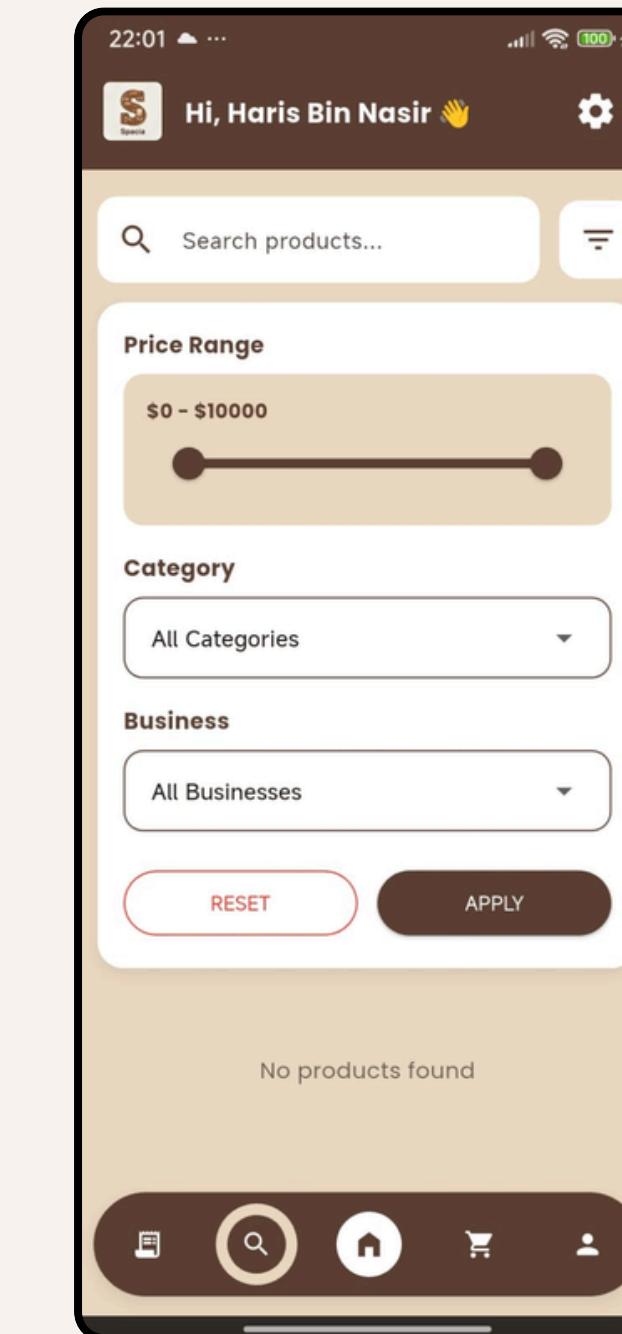
SEARCH SCREEN



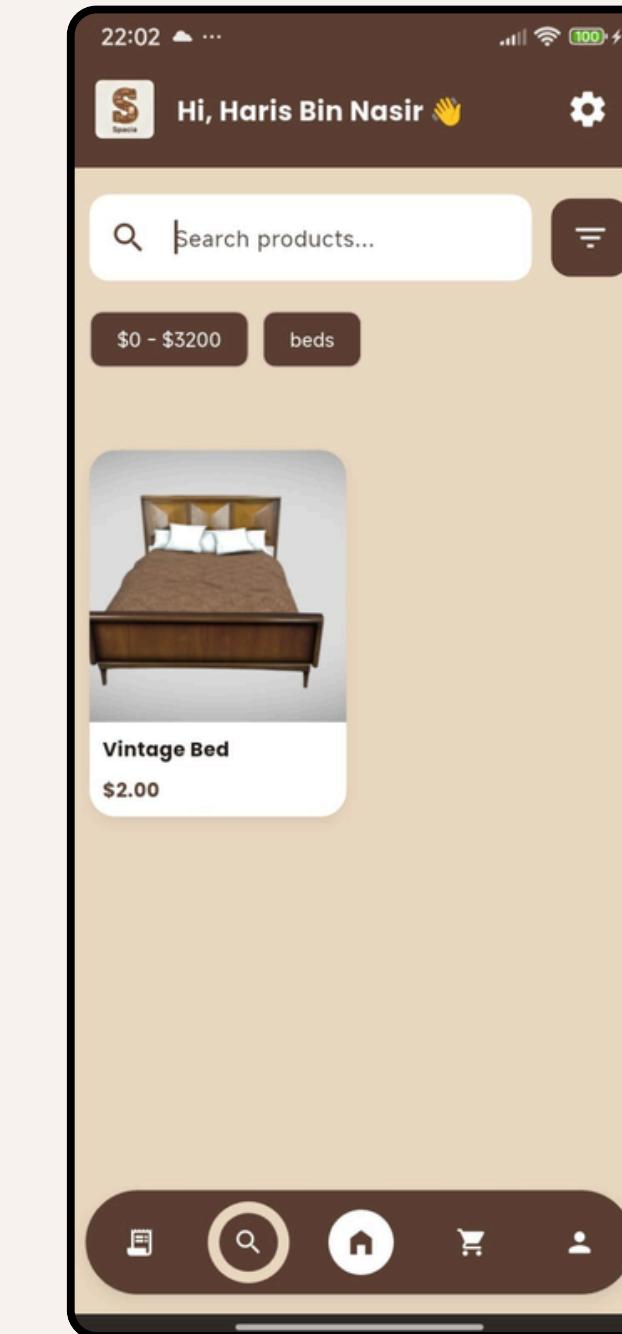
SEARCH SCREEN



SEARCH RESULTS



FILTER

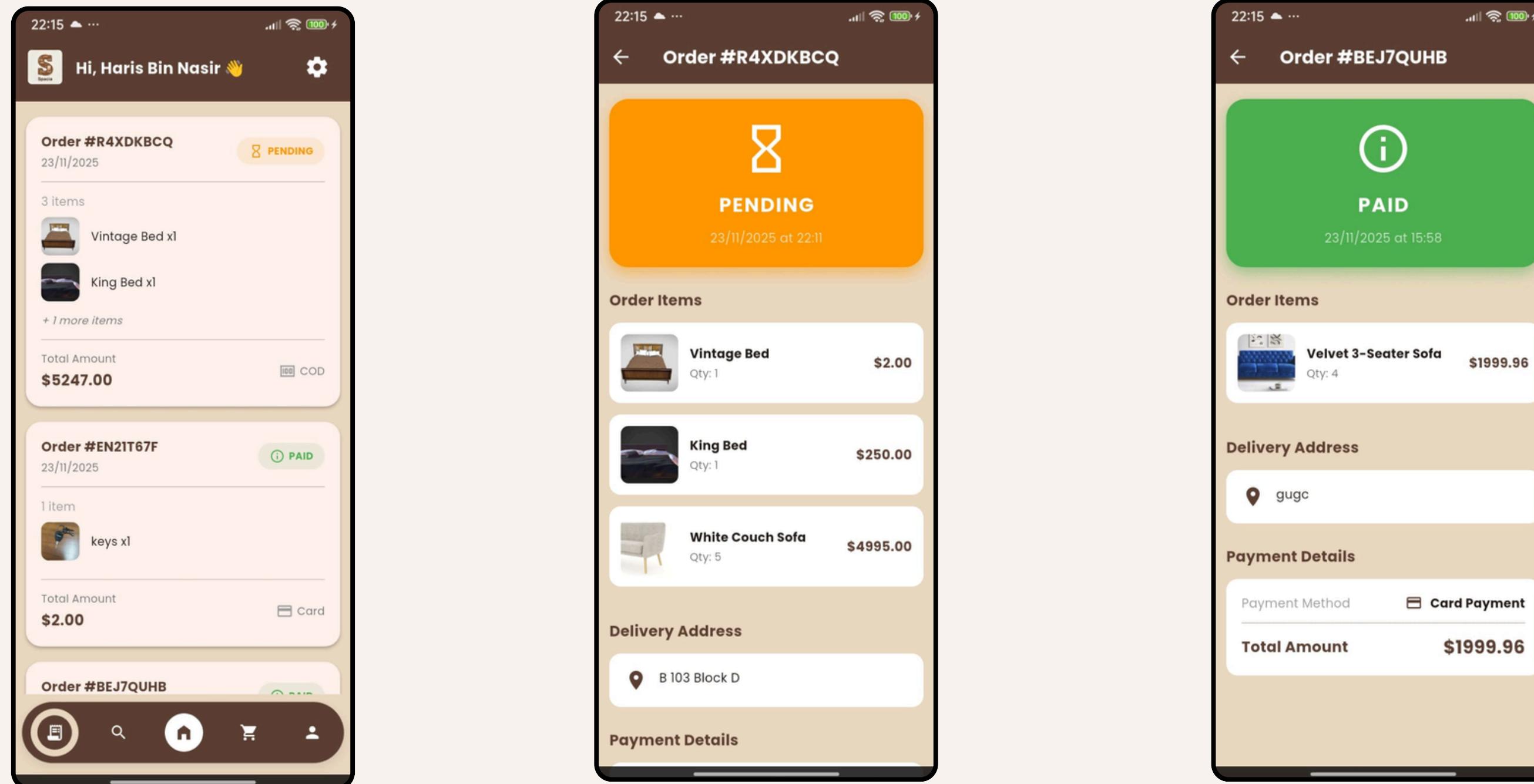


FILTER RESULTS

SEARCH SCREEN FLOW

The Search Screen allows users to easily explore all available products directly from the navigation bar. When the user taps the search icon, they are brought to a page displaying a full list of items, each showing its name, price, and thumbnail. At the top, the search bar enables users to quickly find products by typing in keywords; as they type, the search results update instantly, showing only the items that match their query. Additionally, users can refine their search further by opening the filter panel, where they can adjust the price range, choose specific categories, or filter by business. Once filters are applied, the results reflect only the products that meet the selected criteria. Both search results and filtered results are displayed on the same screen, providing a seamless and intuitive product discovery experience.

ORDERS SCREEN



ORDERS SCREEN

PENDING ORDER

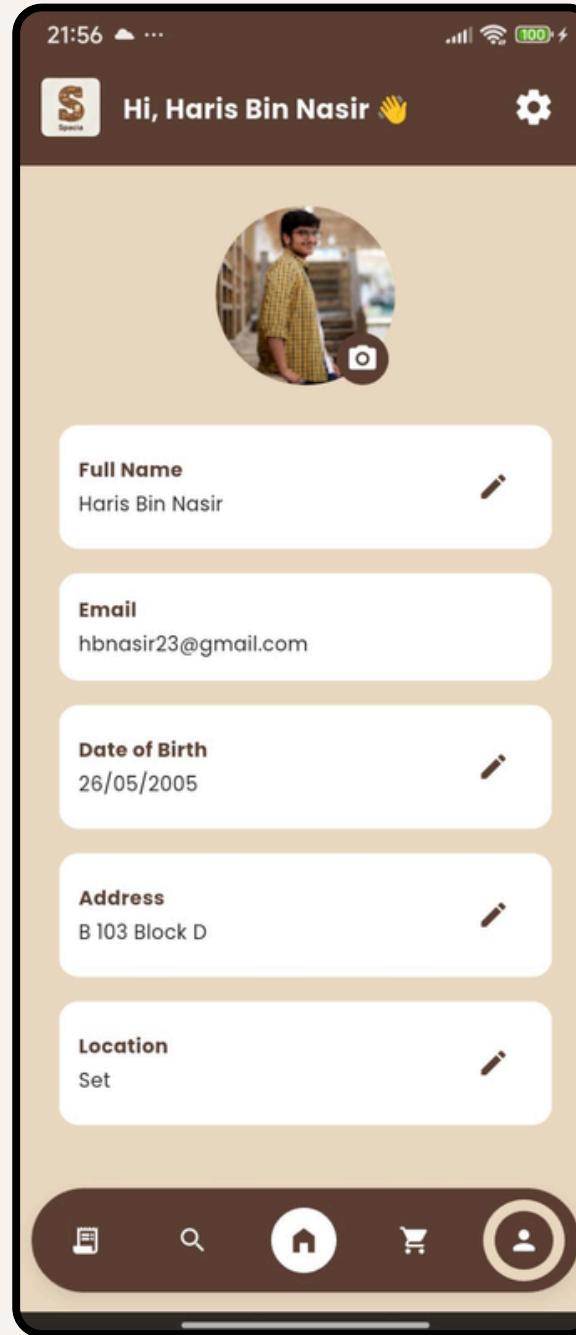
PAID ORDER

ORDERS SCREEN FLOW

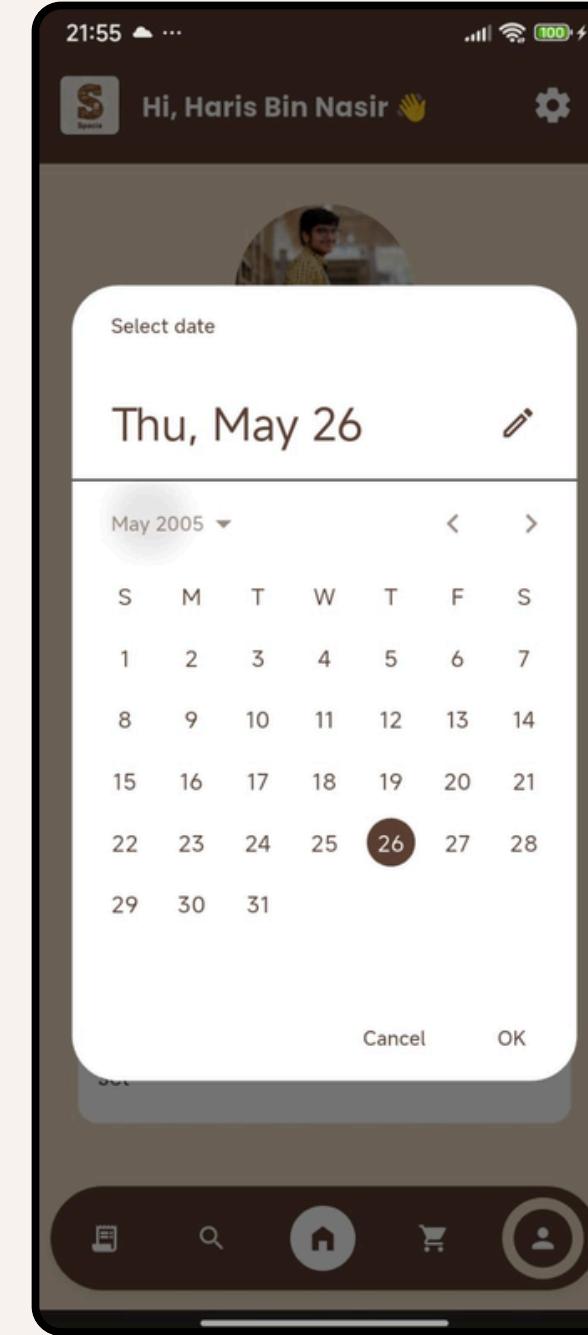
The Orders Screen provides users with a complete overview of all their past and ongoing purchases. Each order is displayed with essential details such as the order ID, date, item summary, total amount, and payment type. This screen serves as the central place where users can track their shopping history and monitor the status of their orders.

When a user taps on a specific order, they are taken to the detailed order view. Depending on the status of the order, the screen displays one of two layouts. If the order is still pending, the details page highlights the pending status prominently and shows all ordered items along with the delivery address and payment information. If the order is paid, the page reflects the completed status with a paid indicator, showing the finalized payment details and confirming that the transaction has been successfully processed. This dual-view system ensures users can easily understand the current state of any order at a glance.

