UNIVERSITY of TECHNOLOGY, MAURITIUS

School of Innovative Technologies and Engineering

BSc (Hons) Software Engineering
Academic Year 3(Semester 1)

Module: Advance Mobile Application & Development

Assignment2b " Hotel Room GRUD + Firebase"

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Submission Date: 8th August 2024

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Hotel Booking System with Firebase and Authentication Integration

Introduction

This Flutter application is designed for managing hotel room bookings. The application integrates Firebase Firestore for real-time data synchronization and SQLite for local database operations and with firebase authentication. Below, I provide a detailed report on the implementation, along with code snippets and screenshots to elucidate the workflow and integration of Firebase with the Flutter application.

Firebase Setup

1. Firebase Initialization:

Firebase is initialized in the main function using **Firebase.initializeApp** with **DefaultFirebaseOptions.currentPlatform.**

Main.dart :

```dart
import 'package:auth_firebase/firebase_options.dart';
import 'package:auth_firebase/pages/login/login.dart';
import 'package:firebase_core/firebase_core.dart';
import 'package:flutter/material.dart';
import 'pages/signup/signup.dart';

Future<void> main() async {
  WidgetsFlutterBinding.ensureInitialized();

  await Firebase.initializeApp(
    options: DefaultFirebaseOptions.currentPlatform
  );
```

These import statements bring in necessary packages for building a Flutter app, connecting to Firebase, and accessing the cloudFire database.

- **WidgetsFlutterBinding.ensureInitialized()**: Ensures that Flutter bindings are initialized before using any Flutter APIs.
- **Firebase.initializeApp**: Initializes Firebase with the platform-specific options provided.
- **Imports**: It imports necessary packages, including Firebase options, the login page, Firebase initialization, and Flutter's material design components.
- **main() Function**: The entry point of the application. It ensures that Flutter's bindings are initialized before anything else, then asynchronously initializes Firebase with platform-specific options.
- **MyApp Class**: A stateless widget that represents the root of the app. It disables the debug banner and sets the home screen to the Login page.

Flutter Application Setup

2. Flutter App Structure:

- The app consists of **MyApp** which sets up the Material theme and home screen.
- **ProductPage** is the main screen for CRUD operations on hotel rooms.

```
class MyApp extends StatelessWidget {
  @override
  Widget build(BuildContext context) {
    return MaterialApp(
      home: ProductPage(),
      debugShowCheckedModeBanner: false,
      theme: ThemeData(
        primarySwatch: Colors.blue,
        textTheme: TextTheme(
          headline1: TextStyle(fontSize: 32, fontWeight: FontWeight.bold, color: Colors.b
          bodyText1: TextStyle(fontSize: 18, color: Colors.black),
        ),
        inputDecorationTheme: InputDecorationTheme(
          border: OutlineInputBorder(
            borderRadius: BorderRadius.circular(8),
            borderSide: BorderSide(color: Colors.blue),
          ),
          focusedBorder: OutlineInputBorder(
            borderRadius: BorderRadius.circular(8),
            borderSide: BorderSide(color: Colors.blue),
          ),
          labelStyle: TextStyle(fontSize: 22, color: Colors.blue),
        ),
        elevatedButtonTheme: ElevatedButtonThemeData(
          style: ElevatedButton.styleFrom(
            foregroundColor: Colors.white,
            backgroundColor: Colors.blue,
            textStyle: TextStyle(fontSize: 20),
            padding: EdgeInsets.symmetric(horizontal: 20, vertical: 15),
            shape: RoundedRectangleBorder(
              borderRadius: BorderRadius.circular(8),
```

App Theme and UI Configuration:

MaterialApp: Sets up the main structure of the app, including themes and initial route (ProductPage).

```dart
class ProductPage extends StatefulWidget {
  @override
  _ProductPageState createState() => _ProductPageState();
}

class _ProductPageState extends State<ProductPage> {
  final FirebaseFirestore firestore = FirebaseFirestore.instance;
  final CollectionReference mUsers = FirebaseFirestore.instance.collection('products');
  final _formKey = GlobalKey<FormState>();
  TextEditingController _descriptionController = TextEditingController();
  TextEditingController _priceController = TextEditingController();
  TextEditingController _roomNumberController = TextEditingController();
  int? _selectedProductId;

  String? _selectedRoomCategory;
  final List<String> _roomCategories = [
    'Classic Room',
    'Family Room',
    'Family Suite',
    'VIP Suite',
  ];

  List<Map<String, dynamic>> _products = [];
```

State Management and Firebase Firestore:

- **FirebaseFirestore:** Instance of Firestore to interact with the database.
- **Form Controllers:** Manage input data for form fields.

```dart
@override
void initState() {
  super.initState();
  _fetchProducts();
}

Future<void> _fetchProducts() async {
  final products = await DatabaseHelper().getProducts();
  setState(() {
    _products = products;
  });
}
```

Authentification Operations

3. Authentication Services:

This code defines an AuthService class that handles user authentication tasks such as signing up, signing in, and signing out using Firebase Authentication in a Flutter app.

```dart
import 'package:firebase_auth/firebase_auth.dart';
import 'package:flutter/material.dart';
import 'package:fluttertoast/fluttertoast.dart';

import '../pages/home/home.dart';
import '../pages/login/login.dart';

class AuthService {

  Future<void> signup({
    required String email,
    required String password,
    required BuildContext context
  }) async {

    try {

      await FirebaseAuth.instance.createUserWithEmailAndPassword(
        email: email,
        password: password
      );
```

Imports: The necessary packages for Firebase authentication, UI components, and toast notifications are imported.

