Mini-Project Report On

Corental (An Application that allows online booking of rental costumes.)

Submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Technology

in

Computer Science & Engineering

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CERTIFICATE

This is to certify that the mini-project report entitled ***"Corental (Application that allows online booking of rental costumes.)"*** *is a bonafide work done by* ***Ms. Namitha Reji (U2003142), Ms. Navami Sunil (U2003144), Ms. Sandra Philna Sajiv (U2003185), Mr. Sreeranj S (U2003204)****, submitted to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology (B. Tech.) in Computer Science and Engineering during the academic year 2022-2023.*

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ABSTRACT

The challenge is to create a mobile application which will help its users to book costumes online.People spend a lot of money on clothes and other accessories but often use them only for a single occasion, resulting in excess money being spent for each occasion. It is found that people are often running behind the current trend, and are hence willing to spend money unnecessarily for the same even though the usage is for a short period. This application will prove to be an ideal option to save travel cost and time, by allowing users to search for a costume of their choice to rent for a particular duration.

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Chapter 1

Introduction

1.1 General Background

1.1.1 Android Development

Flutter is a popular framework for Android development that offers cross-platform capabilities and a simplified development process. It allows developers to create visually appealing and high-performance applications using a single codebase. With features like hot reload and a widget-based architecture, Flutter enables quick iteration and easy User Interface customization. Its performance is enhanced through native code compilation and the use of the Skia graphics engine. Flutter also benefits from a thriving community that provides resources and plugins to support developers. Overall, Flutter simplifies Android development, resulting in efficient and impressive applications.

Android Studio is used which is an integrated development environment (IDE) specifically designed for Android app development. It provides robust support for Flutter-based app development, offering features such as project creation, code editing, emulator and device testing, hot reload, debugging, performance profiling, and deployment. Android Studio streamlines the process of developing Flutter apps, allowing developers to create high-quality, cross-platform applications efficiently.

1.2 Objectives

To facilitate online costume rental booking service and to reduce the expenses caused by unnecessary travel and purchase. It allows us to prebook and rent a product for a certain duration.

- Transportation cost.
- Lack of time to visit shops.

1.3 Existing System

In the 'Rent the Runway' application, you can find designer dresses, and rent them for a couple of days. This application is only available in US, and it also requires users to subscribe.

1.4 Problem Statement

The challenge is to create a mobile application which allows users to book rental costumes. People spend unnecessary money on clothes and other accessories but often use them only for a single occasion. Our project aims to find a solution for this.

1.5 Motivation

A costume rental application offers a convenient solution for customers who are looking for rent costumes for various occasions without the need to visit physical stores.It allows users to access a wide range of costumes at a fraction of cost of buying them.It also promotes sustainable consumption by reducing waste and the need for manufacturing new costumes.

1.6 Objectives

- **Objective**- To facilitate online costume rental booking service and to reduce the expenses caused by unnecessary travel and purchase. It allows us to rent a product for a couple of days when an occasion arises.
- **Convenient Access** - Provide users with an easy and convenient way to browse and rent costumes.
- **Home Page** Offers a seamless user interface that allows customers to filter and view costumes.
- **Booking and Scheduling** -Enable users to book costumes for rent in advance for a specific duration.

1.7 Summary of Report

The primary goal of this report explains processes and efforts that went into developing an Android application that facilitate online costume rental booking service to reduce the expenses caused by unnecessary travel and purchase.The first chapter deals with the general background of the project, its objective and the motivation behind it. The second part deals with an analysis of the different papers that were referred throughout the project. The third chapter describes the problem definition, the system architecture, the scope of the project and a detailed explanation about the implementation of the project and the technologies used. The fourth chapter contains the final results and discussions associated with the project while the last chapter outlines the conclusion of the entire project and its future scope. The report also includes the various references used as well as appendixes specifying the project code and project objectives.

Chapter 2

Literature Review

2.1 Firebase (Backend as A Service) for Mobile Application Development

Authors: Prachi R. Saraf, Sakshi M. Jadhao, Saurabh J. Wanjari, Shital G. Kolwate, Prof. Ankush D. Patil[1]

A. Backend As A Service(BaaS) In the area of mobile application development, there are two major terms on which the developers has to work i.e. for frontend and backend. Backend is the most crucial part of mobile application development which responsible for storing the data, securing data, etc. The backend of the application is like a server for mobile apps, as it stores and sorts the data properly and the end user can only see the necessary information. BaaS i.e Backend-as-a-Service is a cloud service model in which developers outsource all the behind-the-scenes aspects of a web applications or mobile application so that they only have to write and maintain the frontend part. BaaS vendors provide pre-written software for activities that take place on servers, such as user authentication, database ,remote updating, and push notifications (for mobile apps), as well as cloud storage and hosting.