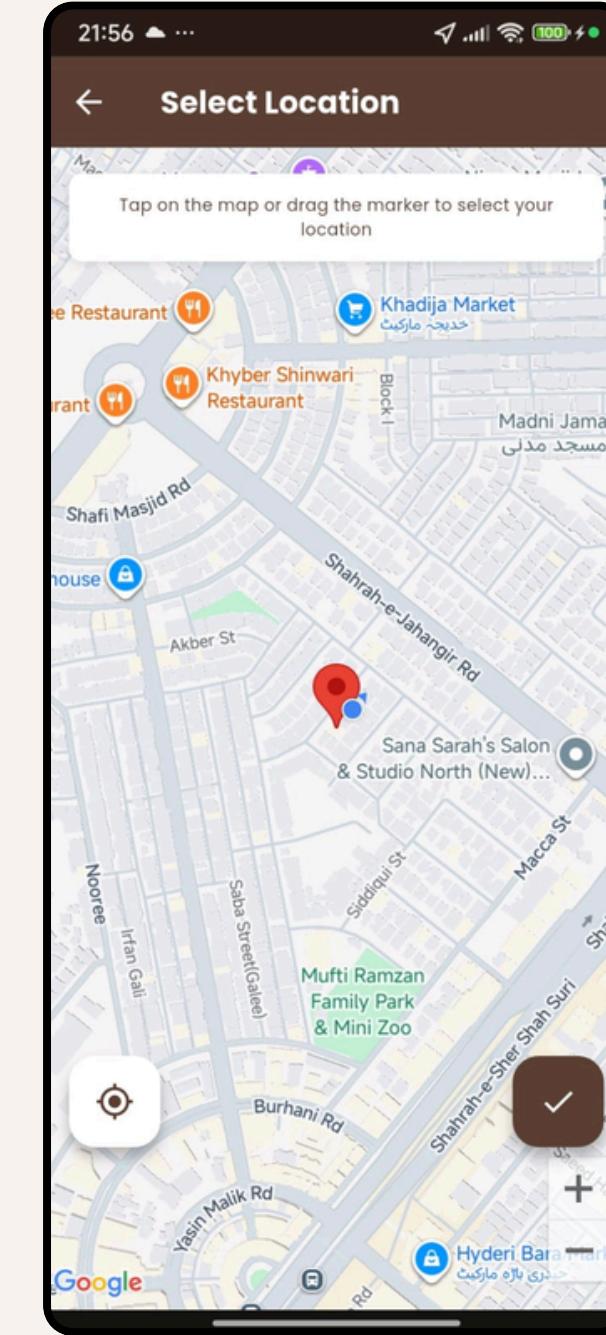
PROFILE SCREEN



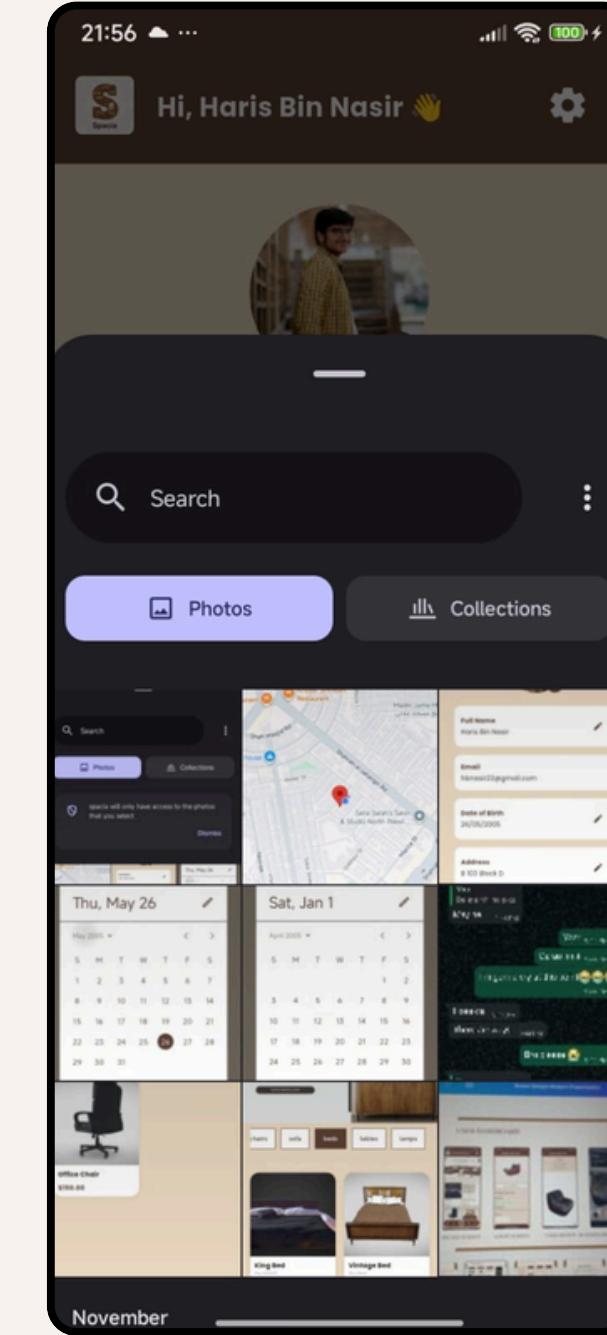
PROFILE SCREEN



DOB SELECT



LOCATION SELECT



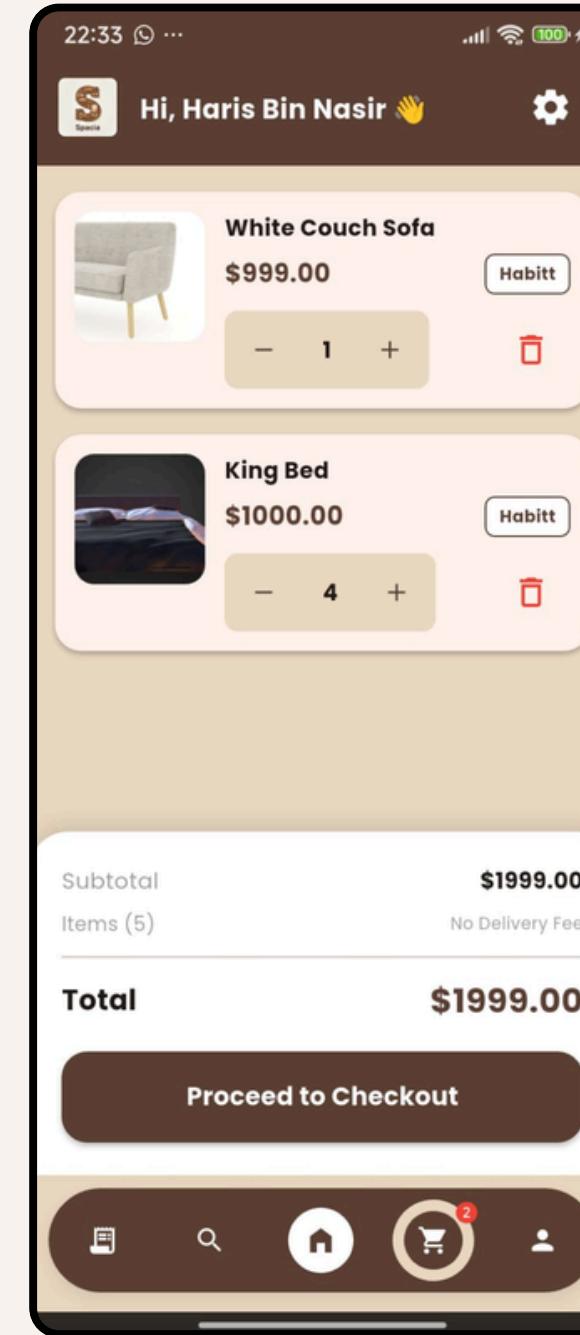
PICTURE SELECT

ORDERS SCREEN FLOW

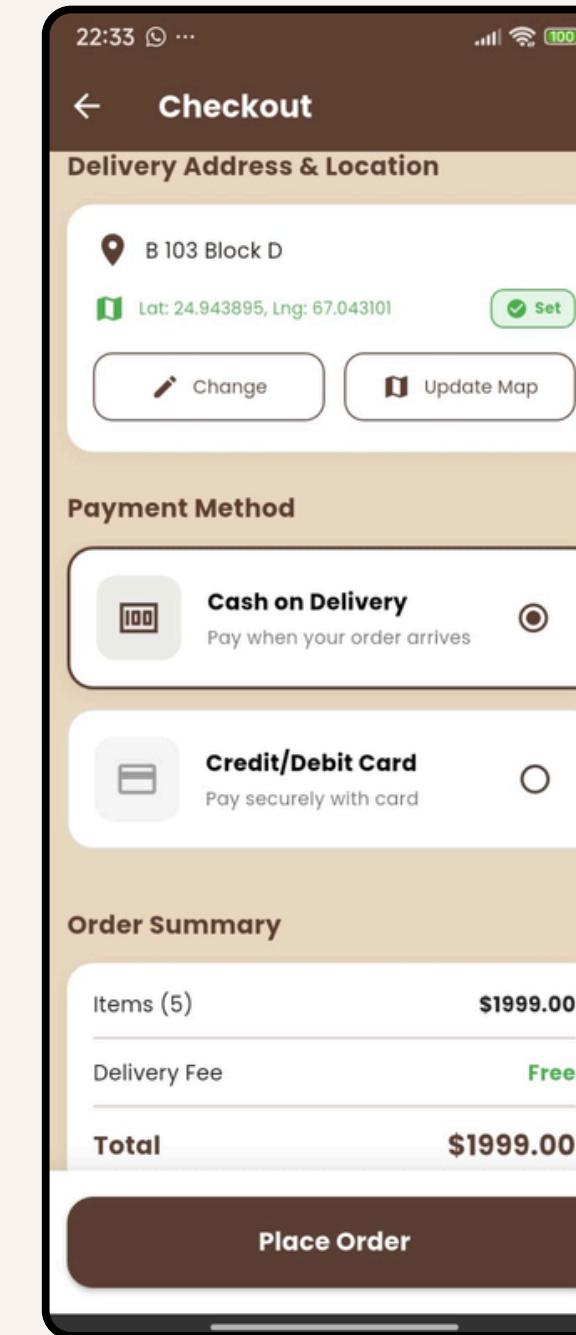
The Profile Screen allows users to view and update their personal information, including their full name, email, date of birth, address, and profile picture. Each field can be edited individually, making it easy for users to keep their details up to date.

When editing specific fields, dedicated selection interfaces open for a smoother experience. Choosing the date of birth brings up a calendar for quick date selection, selecting the address opens a Google Maps view where users can pinpoint their location, and updating the profile picture launches an image picker to choose a photo from the device gallery.

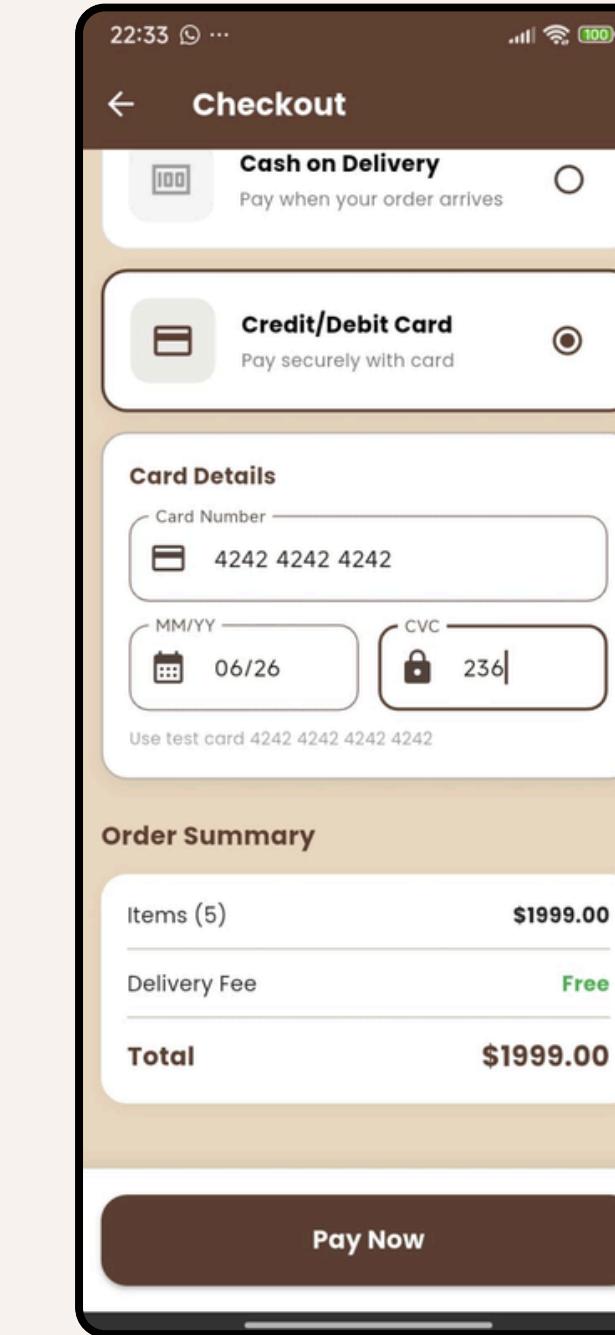
CART & CHECKOUT SCREEN



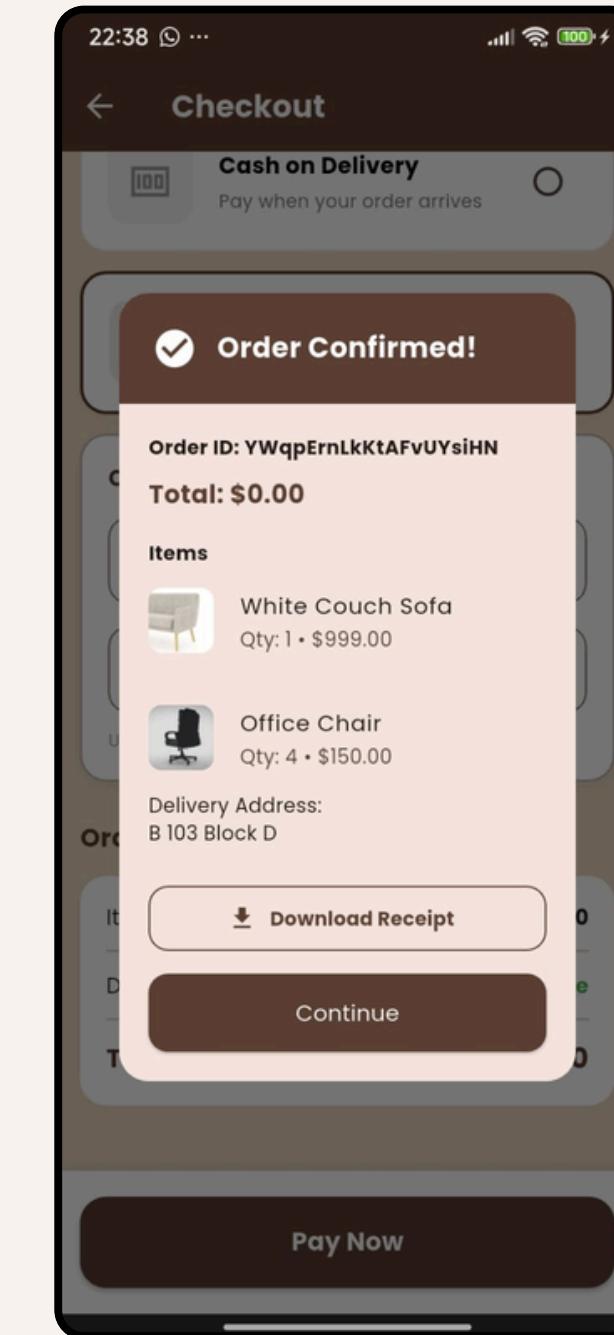
CART SCREEN



CHECKOUT



CARD INPUT



ORDER CONFIRM

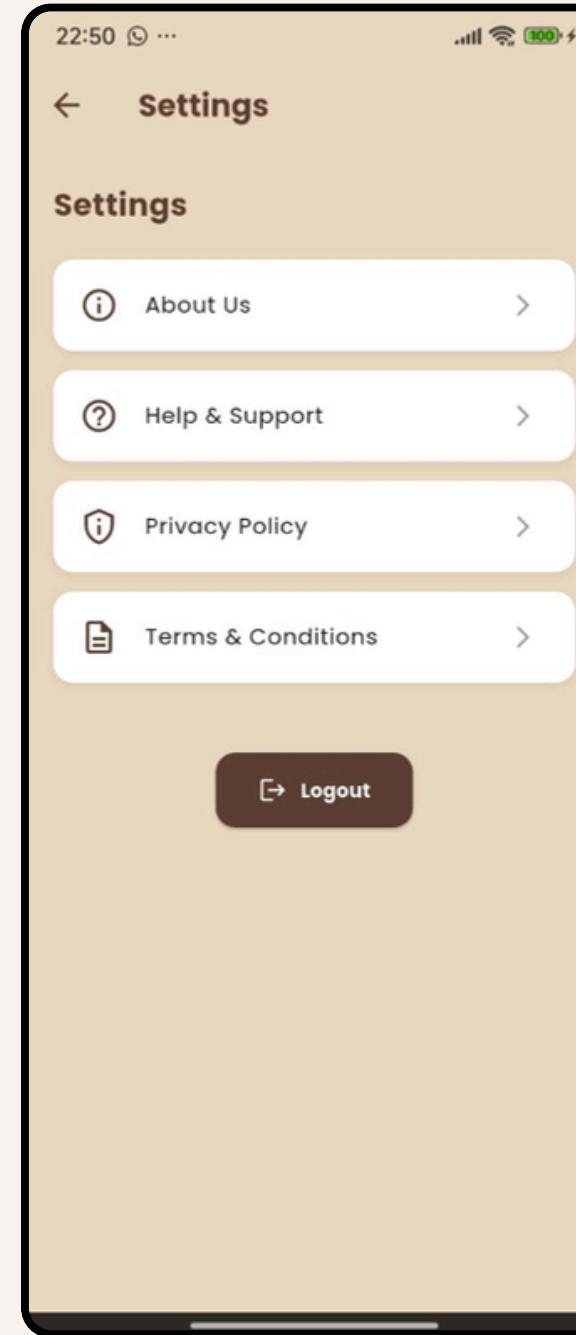
CART & CHECKOUT SCREEN FLOW

The Cart Screen displays all the items the user has added for purchase, along with their quantities, prices, and the calculated total. From here, the user can adjust item quantities or remove products before proceeding to checkout.

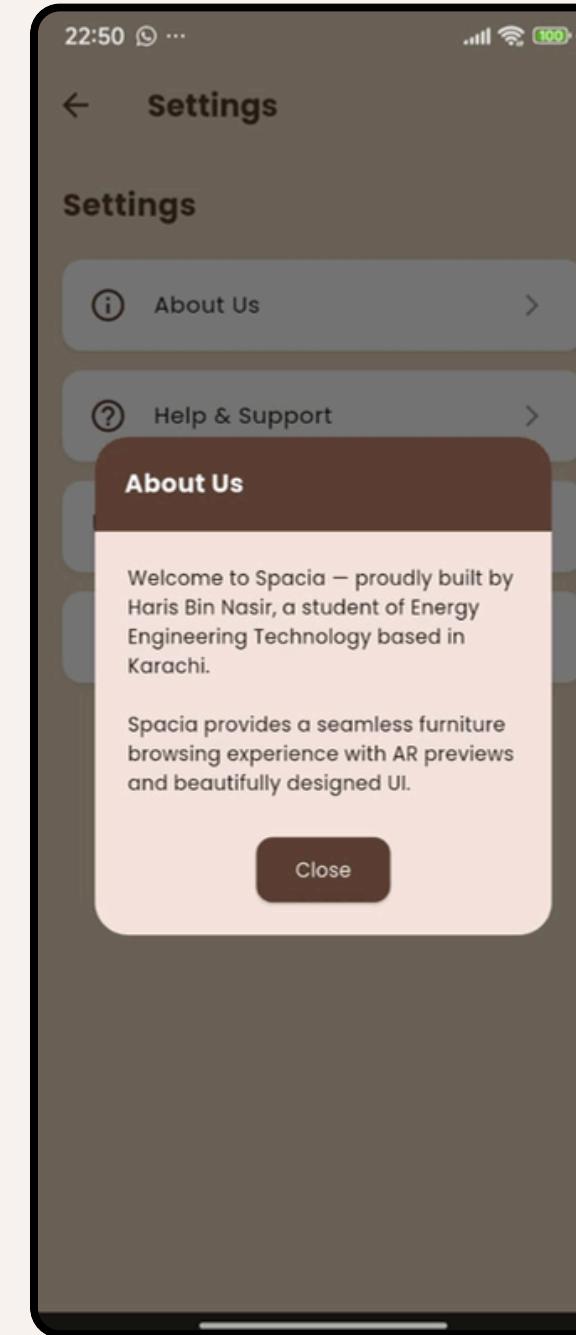
On the Checkout Screen, the user selects their delivery address, which can be set or updated through the integrated map interface. They can also choose their preferred payment method, either Cash on Delivery or Credit/Debit Card.