SignIn (continue):

```
    await FirebaseAuth.instance.signInWithEmailAndPassword(
      email: email,
      password: password
    );

    await Future.delayed(const Duration(seconds: 1));
    Navigator.pushReplacement(
      context,
      MaterialPageRoute(
        builder: (BuildContext context) => const Home()
      )  // MaterialPageRoute
    );

  } on FirebaseAuthException catch(e) {
    String message = '';
    if (e.code == 'invalid-email') {
      message = 'No user found for that email.';
    } else if (e.code == 'invalid-credential') {
      message = 'Wrong password provided for that user.';
    }
     Fluttertoast.showToast(
      msg: message,
      toastLength: Toast.LENGTH_LONG,
      gravity: ToastGravity.SNACKBAR,
      backgroundColor: Colors.black54,
      textColor: Colors.white,
      fontSize: 14.0,
    );
  }
  catch(e){
```

Explanation: This method logs in an existing user with email and password. On success, it navigates the user to the Home page. If an error occurs, it shows a toast notification with the error message.

Similar to the signup method, this block represents the signin logic with a try-catch structure for success and error handling.

SignOut:

```
  Future<void> signout({
    required BuildContext context
  }) async {

    await FirebaseAuth.instance.signOut();
    await Future.delayed(const Duration(seconds: 1));
    Navigator.pushReplacement(
        context,
        MaterialPageRoute(
          builder: (BuildContext context) =>Login()
        )  // MaterialPageRoute
      );
  }
}
```

Fetching Data:

- **_fetchProducts:** Retrieves products from the local SQLite database and updates the state to display them.

```
Future<void> _addProduct() async {
  if (_formKey.currentState!.validate()) {
    _formKey.currentState!.save();

    final roomNumberExists = await DatabaseHelper().doesProductExist(_roomNumberControll
    if (roomNumberExists) {
      ScaffoldMessenger.of(context).showSnackBar(
        SnackBar(content: Text('Product with this room number already exists!')),
      );
      return;
    }

    try {
      await DatabaseHelper().insertProduct({
        'room_category': _selectedRoomCategory,
        'description': _descriptionController.text,
        'price': double.parse(_priceController.text),
        'room_number': _roomNumberController.text,
      });
      _fetchProducts();
      _clearForm();
    } catch (e) {
      print('Error inserting product: $e');
```

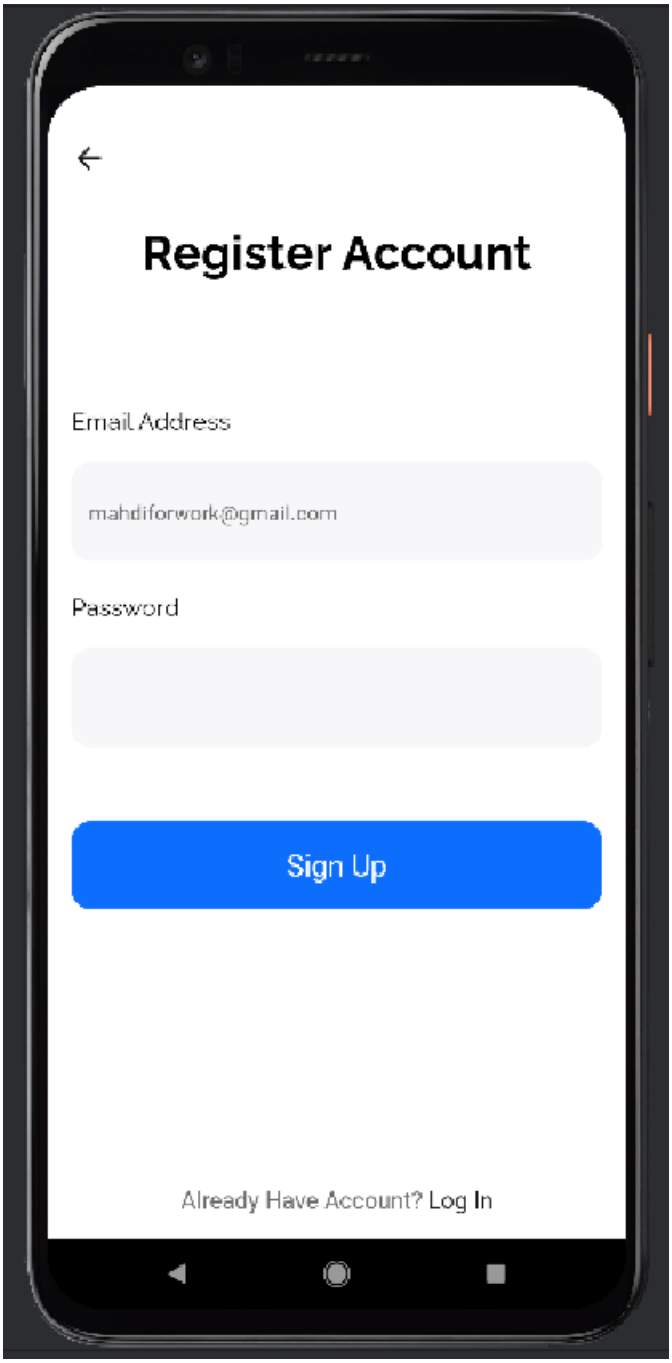
```
Future<void> _onCreate(Database db, int version) async {
  await db.execute('''
    CREATE TABLE products(
      id INTEGER PRIMARY KEY AUTOINCREMENT,
      description TEXT,
      price REAL,
      room_category TEXT,
      room_number TEXT UNIQUE -- Added UNIQUE constraint here
    )
  ''');
}

Future<void> _onUpgrade(Database db, int oldVersion, int newVersion) async {
  if (oldVersion < 2) {
    await db.execute('ALTER TABLE products ADD COLUMN room_number TEXT');
  }
  if (oldVersion < 3) {
    await db.execute('ALTER TABLE products ADD COLUMN room_category TEXT');
  }
  if (oldVersion < 4) {
    // To add a unique constraint, you need to recreate the table
    await db.execute('''
      CREATE TABLE new_products(
        id INTEGER PRIMARY KEY AUTOINCREMENT,
        description TEXT,
        price REAL,
        room_category TEXT,
        room_number TEXT UNIQUE -- Added UNIQUE constraint here
      )
    ''');
```