B. Firebase

1. Introduction to Firebase: Firebase is a real-time database and also acts as a Backend-as-a-Service(BaaS). It allows to store a list of objects. Google Firebase is Google-backed application development software which allows developers to develop applications for Android, iOS, and Web apps. Firebase is a grouping of Google's many services in the cloud, including instant messaging, user authentication, real-time database, storage, hosting, etc. Firebase offer real time database, authentication, cloud storage, cloud functions, etc. Firebase accomplishes real-time data in the database. Firebase makes easy to exchanges the data to and from the database. Firebase provides backend for- iOS, Android, and Web applications. Firebase applications can be arranged over a protected connection

to the firebase server. Firebase offers a dashboard simple control. It provides number of useful services. It is highly secure and minimal setup. Cloud Functions feature is one of the new feature of firebase cloud which allows developers to write programs in JavaScript language and placed them on the Firebase cloud platform. Using Firebase, each unit can directly access the database.Firebase is a Google-owned multi-service cloud-computing solution for mobile and web developers. The feature grouping in Firebase rushes the cloud database integration automatically in both web and mobile app.

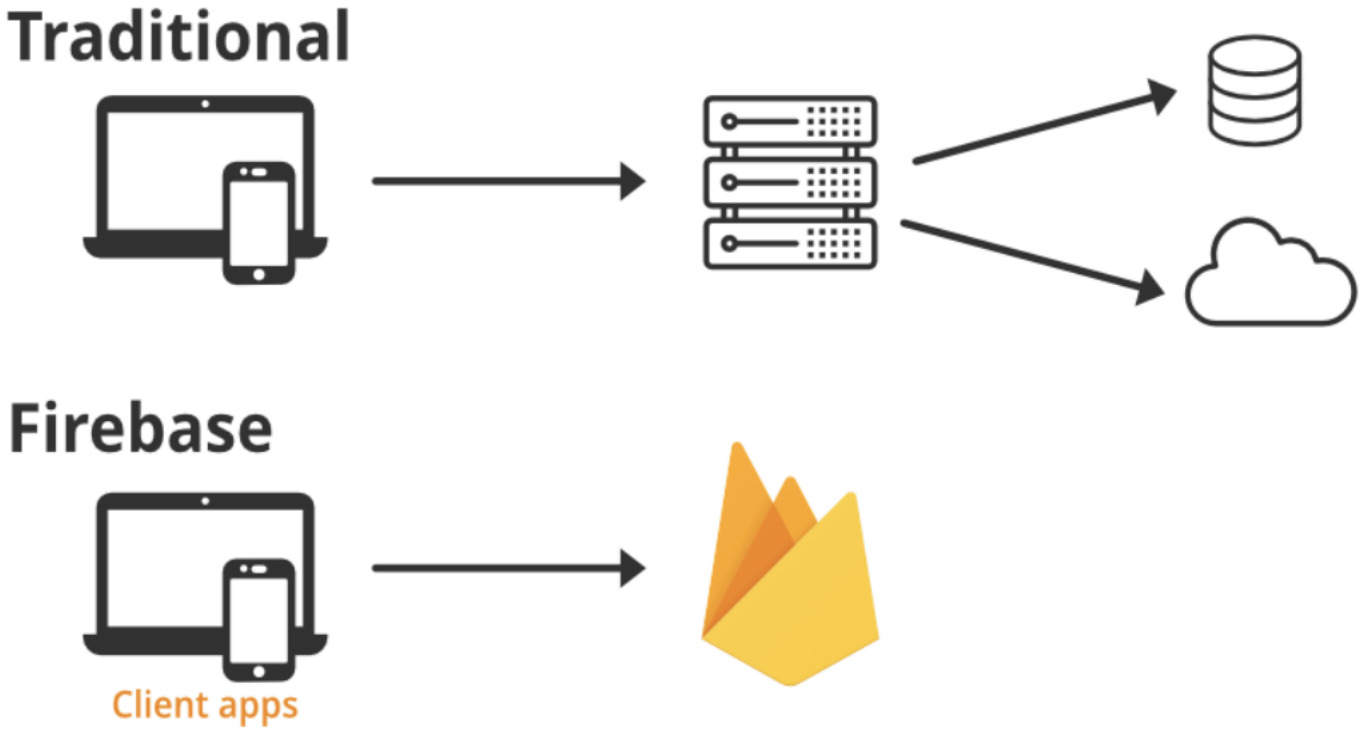

Figure 2.1: LS3 Flowchart

2. Ease of using Firebase: Firebase is a web application development platform created by Google. It lets you to developed the whole application on the front-end without any server-side code. At the same time, it does let you set up some server-side logic through Firebase Functions if you need to react to certain events (Creation of data or files, login, https requests) so that you can send emails or push notifications or process the data after it is written.It's easy to start a project with Firebase or add a Firebase to your project. It allows real-time database connection, which means multiple users can see the changes in the data when the data gets created or edited. Data transmission is handled with web

sockets so you don't have to send requests to get new data, you only need to subscribe once.The same applies for file storage. Quick setup authentication through the major providers (Google, Twitter, Facebook, GitHub). https by default - secure http traffic without setting up certificates. Any static html/javascript content can be hosted.