If the user selects the card payment option, they are taken to a card input section where they enter their card number, expiry date, and CVC. This payment process is powered by Stripe for secure transactions. Once the payment is processed, the final screen confirms the order, showing a summary of purchased items and providing an option to download the receipt for future reference.

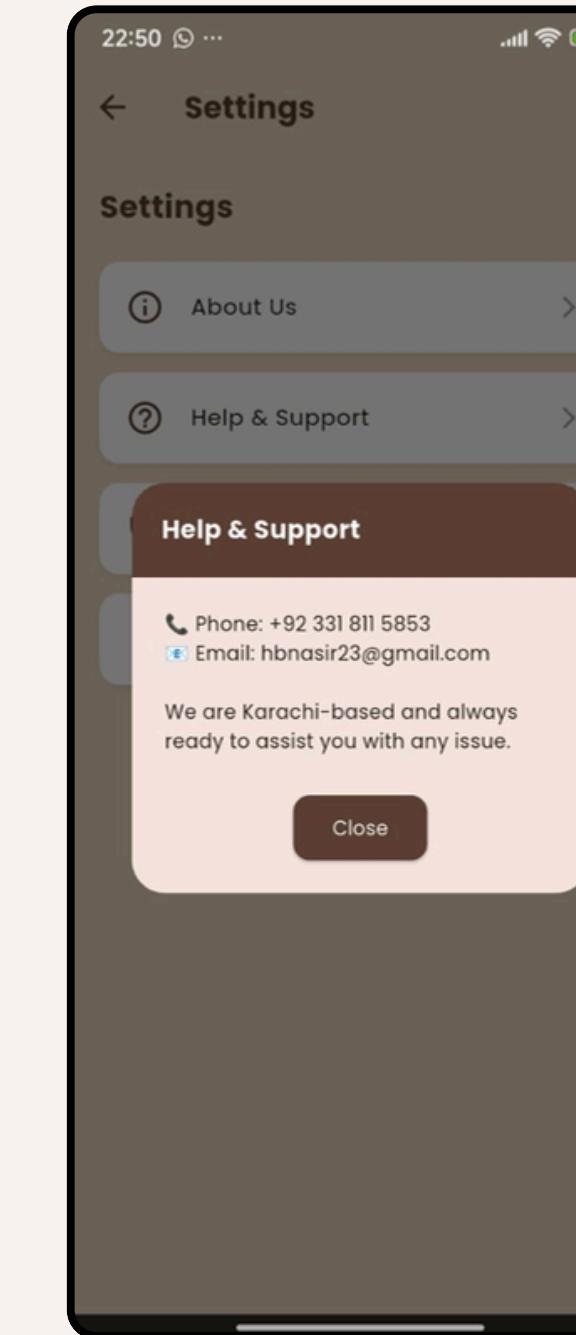
SETTINGS SCREEN



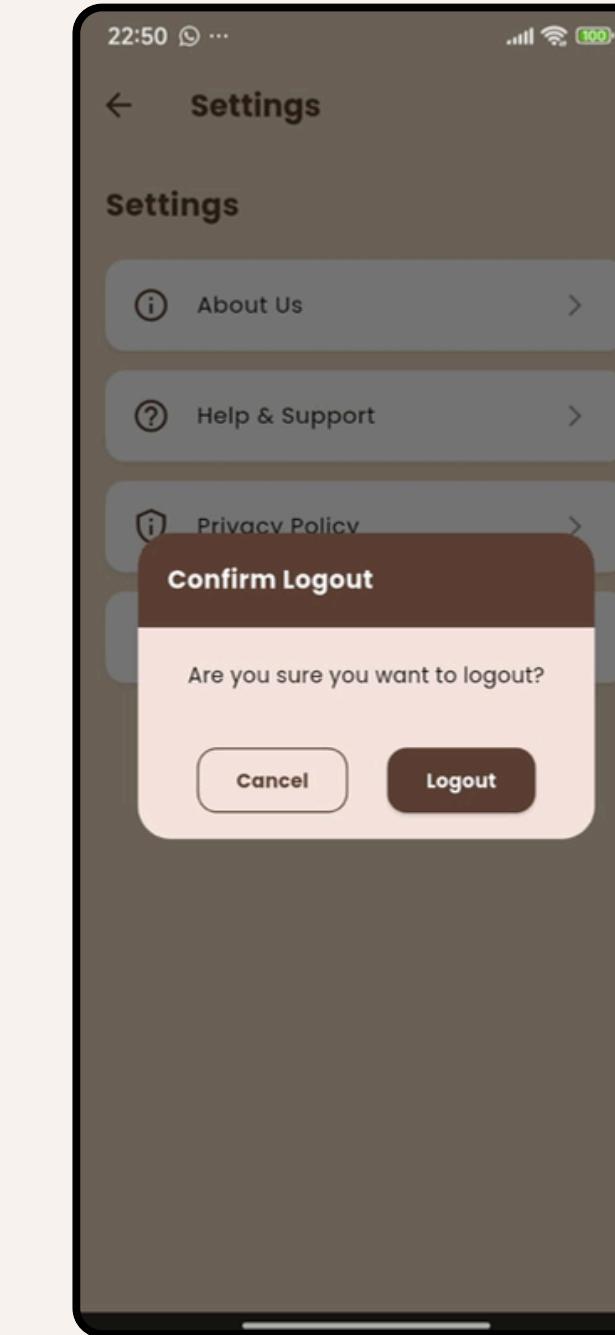
SETTINGS SCREEN



ABOUT US



HELP & SUPPORT



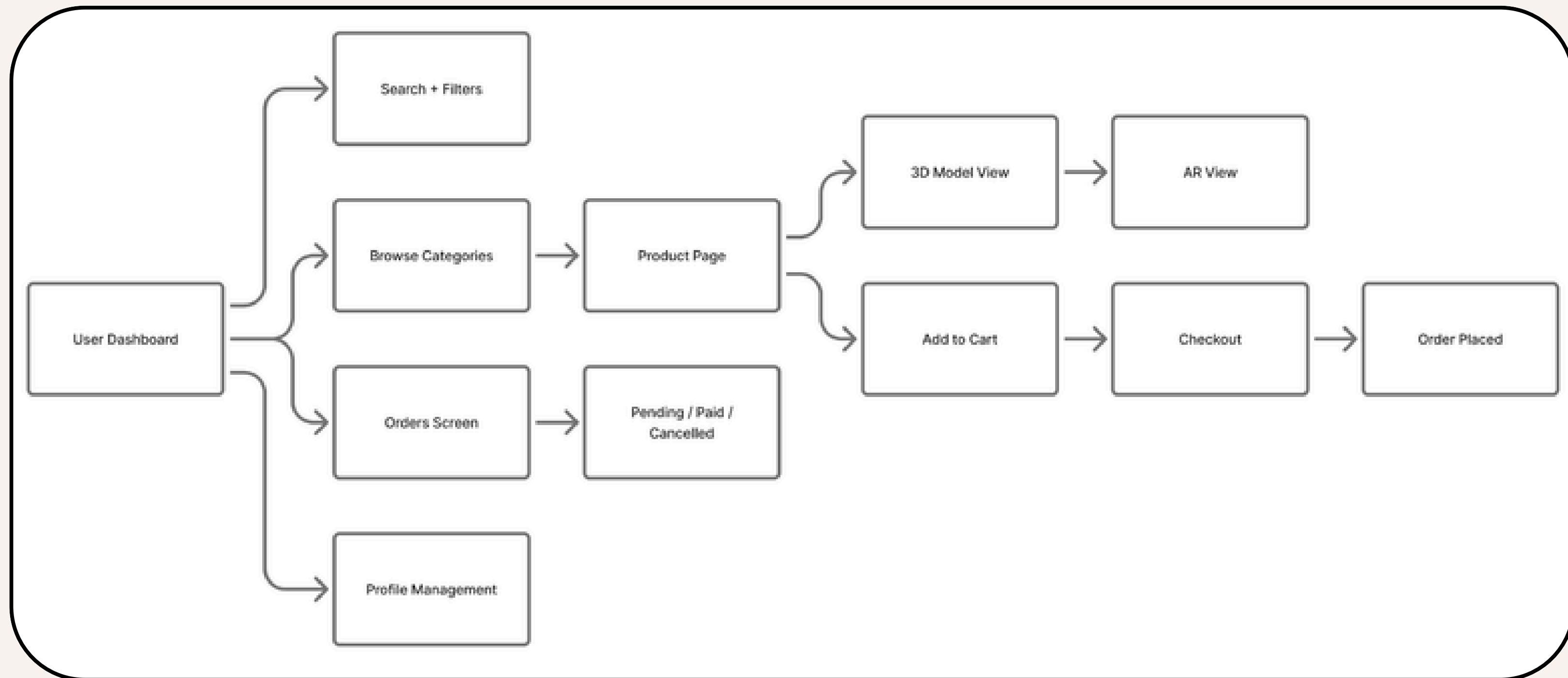
LOGOUT

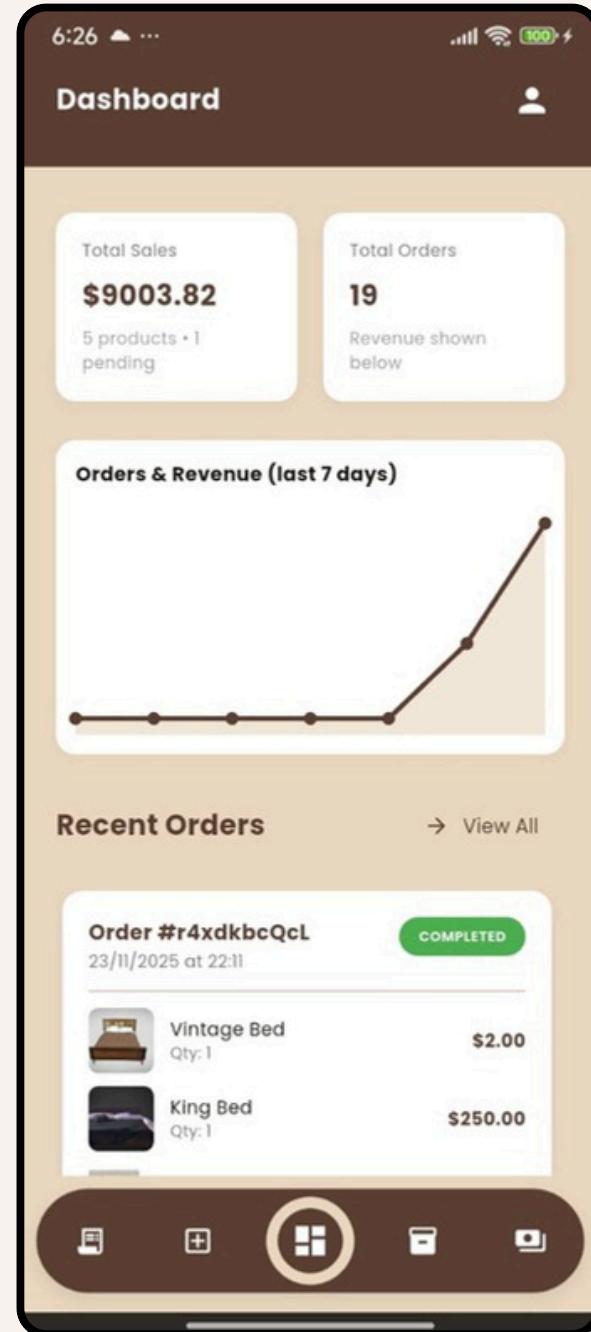
SETTINGS SCREEN FLOW

From the home screen, when the user taps the settings icon in the top-right corner, they are taken to the Settings Screen. This page provides quick access to essential informational and support options, including About Us, Help & Support, Privacy Policy, and Terms & Conditions, along with a Logout button at the bottom.

Each option opens a small popup window for easy viewing. The About Us popup briefly explains the purpose of the app and credits the developer. The Help & Support popup provides contact details such as phone and email for customer assistance. Similarly, Privacy Policy and Terms & Conditions display their respective information in the same popup style. When the user selects Logout, a confirmation popup appears, asking if they are sure they want to log out, preventing accidental sign-outs.

FLOW DIAGRAM

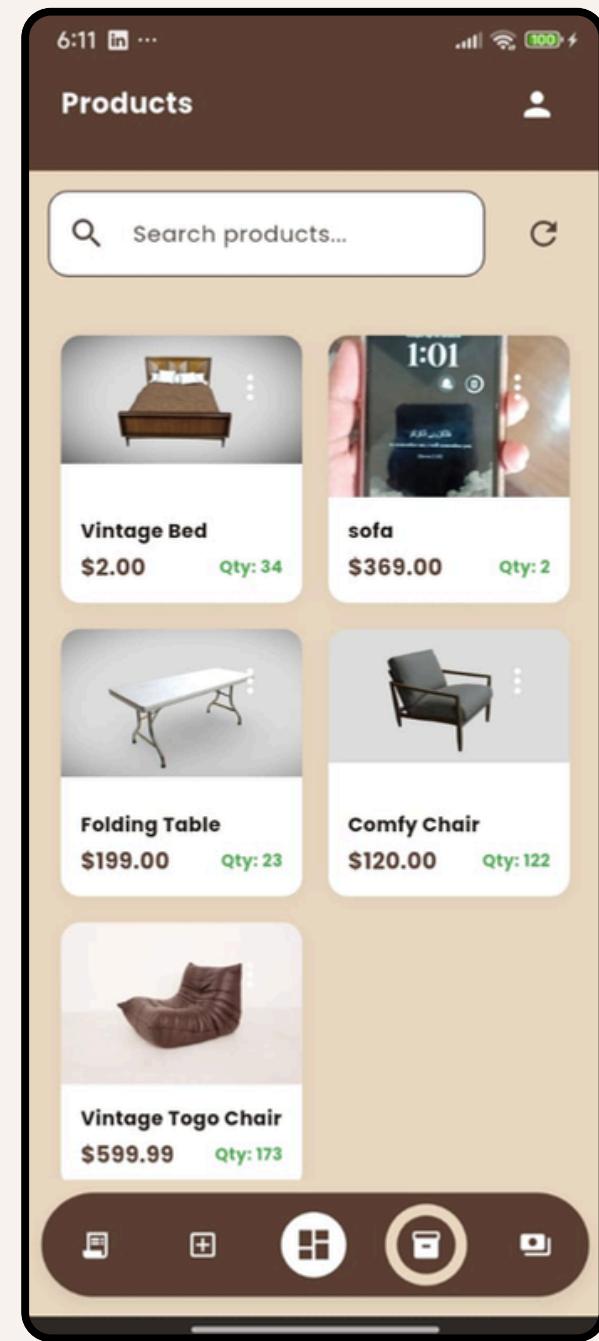




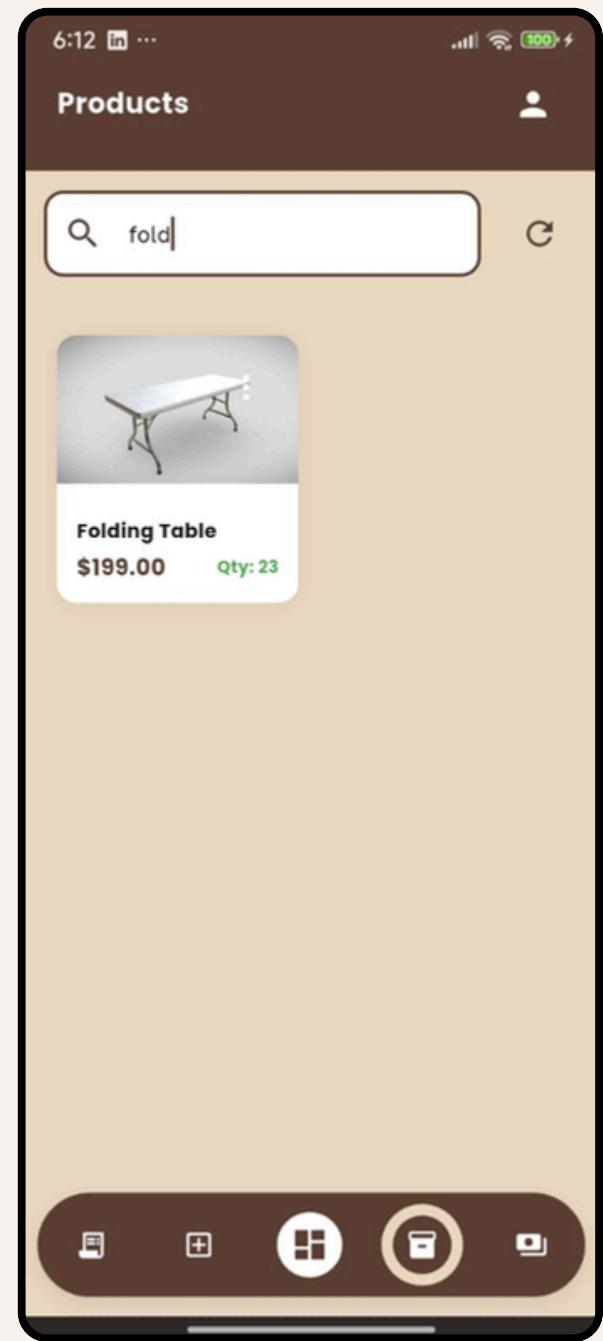
BUSINESS DASHBOARD

- The Business Dashboard serves as the main home screen where businesses can view key performance insights such as total sales, total orders, and weekly revenue trends through a clear revenue chart.
- It also displays recent orders and provides quick navigation to orders, products, profile, and other essential business management features.