Create:

```
Future<void> insertProduct(Map<String, dynamic> product) async {
  final db = await database;
  try {
    // Insert into SQLite
    int id = await db.insert('products', product, conflictAlgorithm: ConflictAlgorithm.i
    product['id'] = id; // Ensure the product has the SQLite ID

    // Also insert into Firestore with the same ID
    await _firestore.collection('products').doc(id.toString()).set(product);
  } catch (e) {
    // Handle the error if necessary
    print('Error inserting product: $e');
  }
}

Future<List<Map<String, dynamic>>> getProducts() async {
  final db = await database;
  return await db.query('products');
}
```

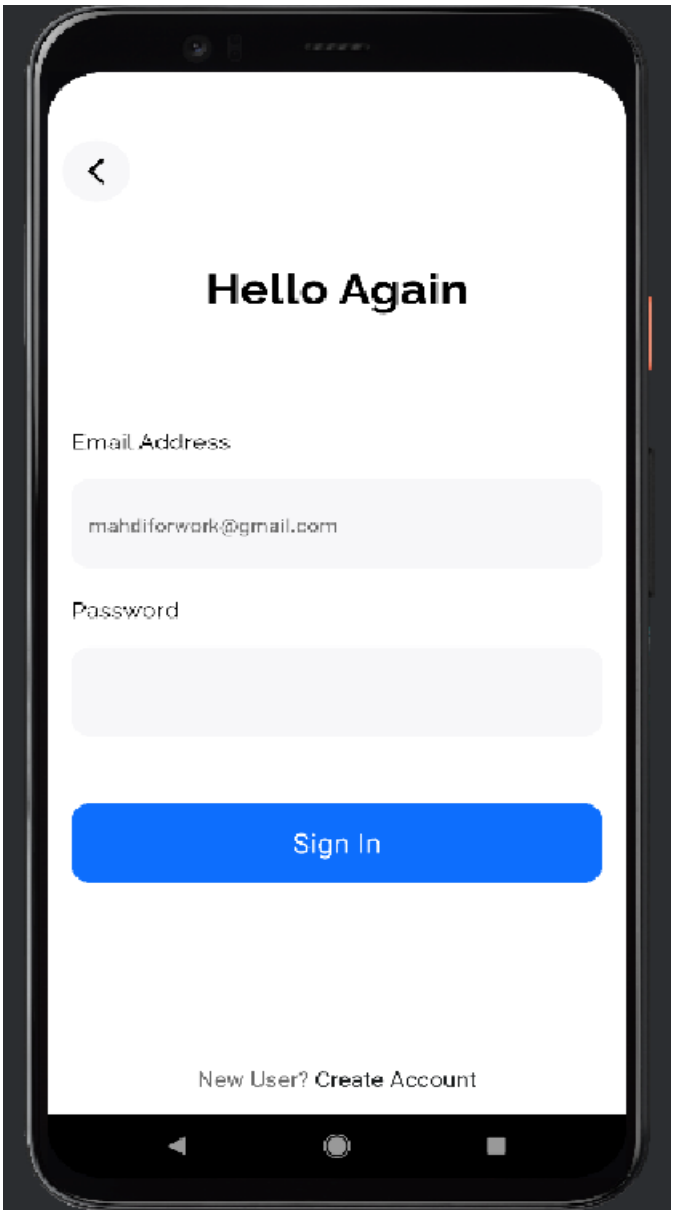
User Interface:

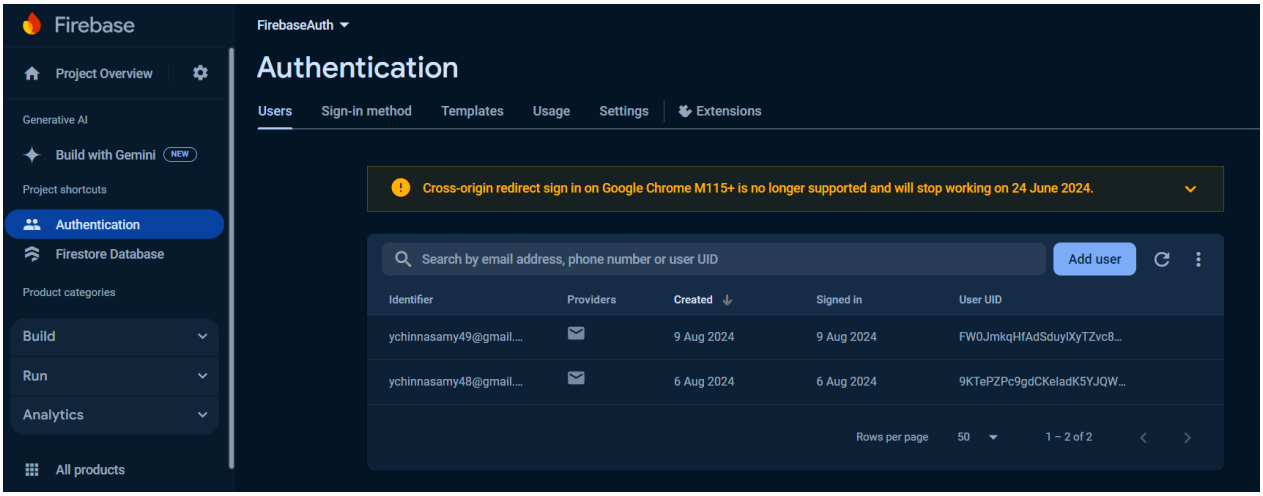
Registration page:
User have to register first if they have not done so, to be able to move to the home page.



Login:

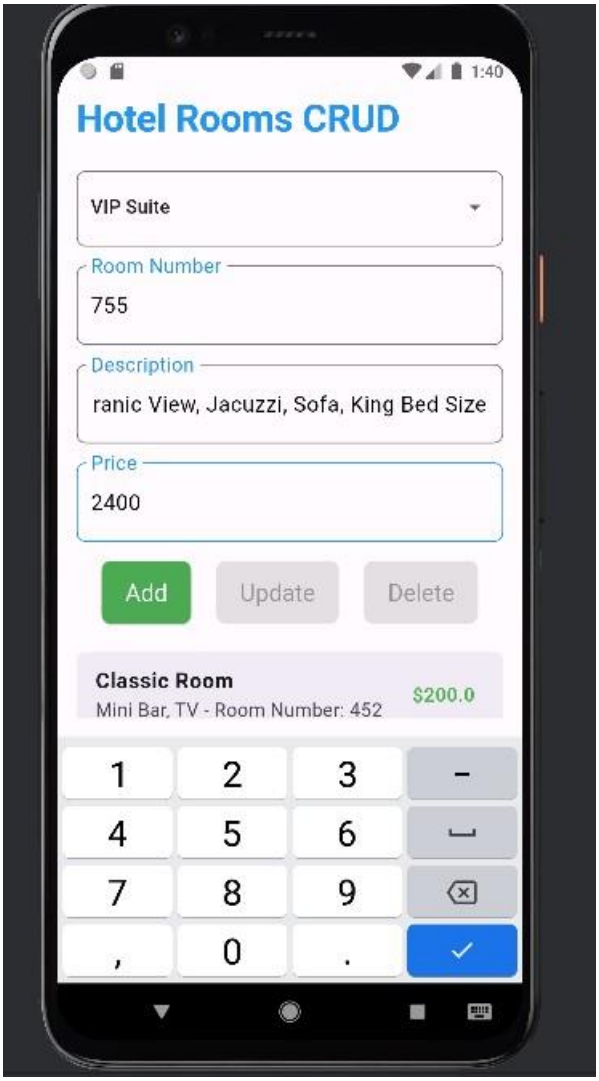
After the user have registered and their credential has been stored in the firebase authentication services, users will be able to access their account and register for their rooms.



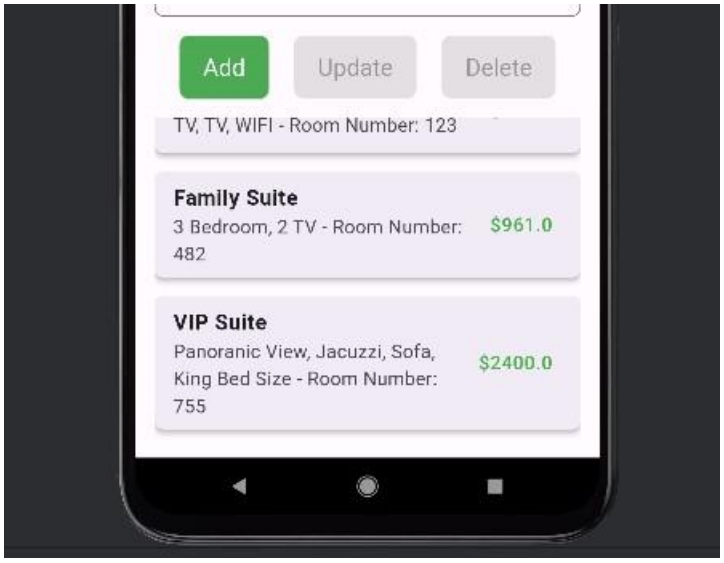


HomePage:

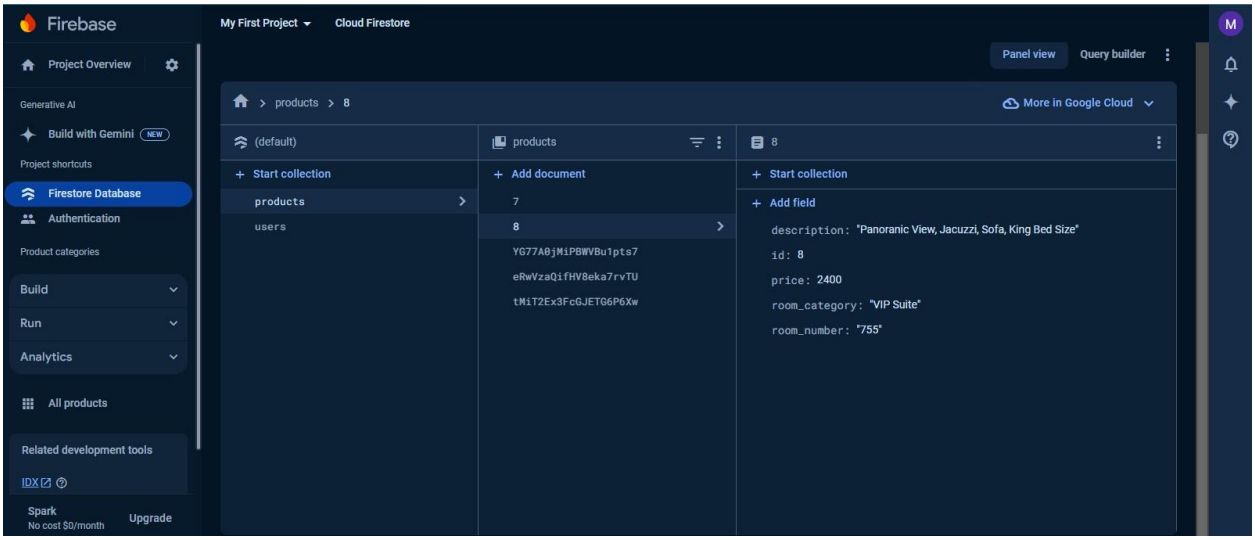
Here the user accesses this page and can add room details, update, and delete if they see its necessary.


1:40
Hotel Rooms CRUD
VIP Suite
Room Number
755
Description
ranic View, Jacuzzi, Sofa, King Bed Size
Price
2400
Add
Update
Delete
Classic Room
Mini Bar, TV - Room Number: 452
$200.0
1 2 3 -
4 5 6
7 8 9
, 0 .

In the List:



On firebase:

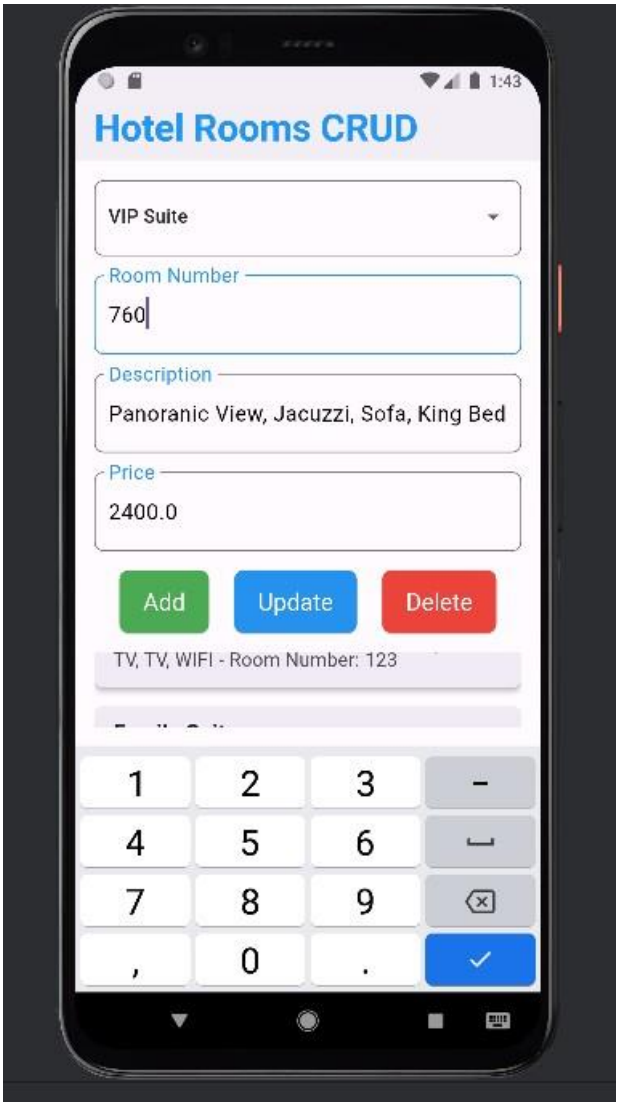


Update:

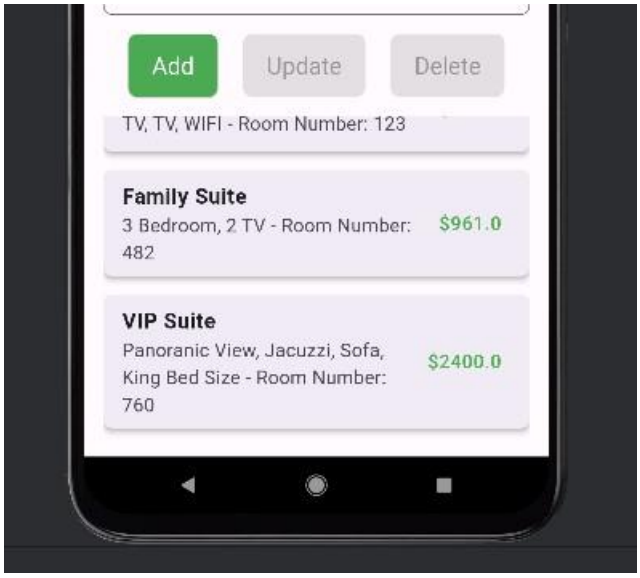
```
Future<void> updateProduct(int id, Map<String, dynamic> product) async {
  final db = await database;
  try {
    // Update in SQLite
    await db.update('products', product, where: 'id = ?', whereArgs: [id]);

    // Update in Firestore using the document ID
    await _firestore.collection('products').doc(id.toString()).update(product);
  } catch (e) {
    // Handle the error if necessary
    print('Error updating product: $e');
  }
}
```

- **_addProduct:** Validates and saves form data, checks for duplicate room numbers, and inserts new product data into both SQLite and Firestore.

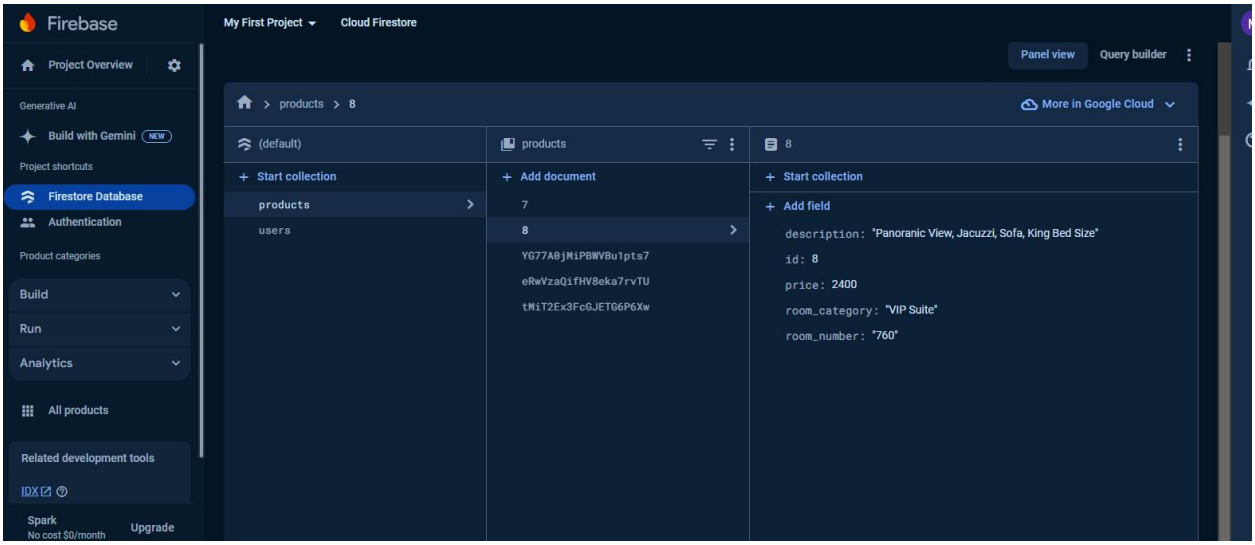
UI:


1:43
Hotel Rooms CRUD
VIP Suite
Room Number
760
Description
Panoranic View, Jacuzzi, Sofa, King Bed
Price
2400.0
Add
Update
Delete
TV, TV, WIFI - Room Number: 123
1
2
3
4
5
6
7
8
9
,
0
.