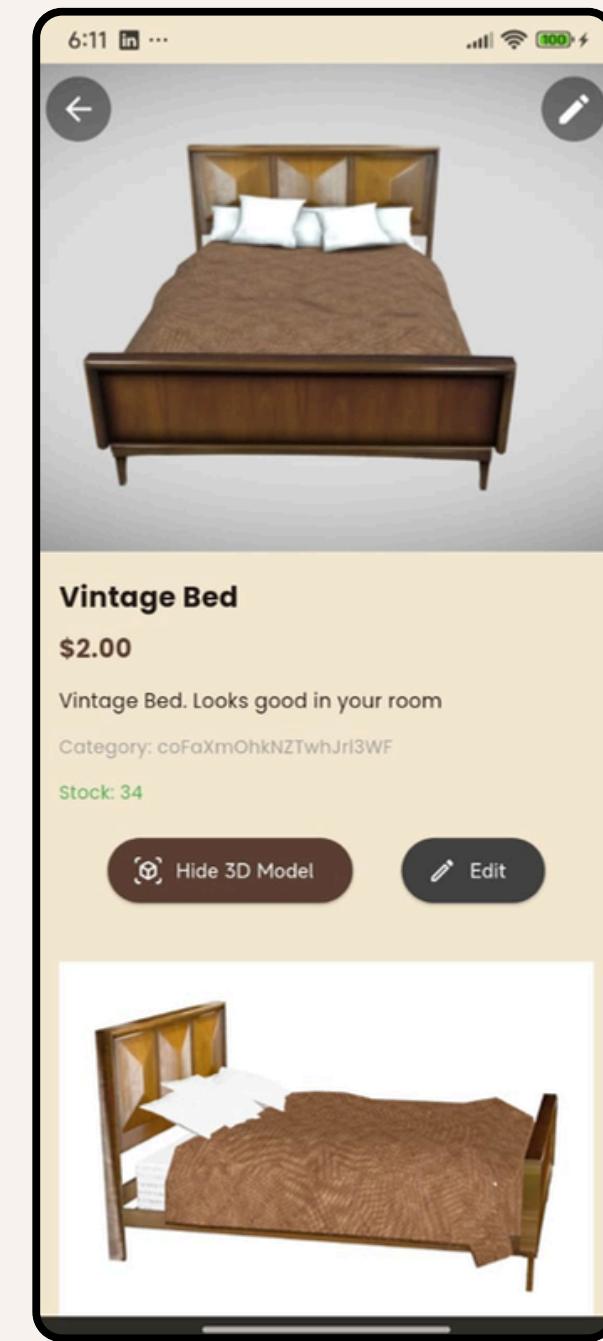
PRODUCTS SCREEN



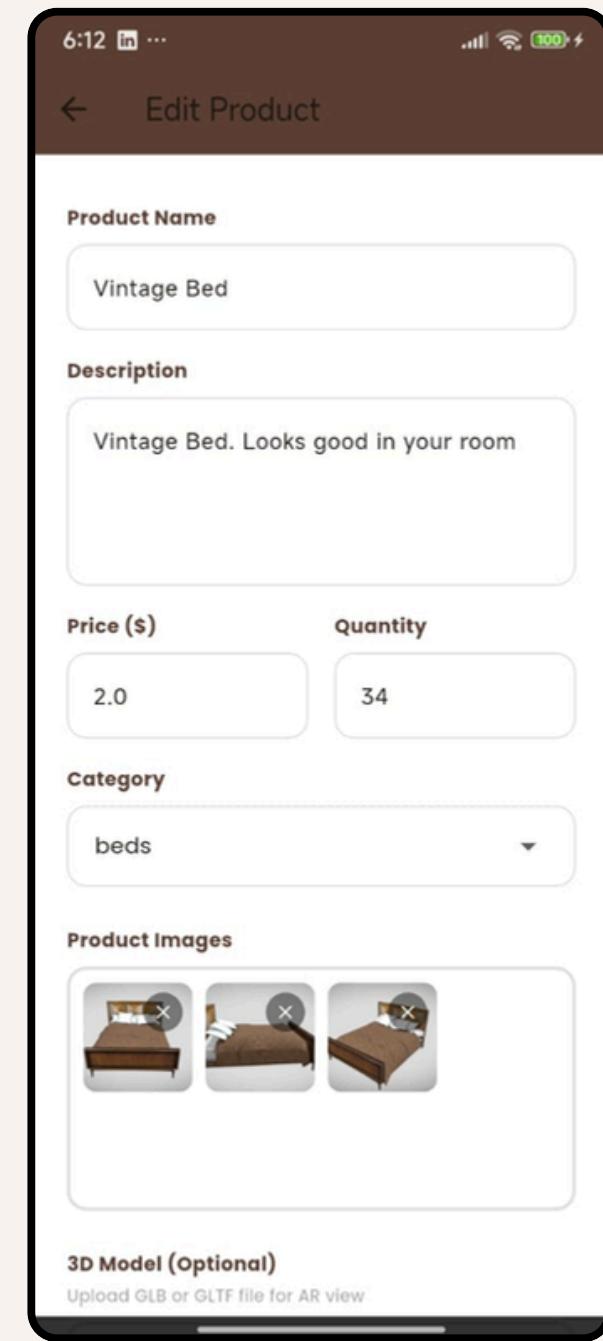
PRODUCTS SCREEN



SEARCH



PRODUCT PAGE

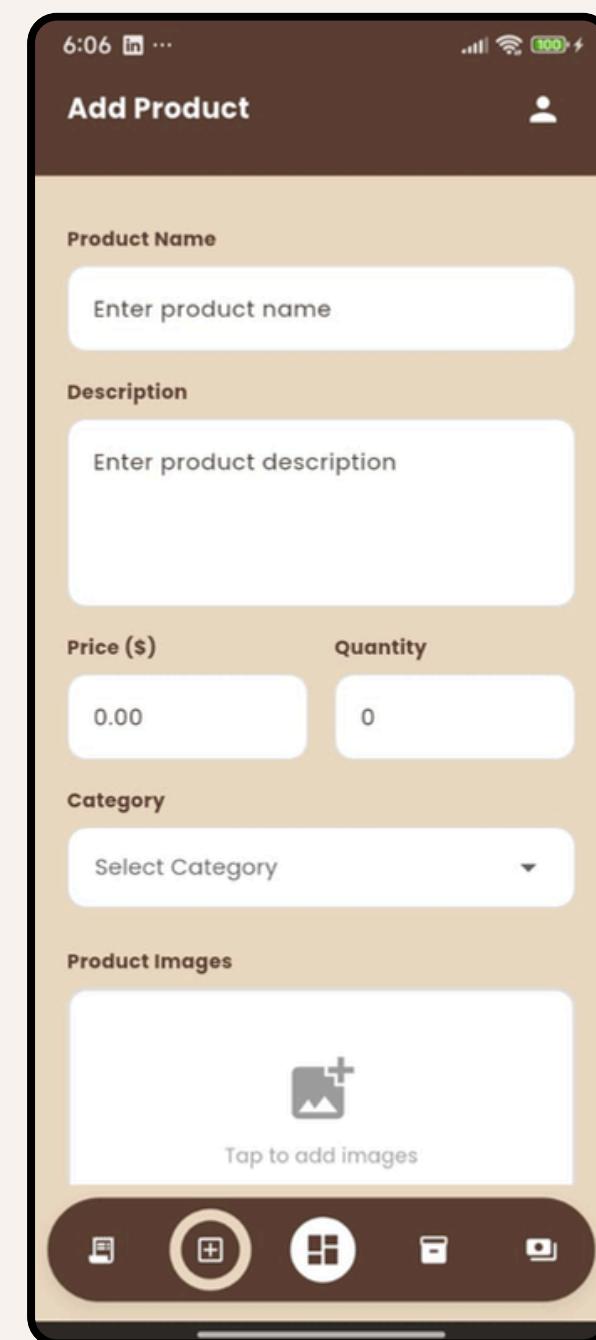


EDIT PRODUCT

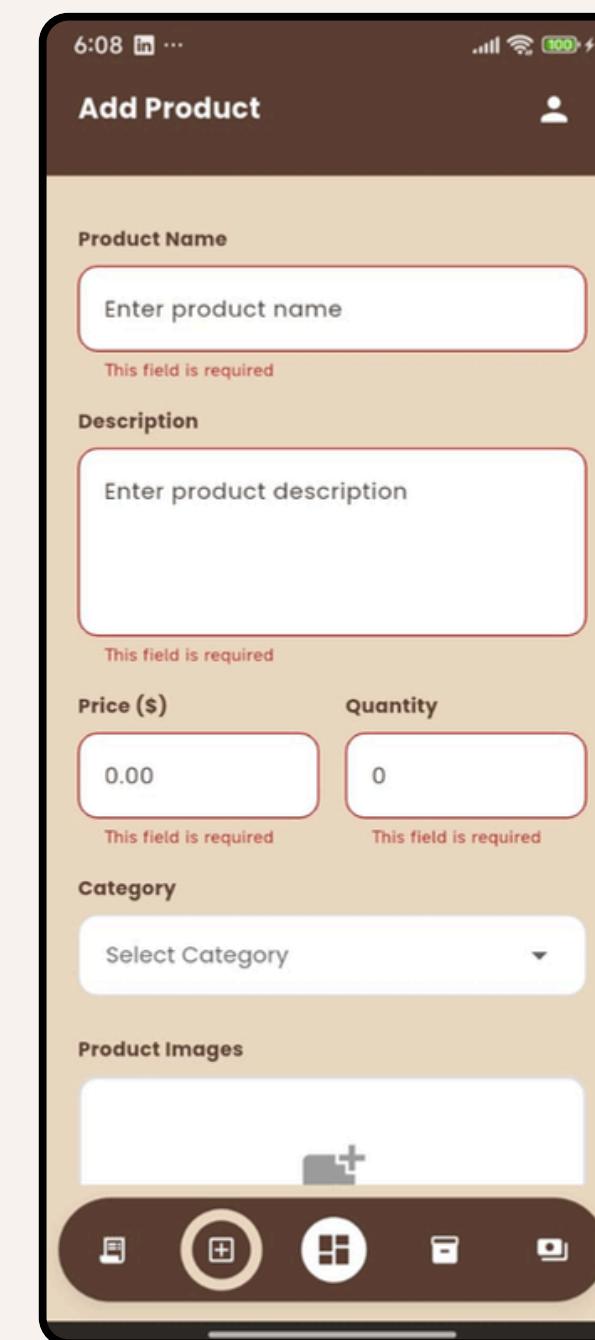
PRODUCTS SCREEN FLOW

- The Products Screen displays all items added by the business, along with price and available stock.
- A search bar allows the business to quickly find specific products by name.
- Selecting a product opens the Product Page, showing detailed information, images, and options to view or hide its 3D model.
- From here, the business can tap Edit to modify the product's details, such as name, description, price, quantity, images, and 3D model.

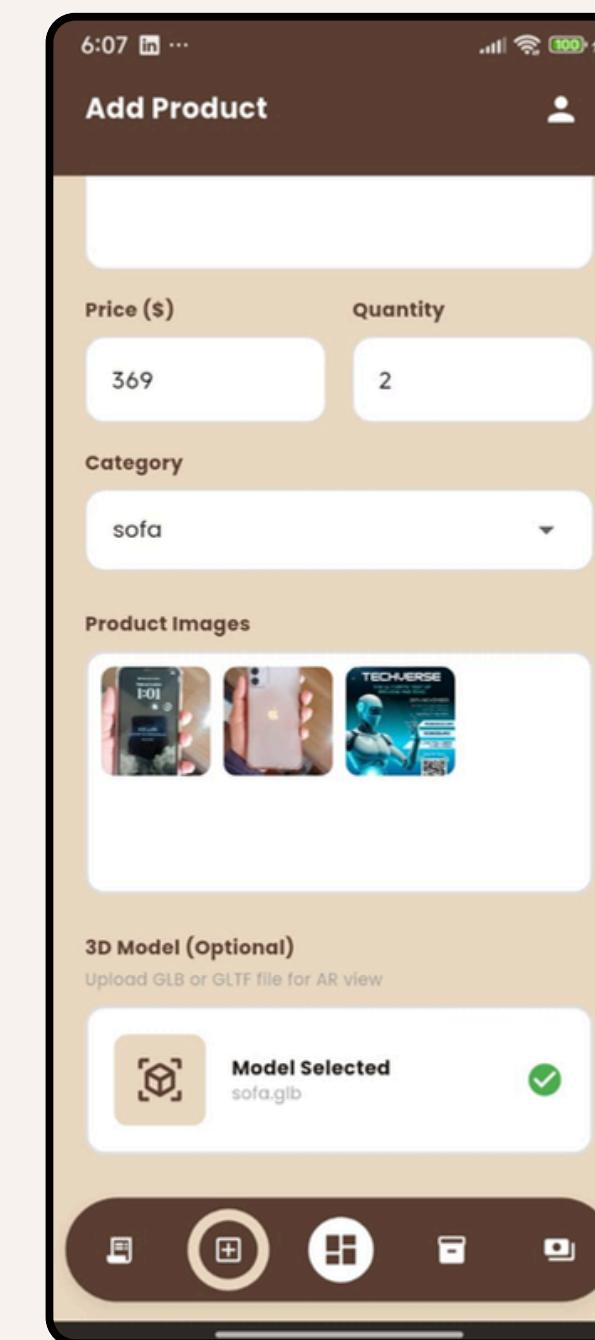
ADD PRODUCT SCREEN



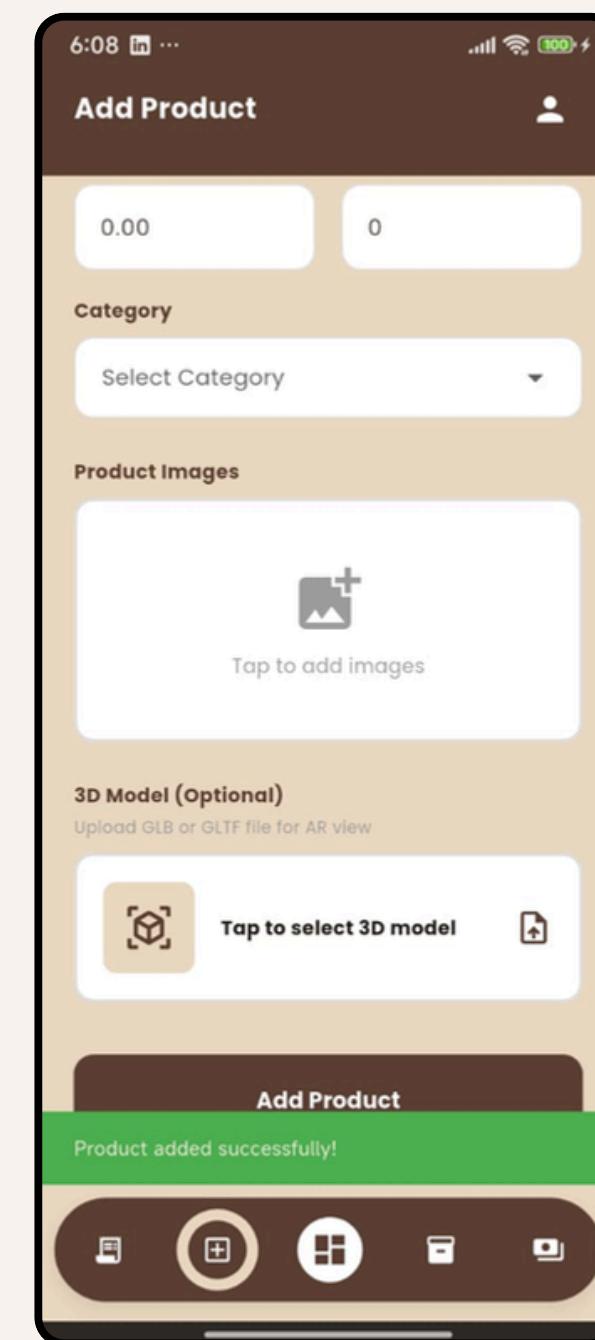
ADD PRODUCT



ERROR



3D MODEL & PIC SELECTION

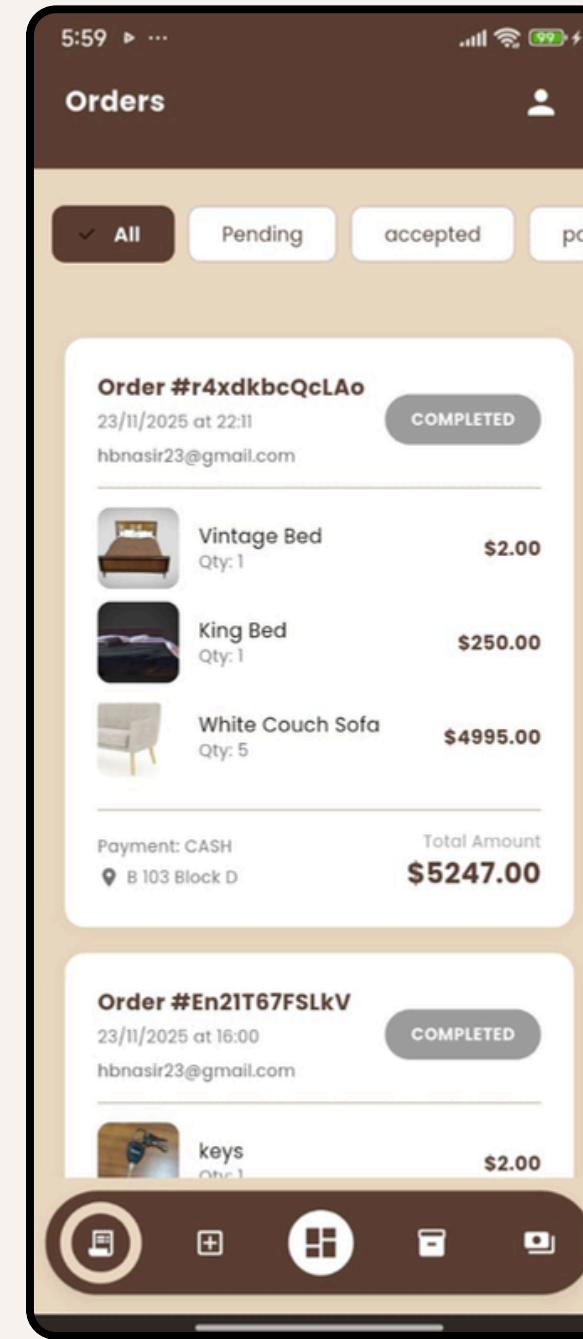


ADDED

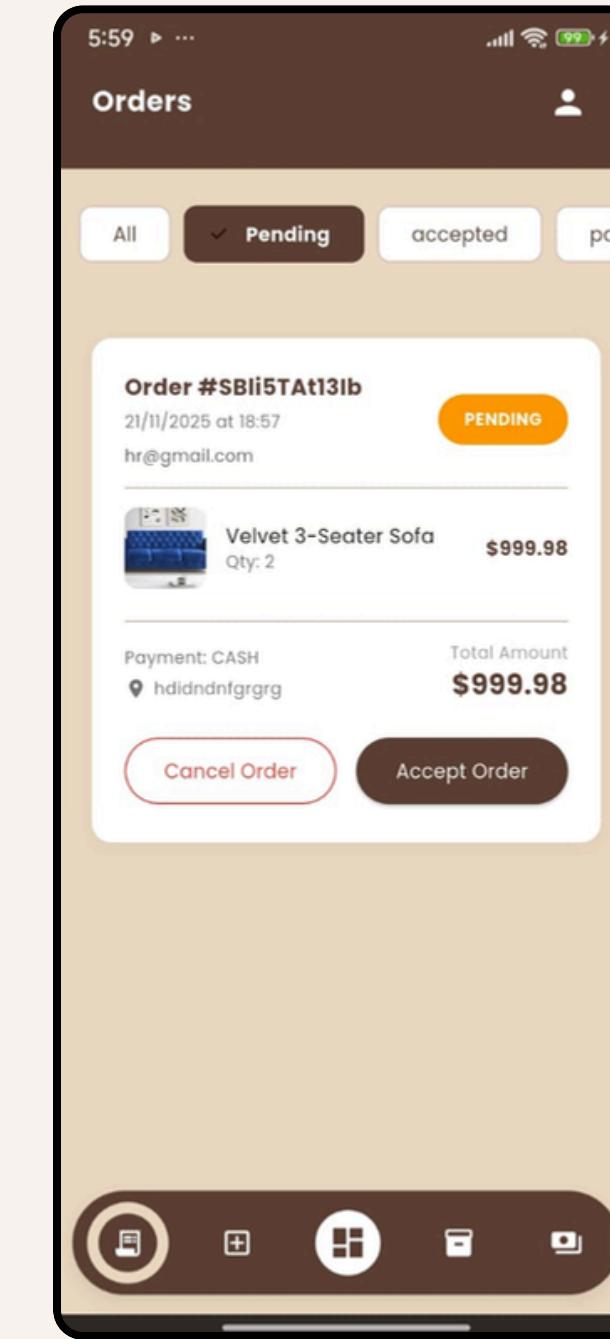
ADD PRODUCT SCREEN FLOW

- Businesses can add new products by entering basic details such as name, description, price, quantity, and category.
- If any required fields are left empty, the screen highlights them with an error message.
- Images can be uploaded for the product, and an optional 3D model can also be added for AR preview.
- Once all details are filled, the business taps Add Product, and the product is successfully added to the store.

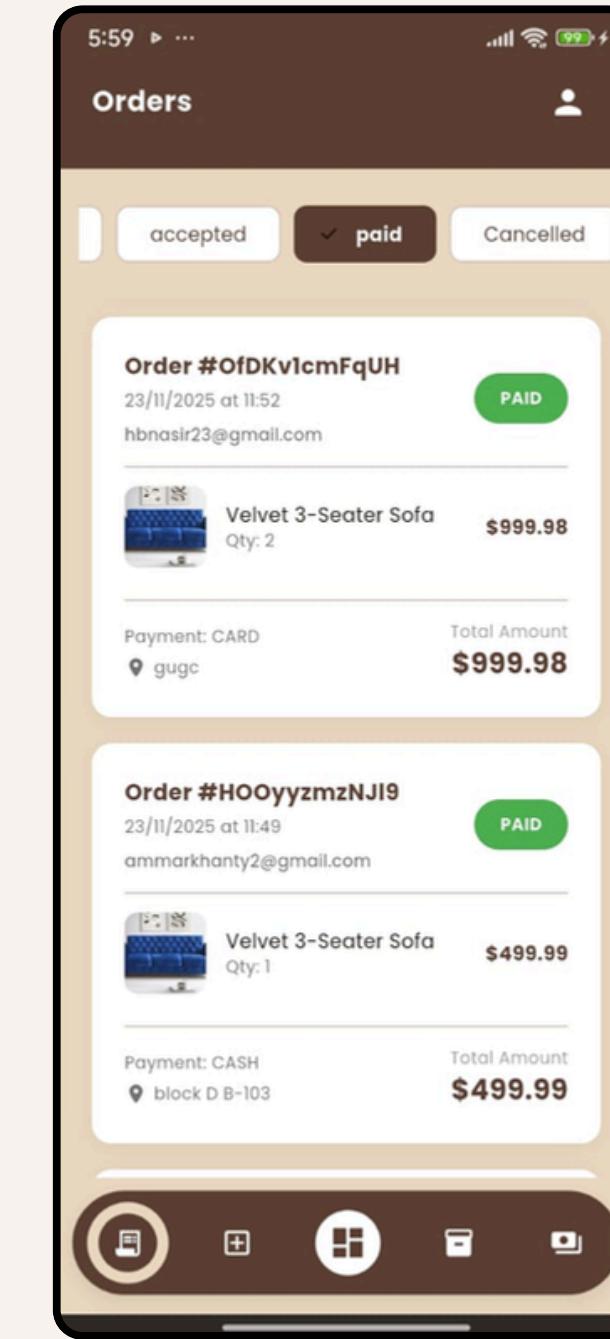
ORDERS SCREEN



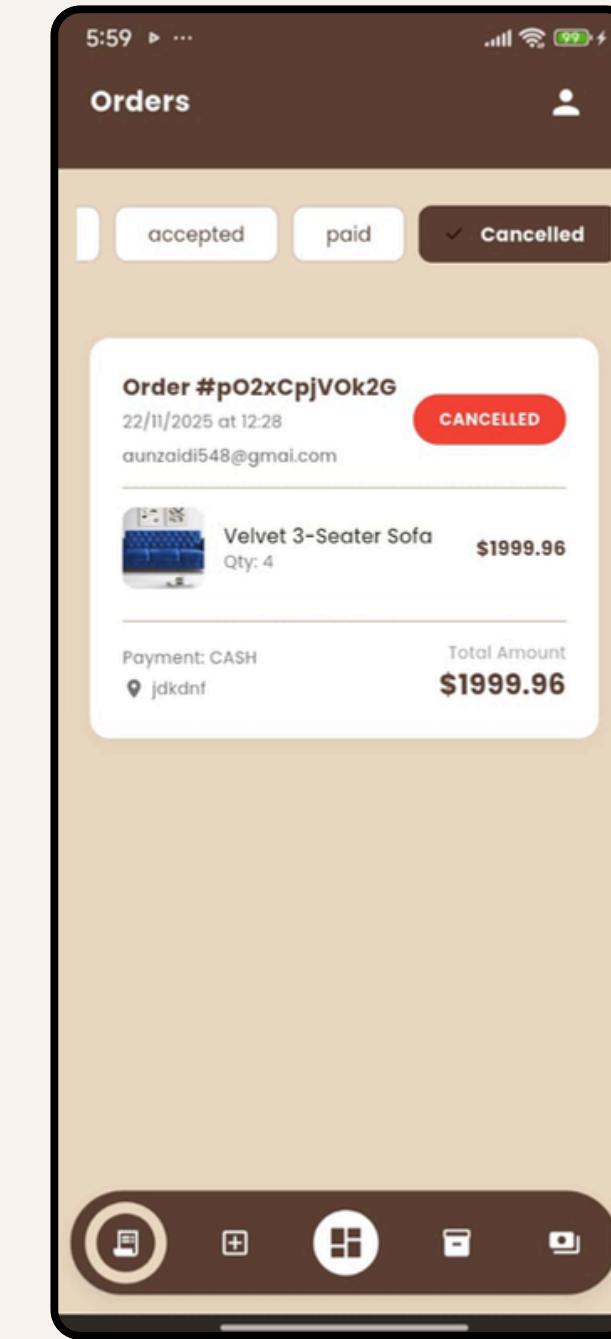
ORDERS SCREEN



PENDING ORDERS



PAID ORDERS

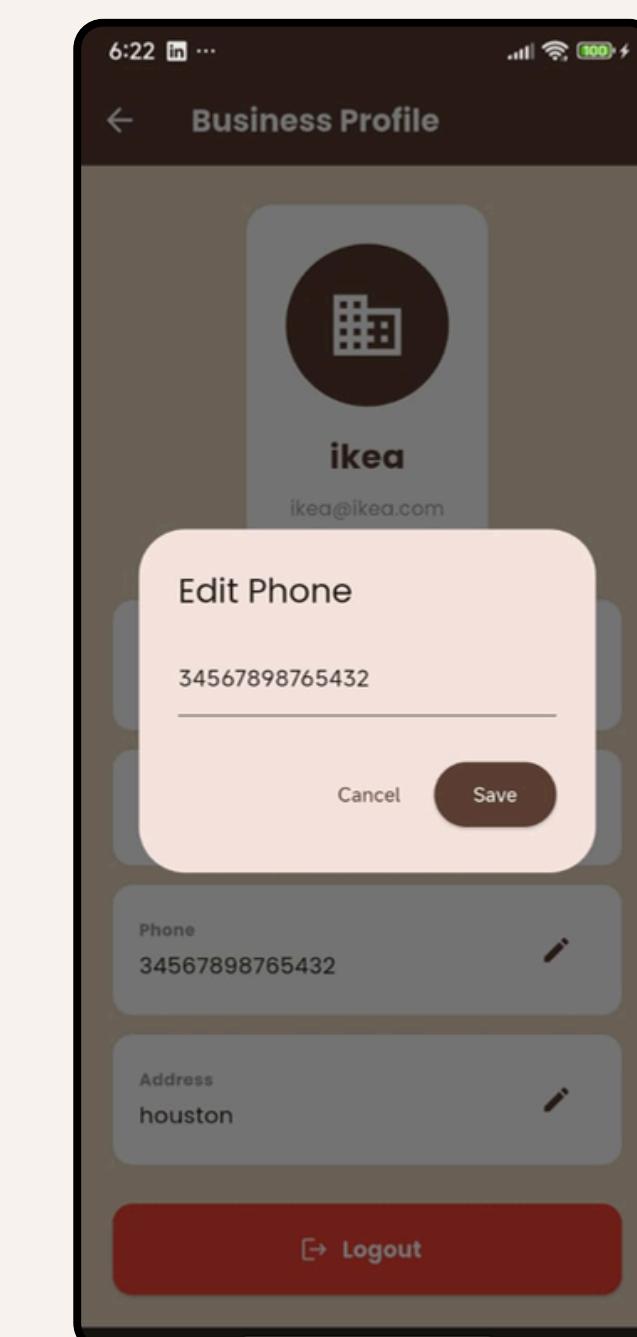
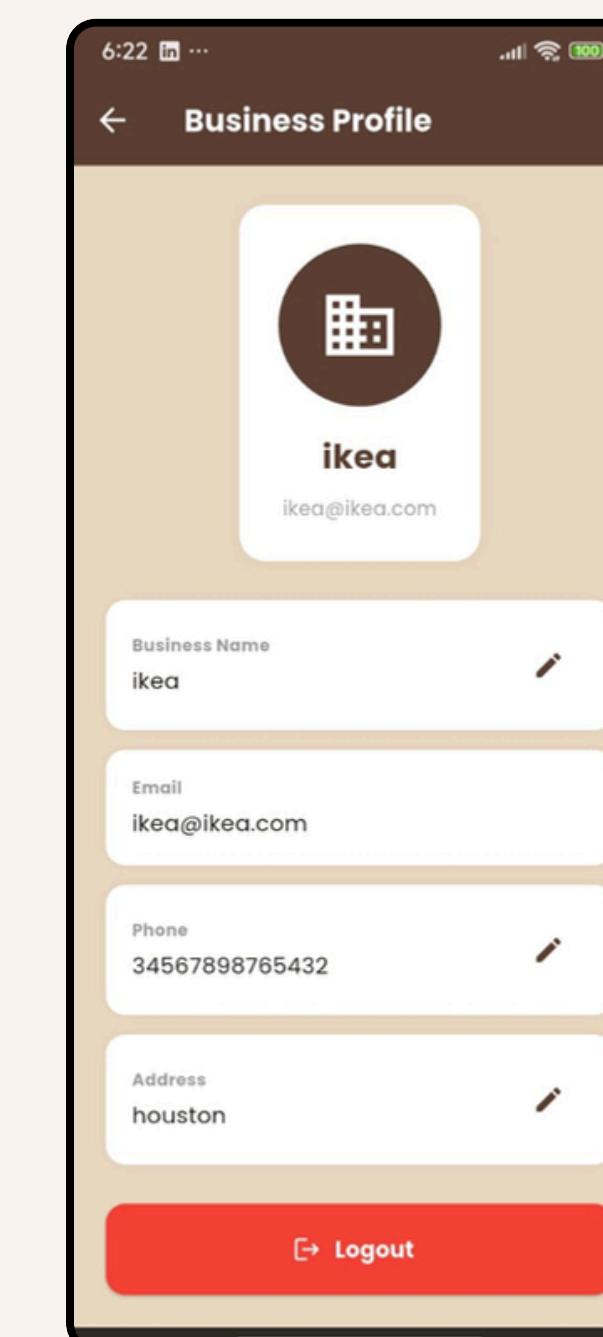
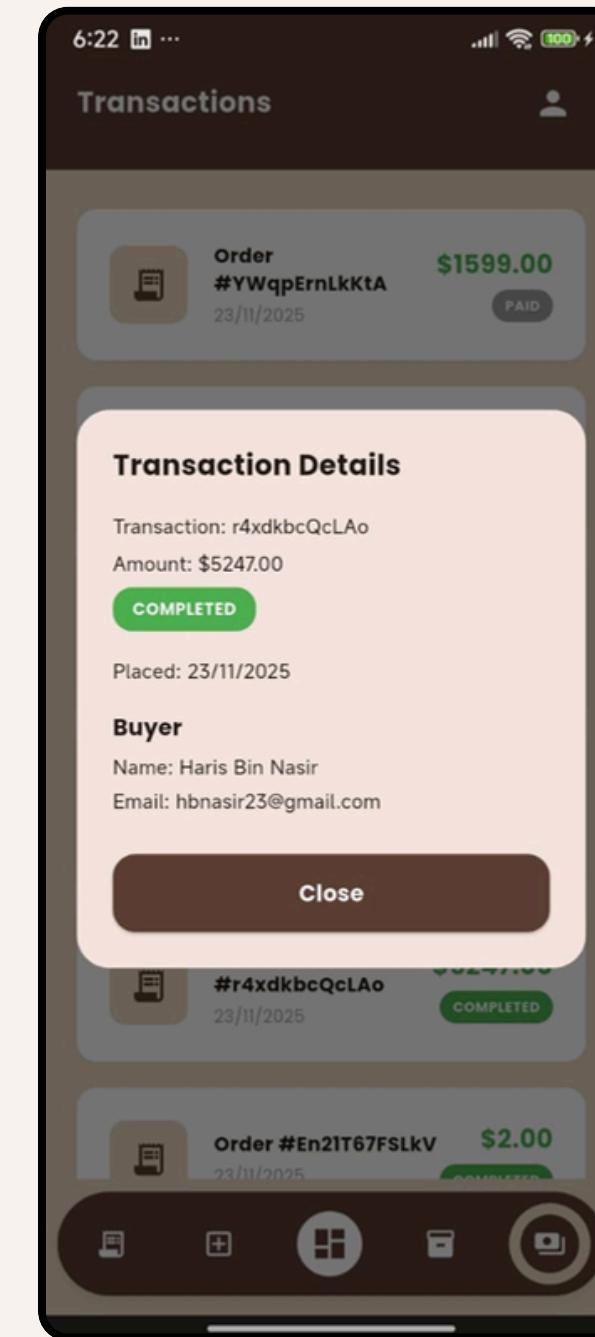
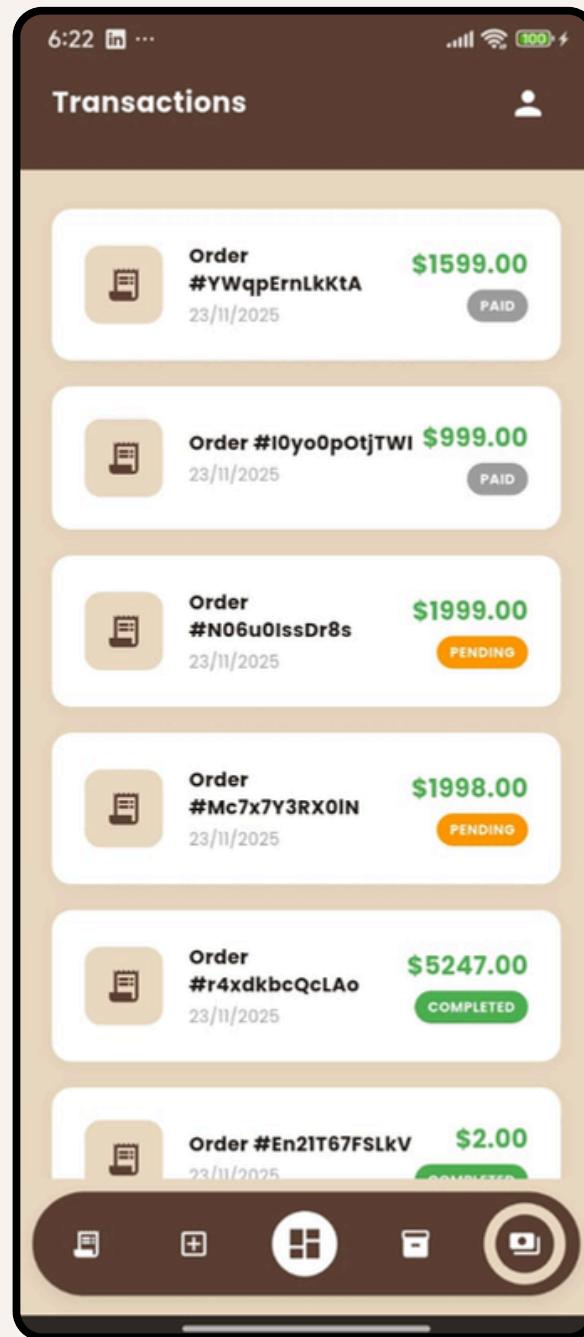


CANCELLED

ORDERS SCREEN FLOW

- The main Orders Screen displays all orders received by the business with their current status.
- Pending orders can be opened, where the business can accept or cancel the order.
- Accepted orders move to the Accepted tab, where the business can later mark them as paid.
- Once marked as paid, the order appears in the Paid section.
- If a pending order is rejected, it is sent to the Cancelled tab for record-keeping.