In the list:



On firebase:

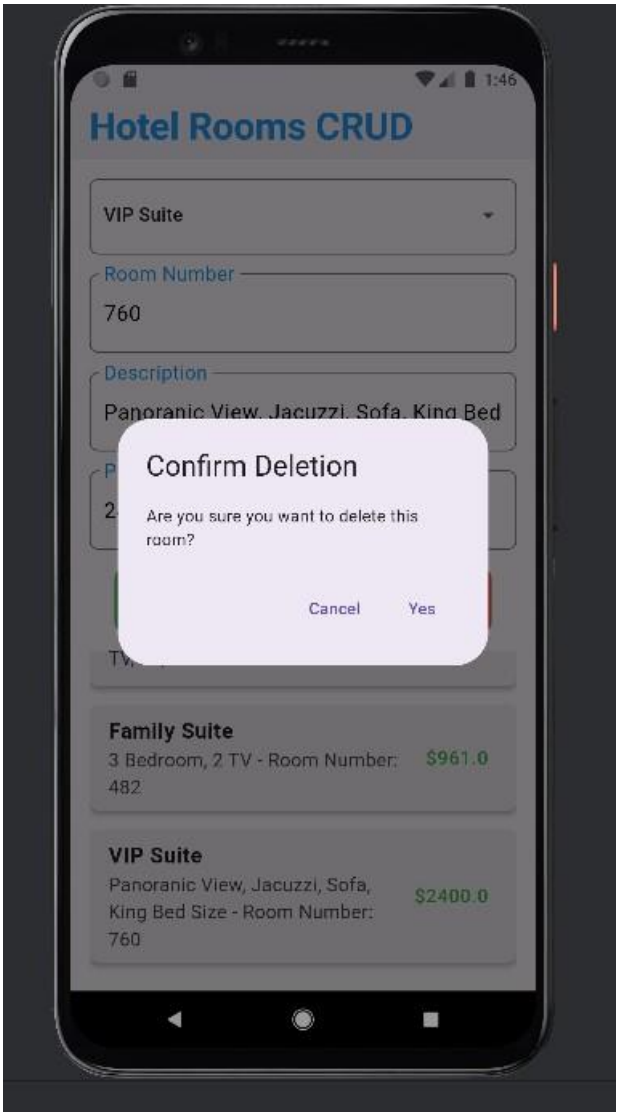


Delete:

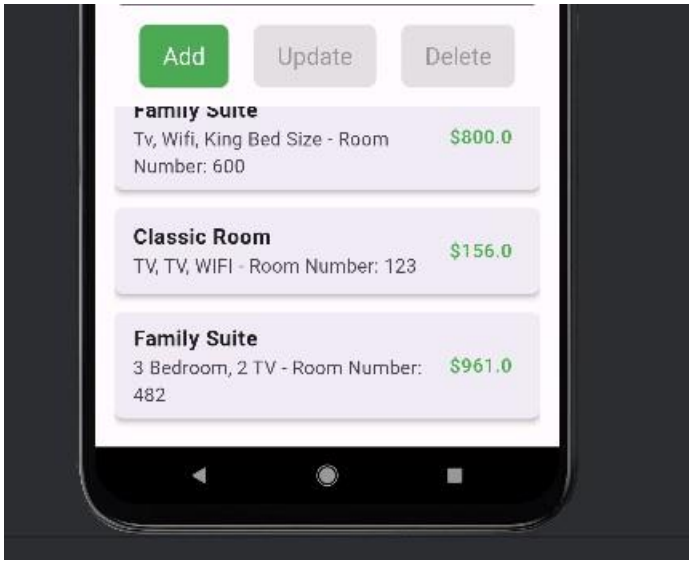
```
  Future<void> deleteProduct(int id) async {
    final db = await database;
    try {
      // Delete from SQLite
      await db.delete('products', where: 'id = ?', whereArgs: [id]);

      // Delete from Firestore using the document ID
      await _firestore.collection('products').doc(id.toString()).delete();
    } catch (e) {
      // Handle the error if necessary
      print('Error deleting product: $e');
    }
  }

  Future<bool> doesProductExist(String roomNumber) async {
    final db = await database;
    final result = await db.query(
      'products',
      where: 'room_number = ?',
      whereArgs: [roomNumber],
    );
    return result.isNotEmpty;
  }
}
```

- **updateProduct:** Validates and saves form data, then updates the product in both SQLite and Firestore.
- **_deleteProduct:** Deletes the product from both SQLite and Firestore.

UI:

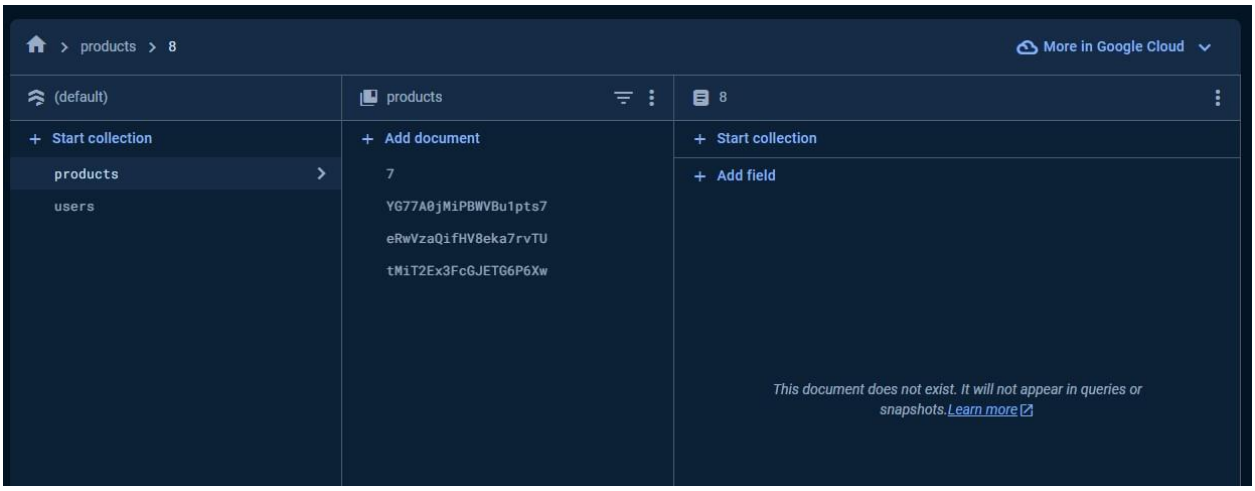

1:46
Hotel Rooms CRUD
VIP Suite
Room Number
760
Description
Panoranic View, Jacuzzi, Sofa, King Bed
Confirm Deletion
Are you sure you want to delete this room?
Cancel
Yes
Family Suite
3 Bedroom, 2 TV - Room Number: 482
$961.0
VIP Suite
Panoranic View, Jacuzzi, Sofa, King Bed Size - Room Number: 760
$2400.0

In the list:



- **It is no more present in the list.**

In firebase:



Delete Confirmation:

- **_showDeleteConfirmationDialog:** Displays a dialog to confirm the deletion of a product.

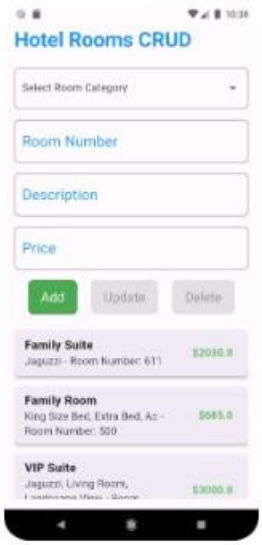
```
void _clearForm() {
  setState(() {
    _formKey.currentState!.reset();
    _selectedRoomCategory = null;
    _descriptionController.clear();
    _priceController.clear();
    _roomNumberController.clear();
    _selectedProductId = null;
  });
}
```

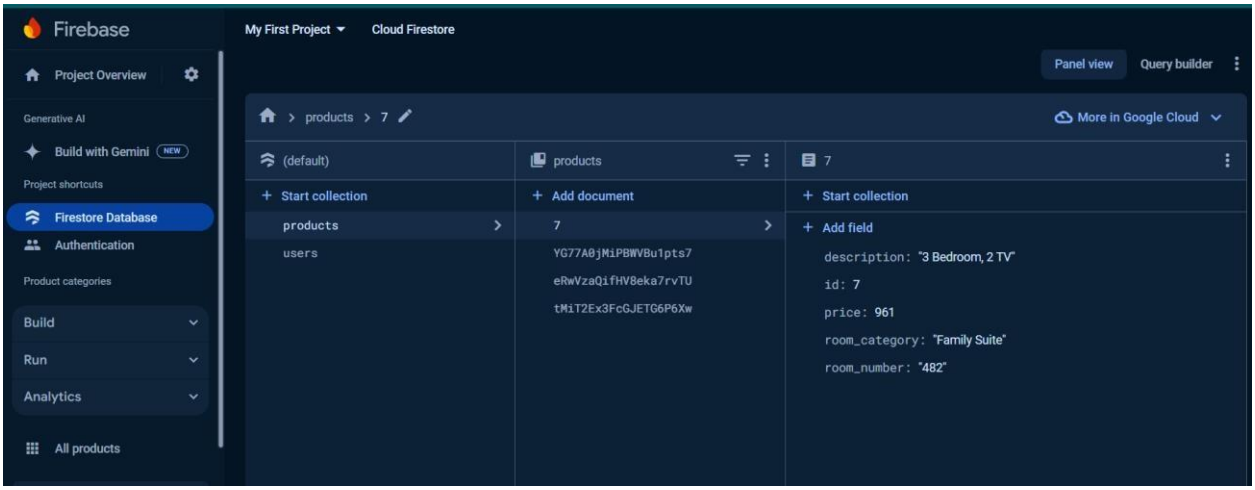
Firestore Database Interface

Product Page:

- The ProductPage allows users to add, update, and delete room bookings.
- Forms are used for input, and a ListView displays the products.

After adding data to the database of cloud_firebase on on the application.





Conclusion

This Flutter application effectively integrates Firebase and authentication services to manage hotel room bookings with a secure operation. The application features a robust UI for CRUD operations and ensures data consistency between local storage and cloud storage. For future improvement, we can consider adding more authentication properties to the app.