TRANSACTIONS & PROFILE SCREEN



TRANSACTIONS SPECIFIC TRANSACTION PROFILE SCREEN

EDIT DETAILS

TRANSACTIONS & PROFILE SCREEN FLOW

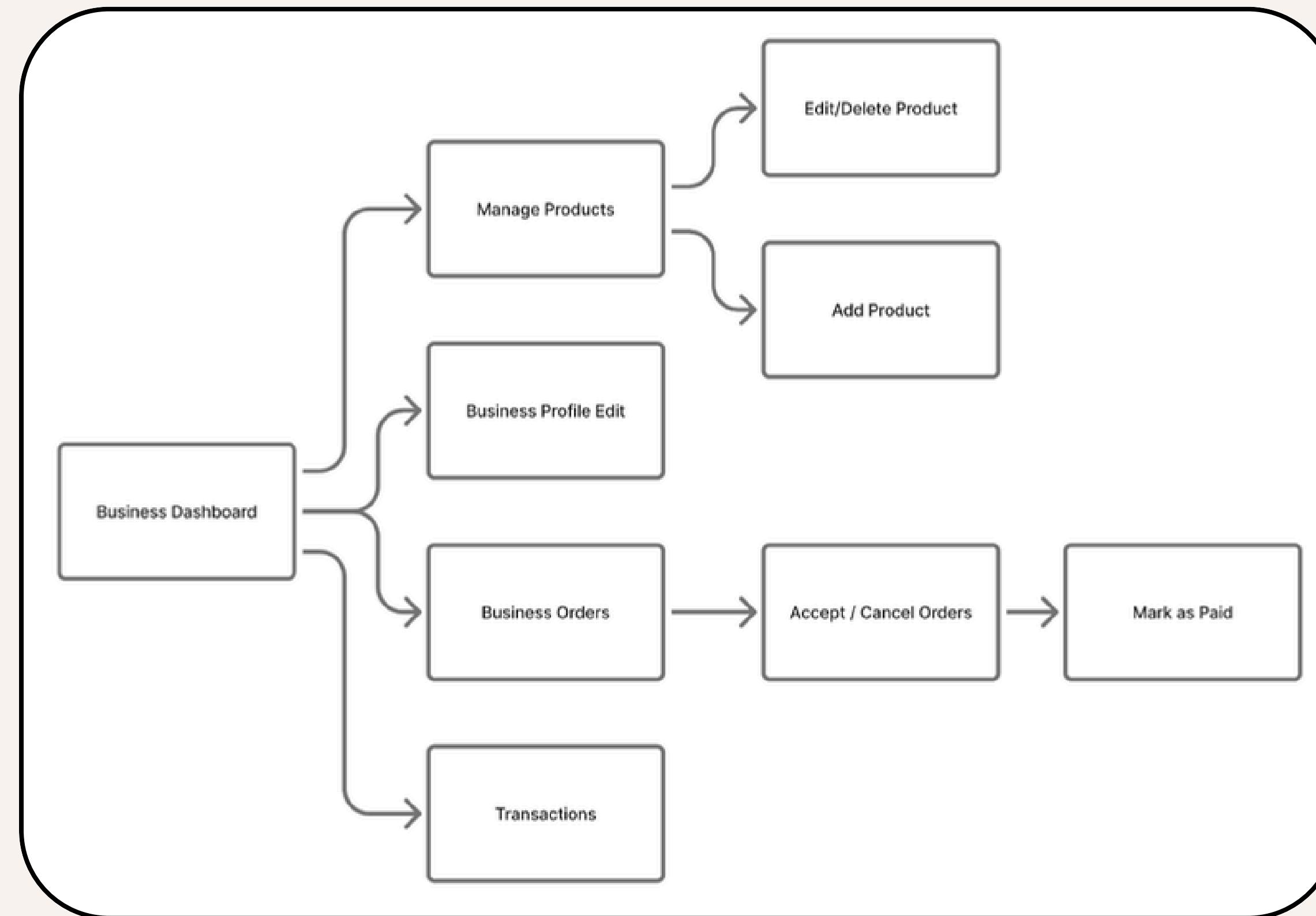
- **Transaction Screen:**

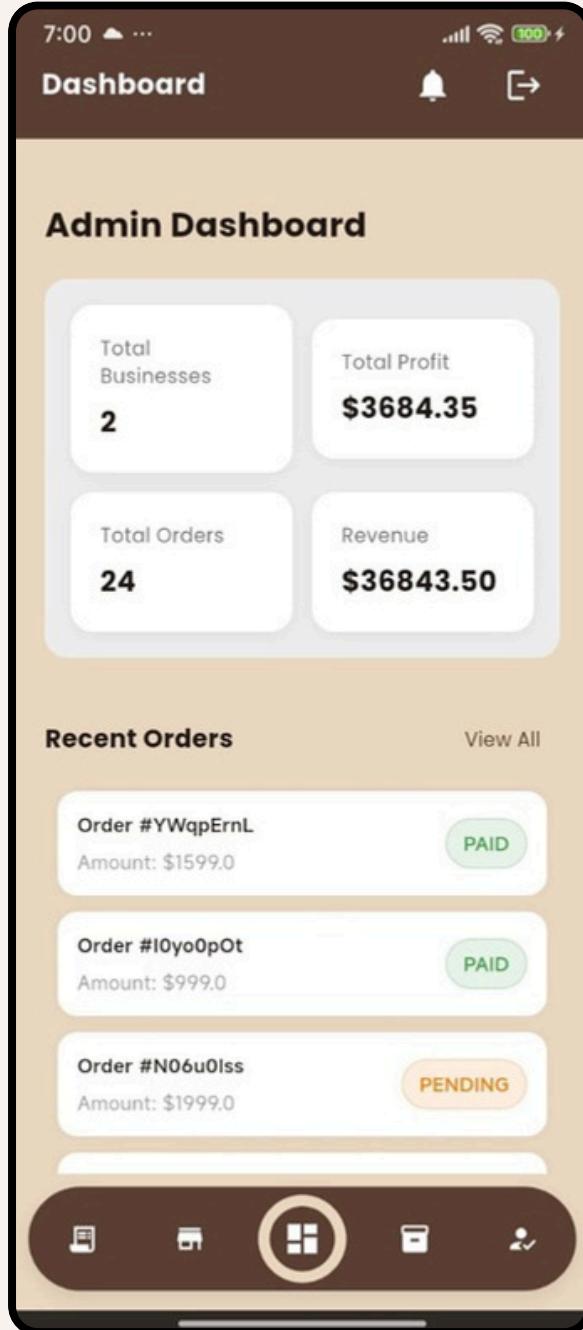
The Transactions section lets the business view all completed, pending, and recent payments, with detailed information shown when a specific transaction is selected.

- **Profile Screen:**

By tapping the profile icon in the top-right corner, the business can open the Profile Screen, where they can edit their business details such as name, email, phone, and address through simple editable fields and pop-up forms.

FLOW DIAGRAM

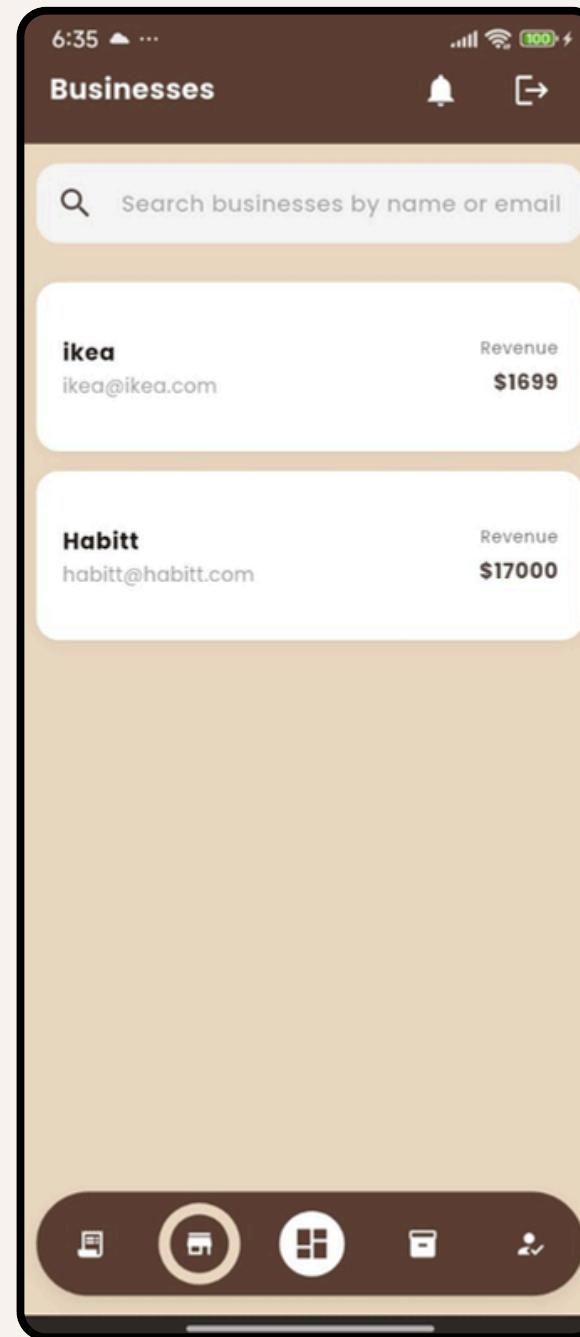




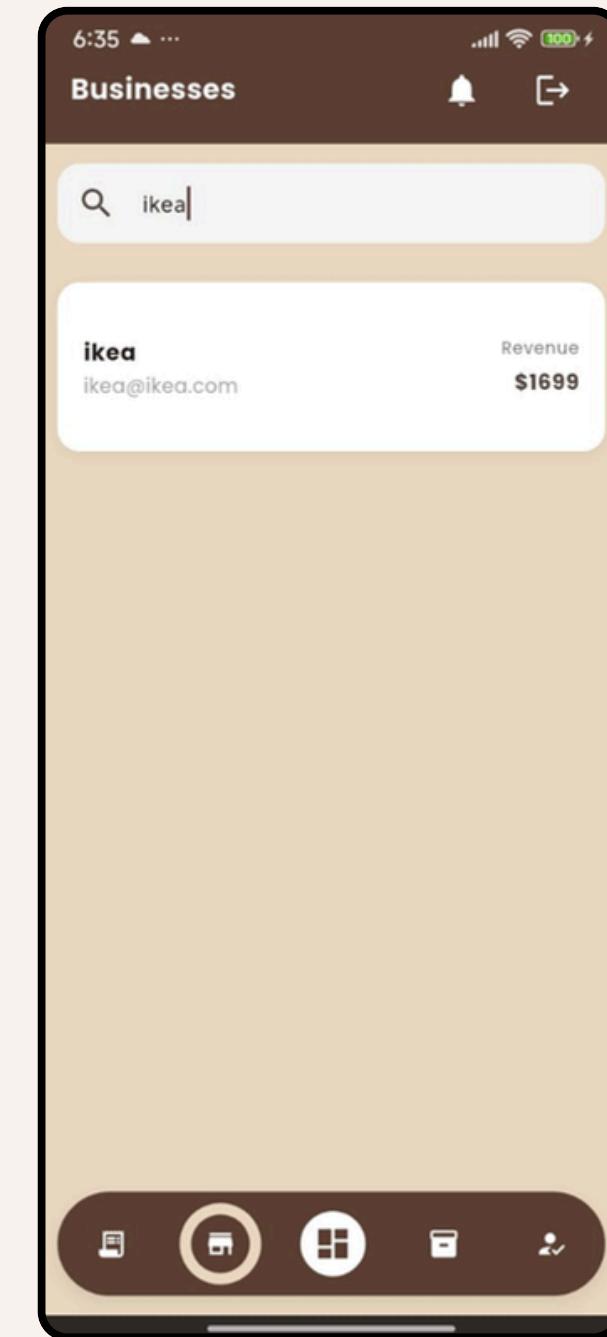
ADMIN DASHBOARD

- This dashboard acts as the central hub for the entire admin panel, connecting to every major page such as orders, products, businesses, and notifications.
- It displays key statistics including total businesses, orders, total profit, and recent activity, giving the administrator a quick overview of the platform's overall performance.

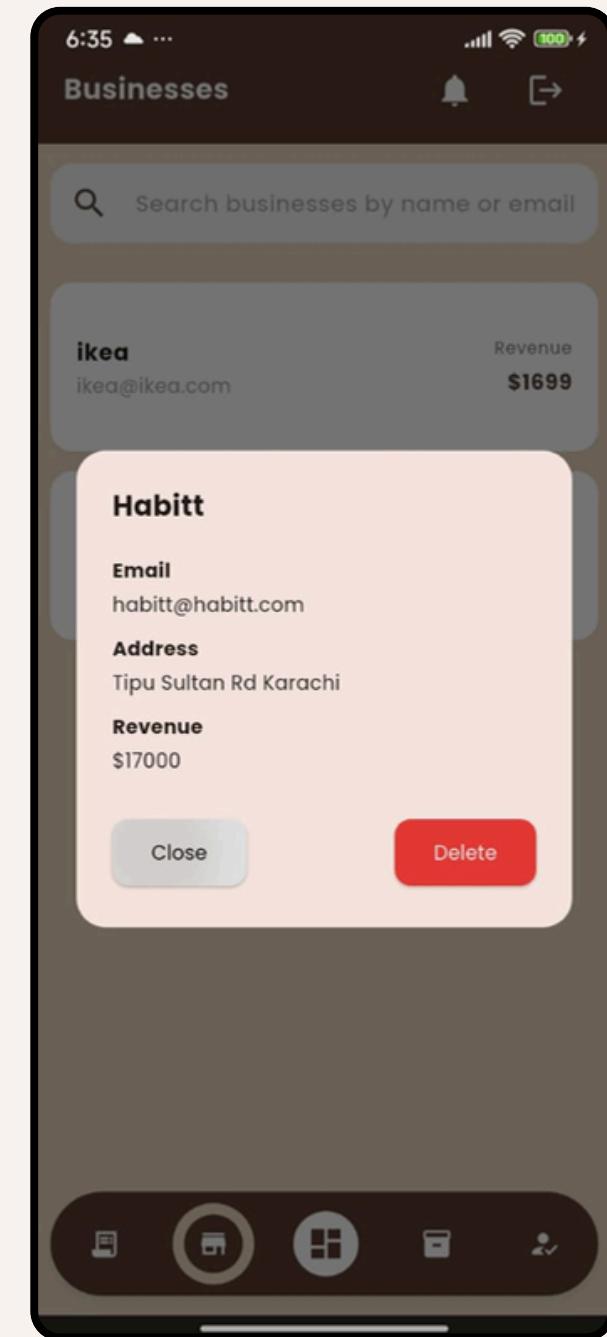
MANAGE BUSINESSES SCREEN



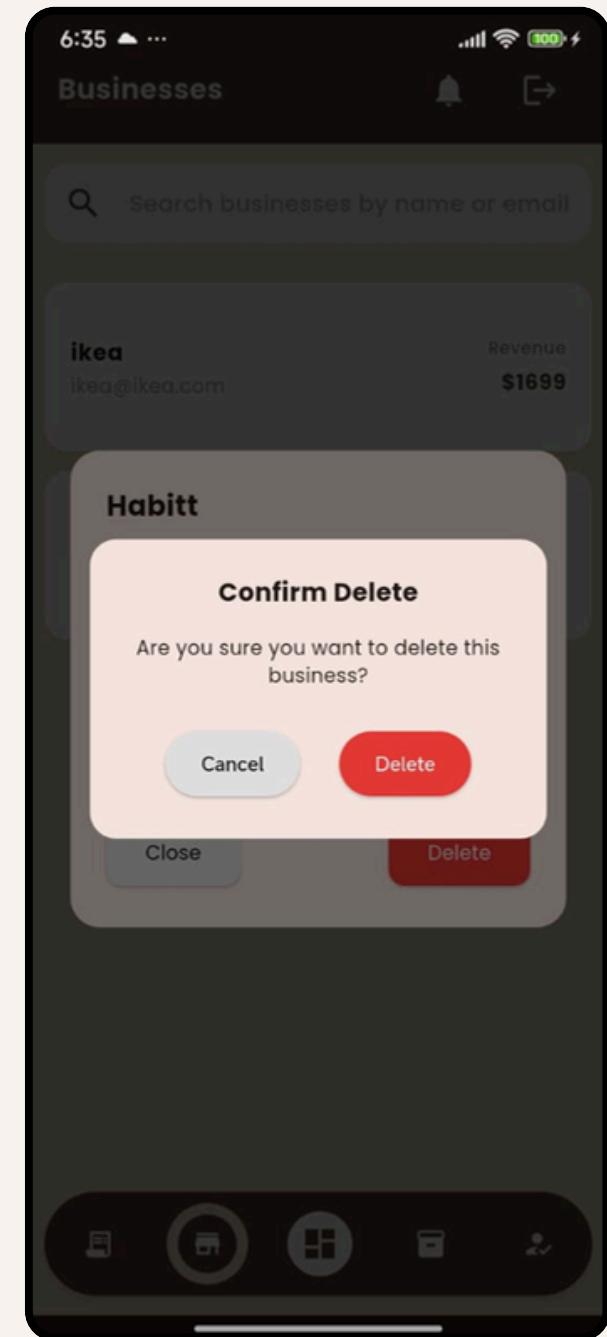
BUSINESSES



SEARCH



SEE BUSINESS

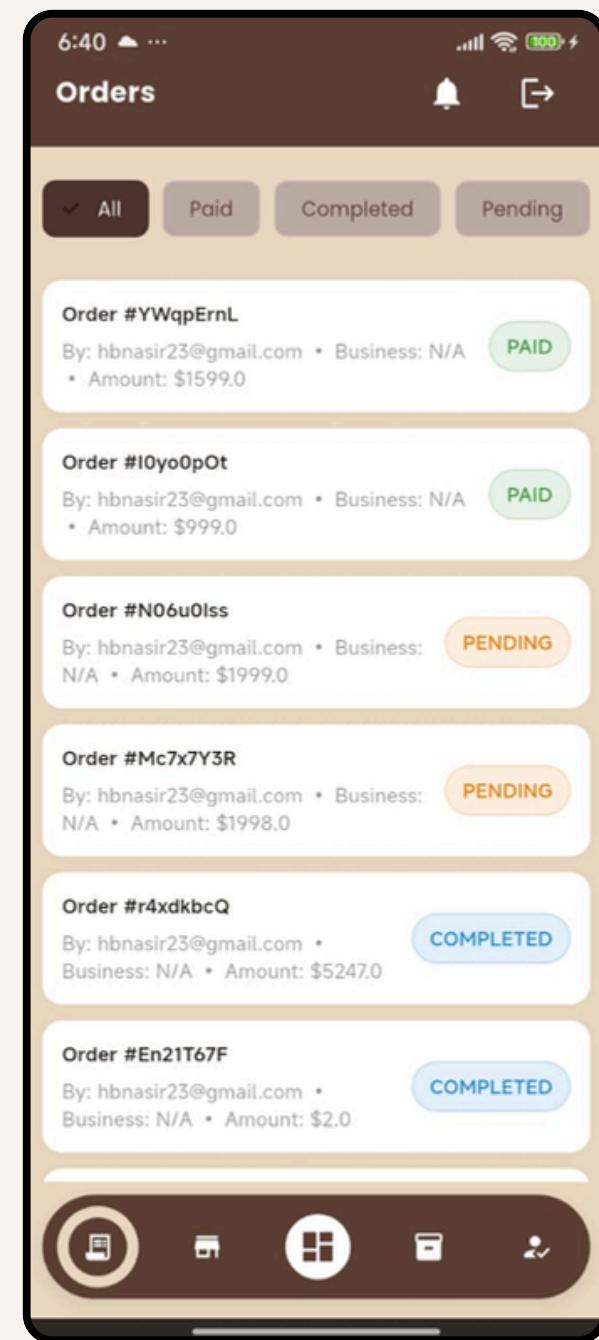


DELETE BUSINESS

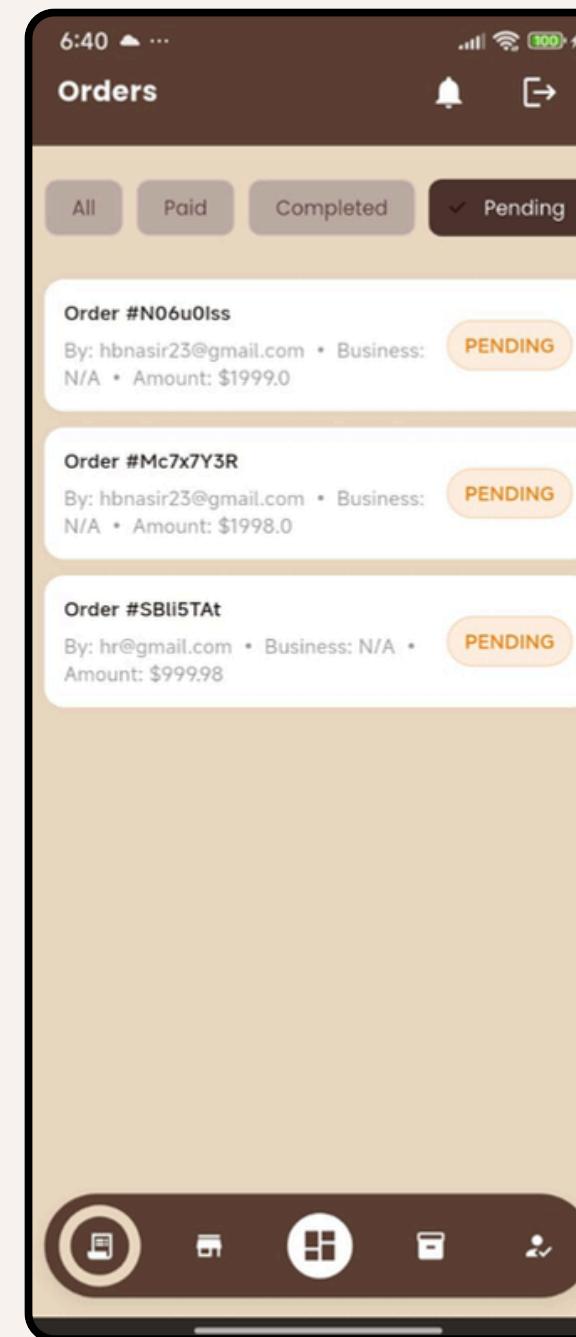
MANAGE BUSINESSES SCREEN FLOW

- The admin can view all registered businesses along with their revenue, and use the search bar to quickly find a business by name or email.
- Selecting a business opens a detail popup with its information and a Delete option, and deleting requires confirmation through a safety popup to prevent accidental removal.

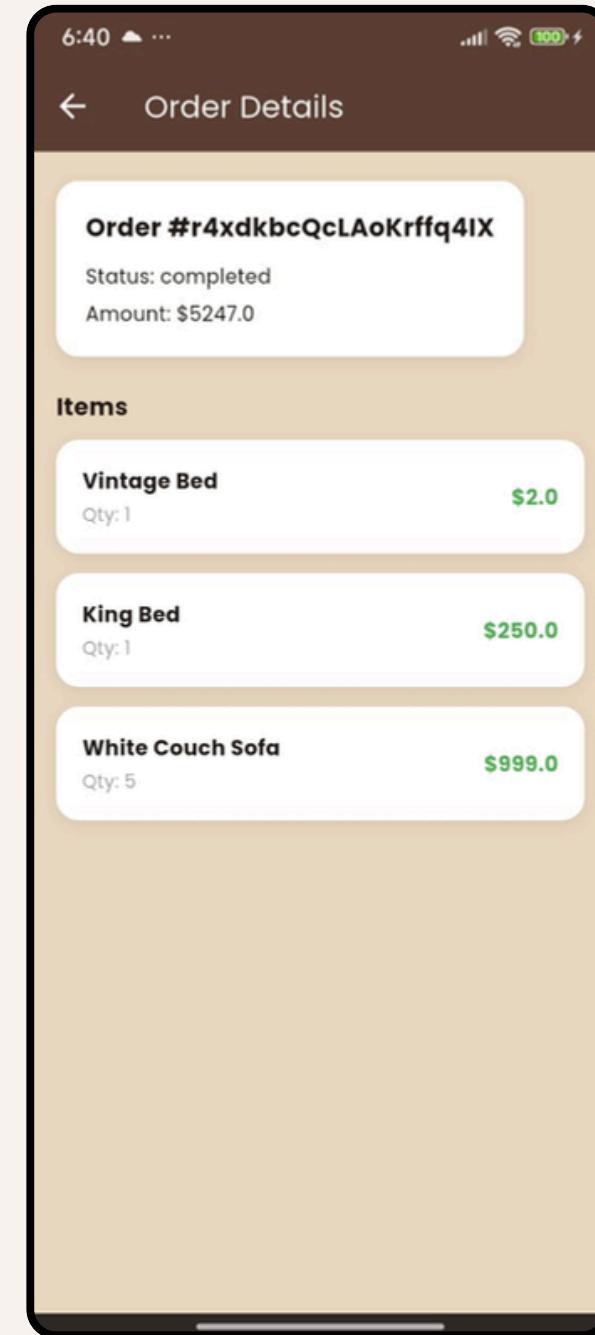
ORDERS SCREEN



ORDERS SCREEN



FILTERS

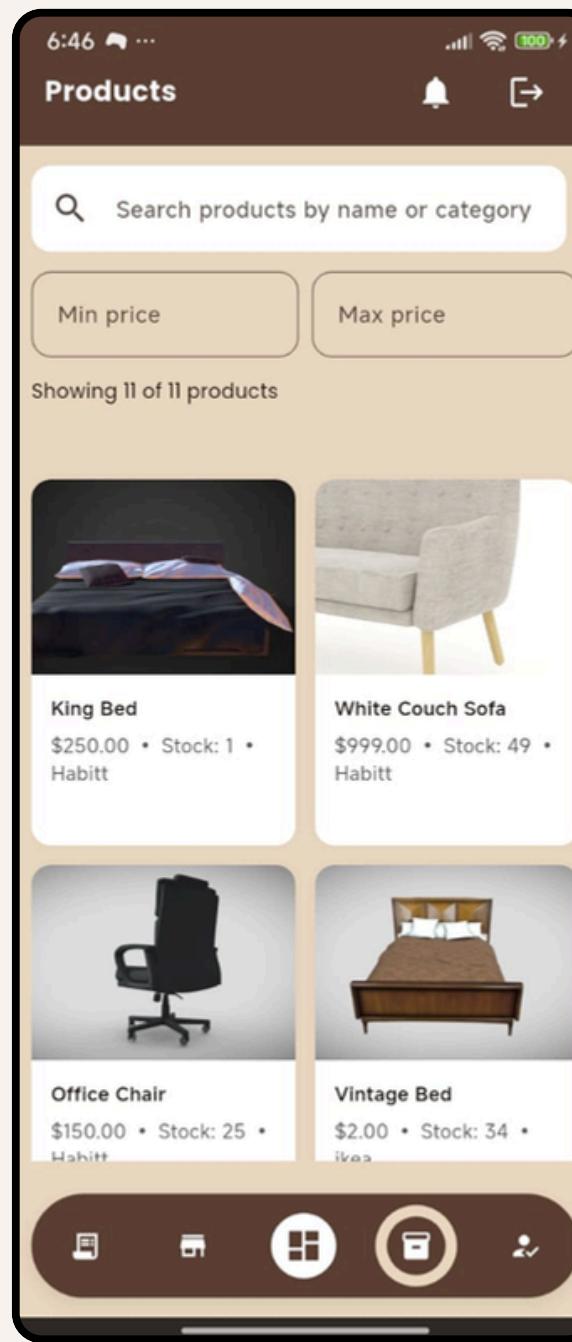


ORDER DETAILS

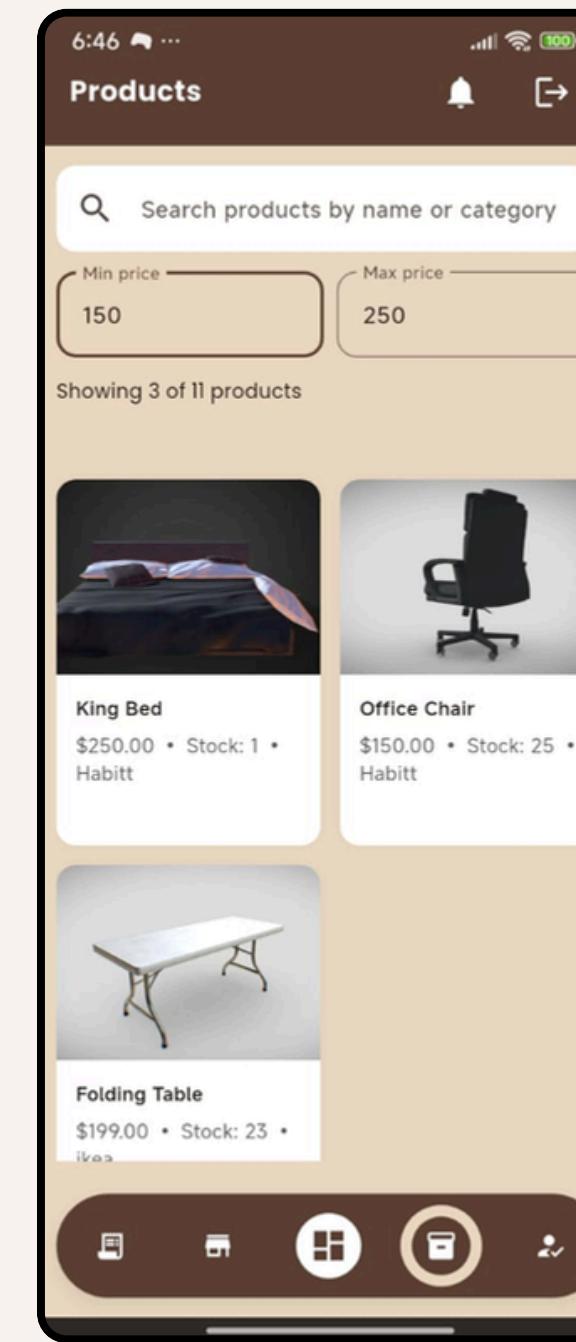
ORDERS SCREEN FLOW

- Admins can view all orders in one place, with filters to switch between All, Paid, Completed, and Pending orders for easier management.
- Tapping an order opens the Order Details page, showing the order status, total amount, and a list of all items included in that order.

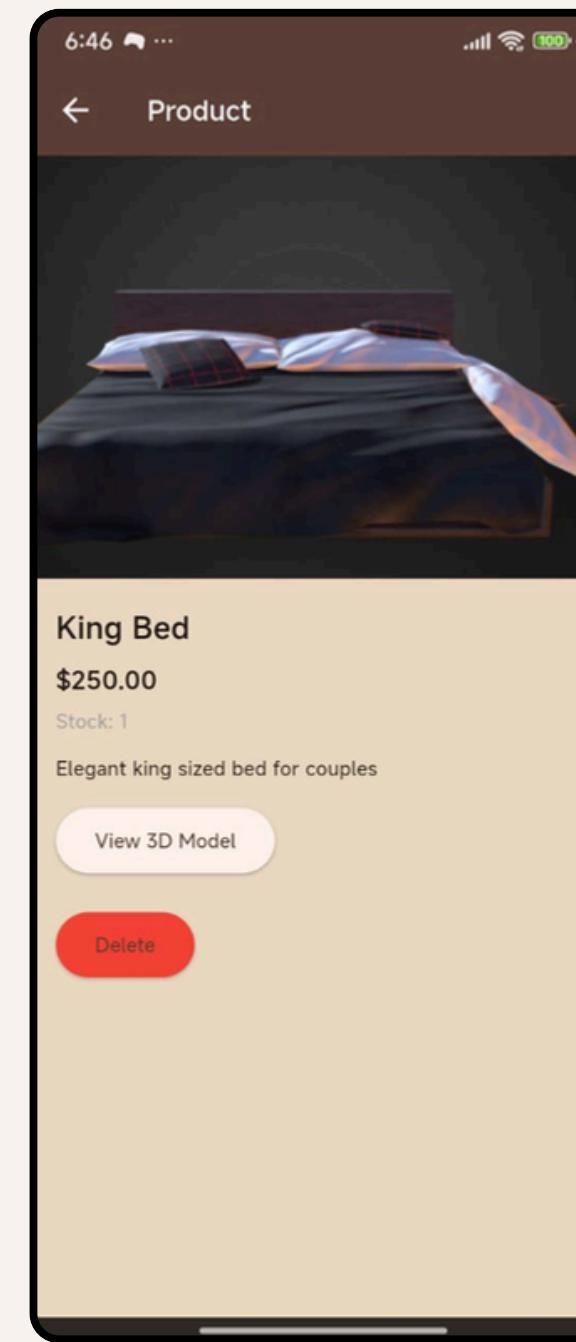
PRODUCTS SCREEN



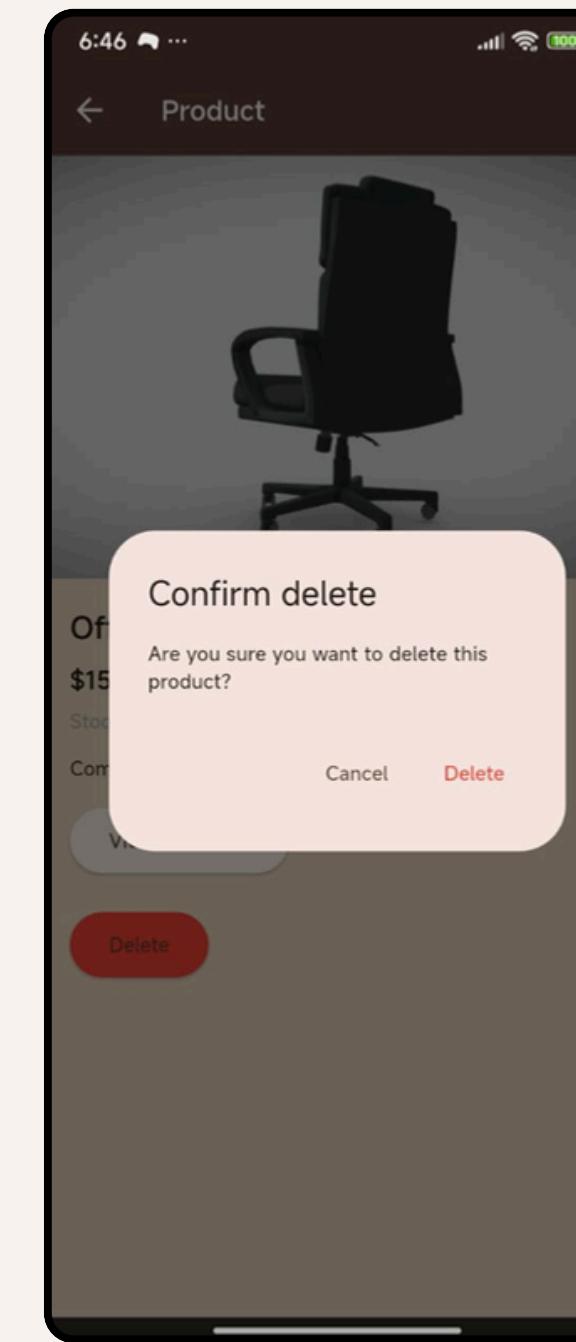
PRODUCTS



SEARCH & FILTER



PRODUCT DETAILS

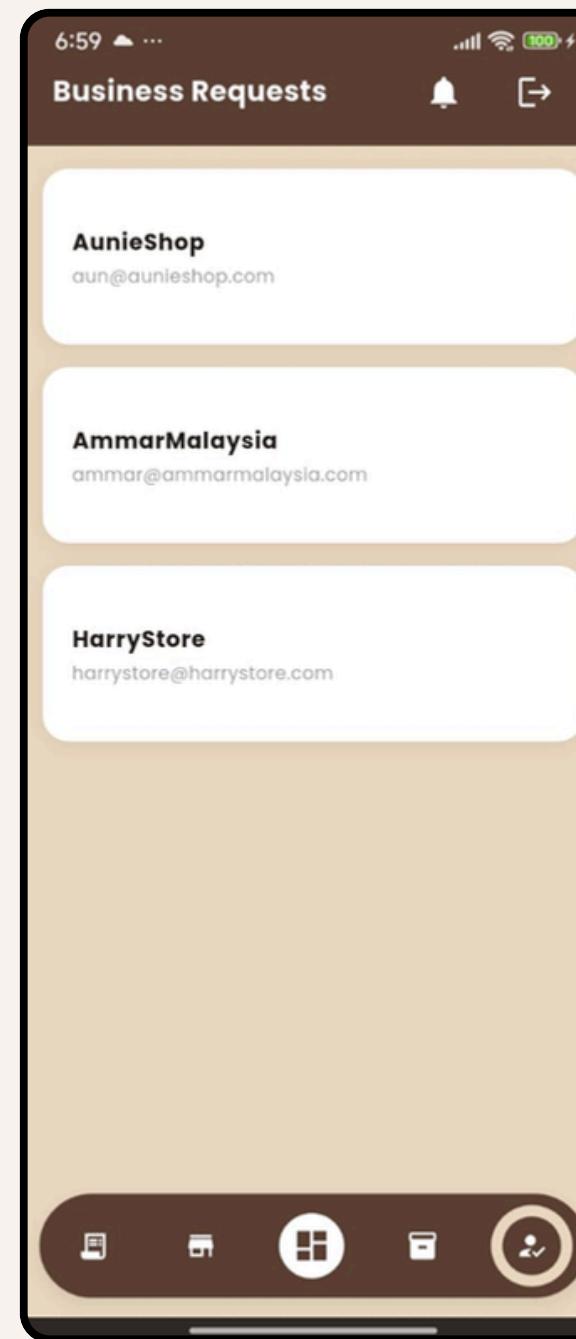


DELETE PRODUCT

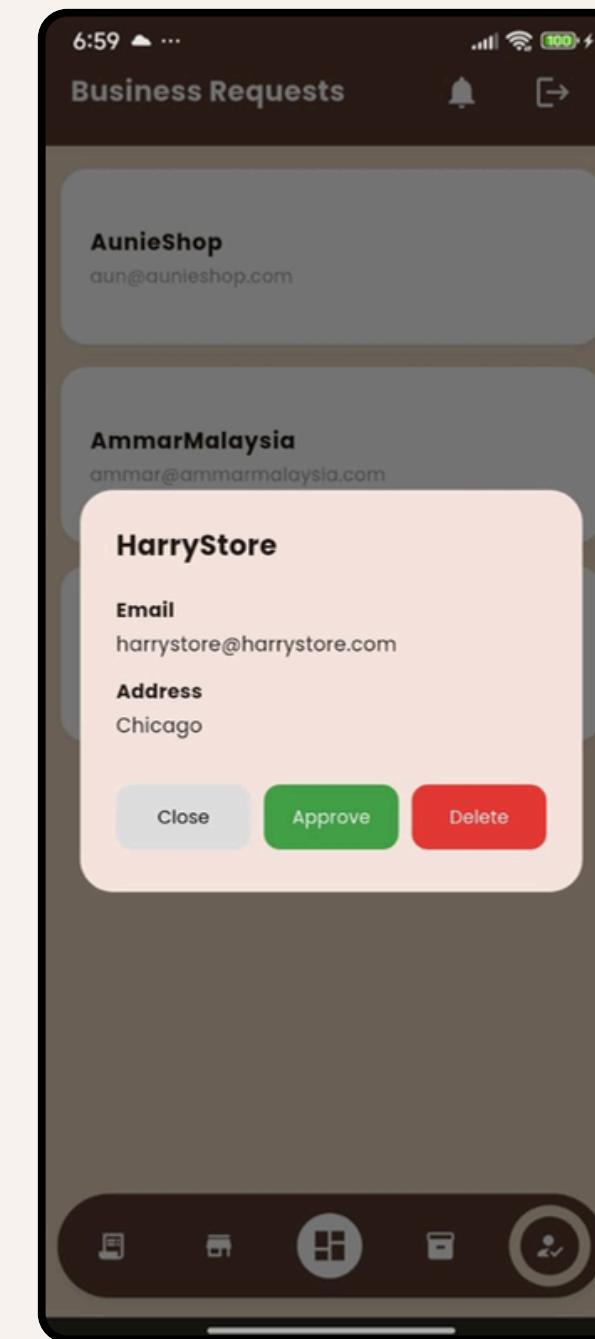
PRODUCTS SCREEN FLOW

- The admin can view all products added by businesses, along with their price, stock levels, and associated business.
- Search and filter options allow the admin to quickly narrow down products by name, category, or price range.
- Selecting a product opens the Product Details page, where the admin can review information and optionally view the 3D model.
- The admin can delete any product, with a confirmation popup shown to prevent accidental deletion.

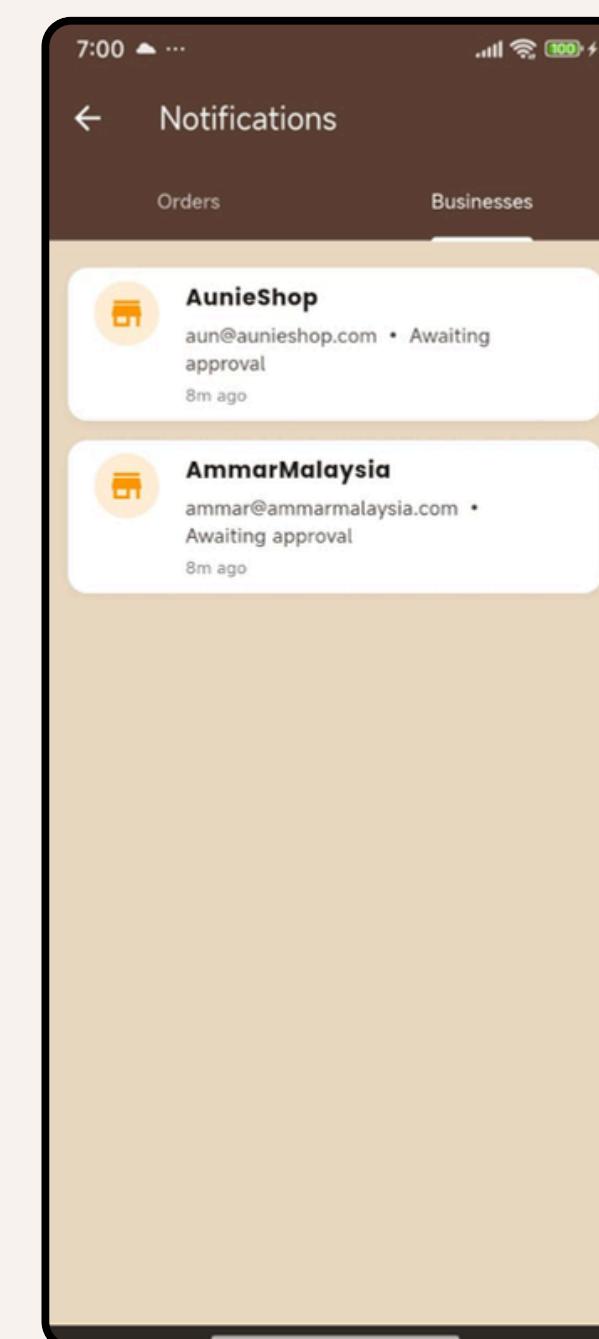
REQUESTS & NOTIFICATIONS SCREEN



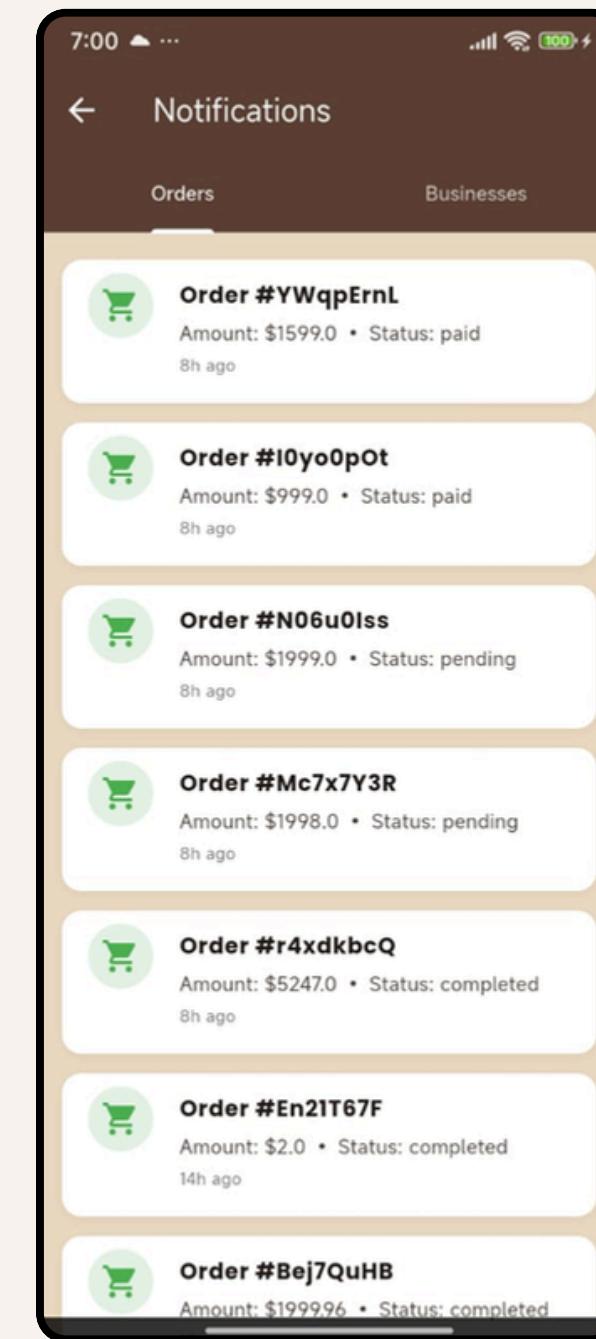
REQUESTS



DIALOG BOX



ORDER
NOTIFICATIONS



BUSINESS
NOTIFICATIONS

REQUESTS & NOTIFICATIONS SCREEN FLOW

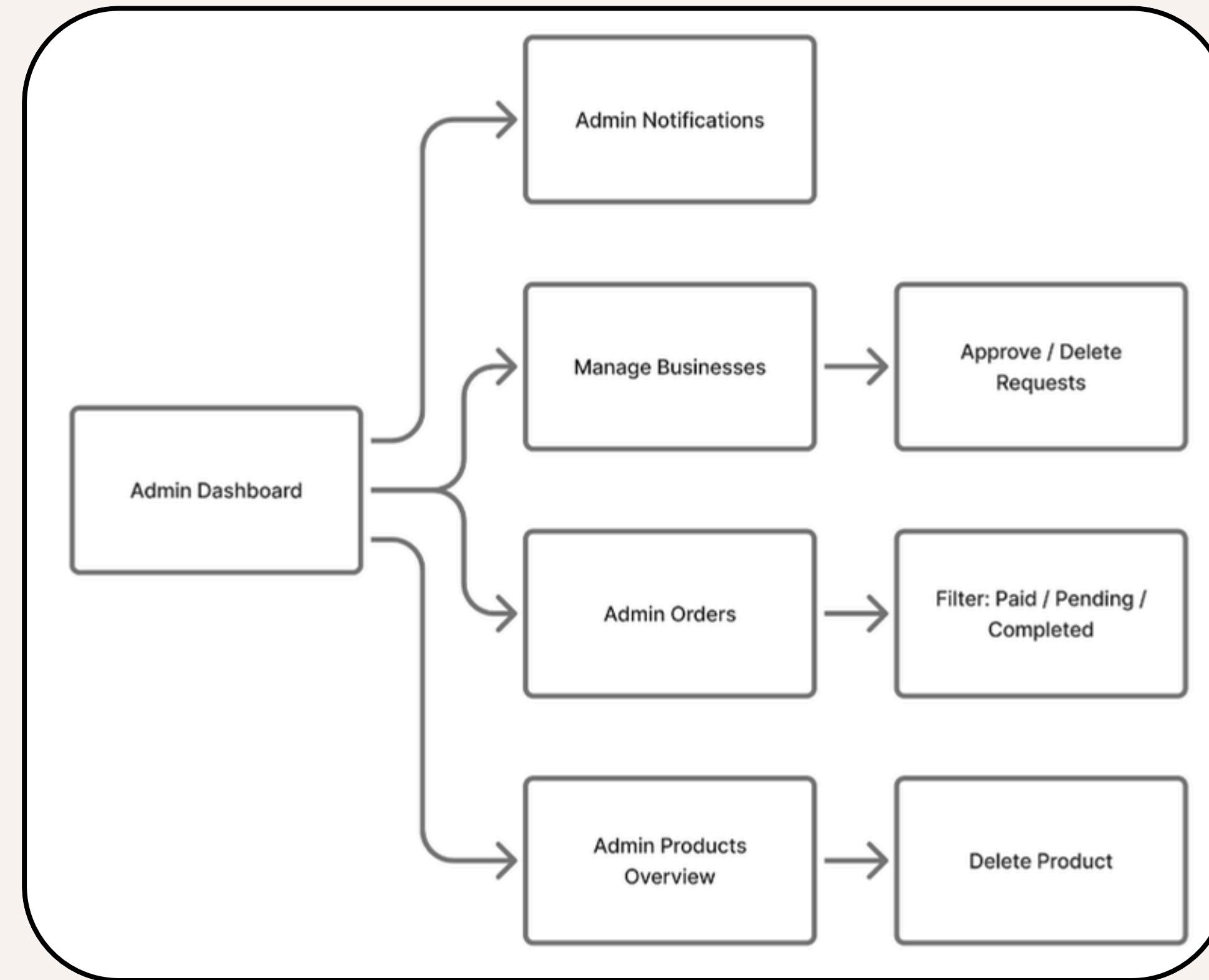
- **Requests Screen:**

From the bottom-right icon on the admin navbar, the Business Requests screen shows all businesses waiting for approval; tapping a request opens a dialog where the admin can approve, delete, or close the request.

- **Notifications Screen:**

The top notification icon opens the Notifications screen, where the admin can switch between viewing Order Notifications and Business Notifications for quick updates.

FLOW DIAGRAM



FUTURE ENHANCEMENTS

- AI-based room recommendations to suggest furniture based on user photos of their space.
- Advanced AR features, including real-world lighting simulation and multi-item placement.
- Web dashboard for businesses and admins to manage data through a browser.
- In-app chat between customers and businesses for support and custom orders.
- Wishlist & favorites for saving products to revisit later.
- Push notifications for order updates, new products, and promotions.
- Review moderation & analytics for businesses to understand customer behavior.

THANK YOU