3. Services of Firebase : Analytics, This feature are also enables the application developer to understand how users are using his application. The Software Development Kit capture events and properties on its own and also allows you to get custom data. The dashboard also provides details like your most active user or what feature of your application is used most.

2.2 Mobile Application Development Based on Flutter Platform

Authors: Shreya A. Bhagat, Sakshi G. Dudhalkar, Prathmesh D. Kelapure, Aniket S. Kokare, Prof. Sudesh A. Bachwani[2]

Flutter as a framework is very promising and right now has a big dev community. Even now we can find complex apps in the market which are based on Flutter, like Alibaba, Google Ads, Reflect, Birch Finance, Hamilton Musical, Hookle (Skuza, 2019). In the Authors opinion, this technology is a good choice for small and medium-size applications or when content and basic features require constant iteration. The technology potential is also big as during Flutter interact conference Google introduces support for web applications (Sneath, 2019). Dart language is also the fastest-growing programming language nowadays. Its list features added during the last two years is also big and includes extension functions, null safety support.

Flutter itself is not a programming language. Rather, it's an Software Development Kit with pre-written code, consisting of ready-to-use and customizable widgets. The programming language that's used is Dart, is also developed by Google. By avoiding using a bridge to communicate with the native layer such as Android or iOS, Flutter minimizes performance issues and boosts app start-up time.

To develop an app using Flutter, you need developers to code in Dart. That should not be an issue, because it's similar to Kotlin, Java, Swift, and JavaScript. Also, it's easy to learn. According to Google, Dart is a client-optimized language for fast apps on any platform. Object-oriented like Java, C++, and Python, it compiles ahead of time to

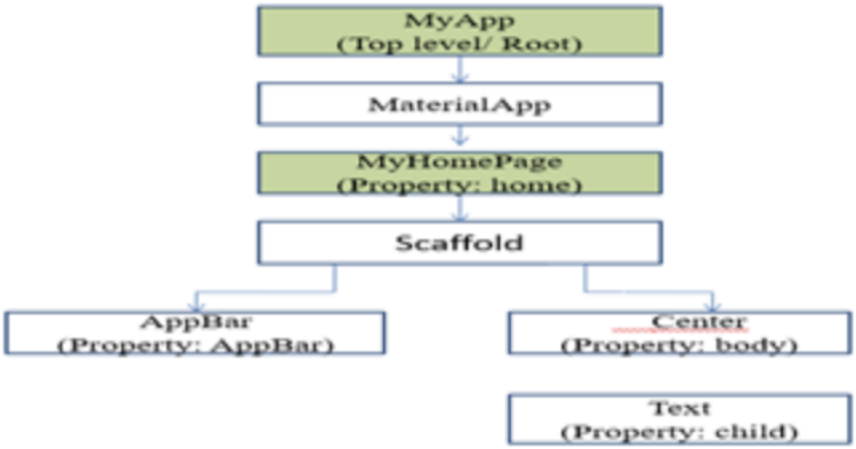

Figure 2.2: Layers of widgets

native ARM or x64 machine code, and to JavaScript byte code for web. As a result, apps written in Dart are impossible to distinguish from native apps at the machine level.

2.3 Fashion Renting

Author: HEEJU NOE, M.F.I.S., AUGUST 2021[3]

Collaborative consumption is continuously growing in the fashion industry. This practice has generated significant interest among practitioners and researchers with its great potential to extend the apparel product life cycle and minimize the environmental impact.

Renting, one typical form of product-service system (access-based consumption), is not a novel concept, yet recent technological advancements in e-commerce have significantly enhanced the FR market. FR is defined as "one party offers an item to another party for a fixed time in exchange for a fixed amount of money and in which there is no change of ownership. That is, FR allows customers to enjoy access to goods in a more convenient and affordable manner without any transfer of ownership. Participation in online FR is constantly growing (e.g., Rent the Runway, LeTote, and Gwynnie Bee). Recently, mall brands such as Urban Outfitters, Ralph Lauren, and Ann Taylor have also joined the rental market to circulate their inventory and supplement their revenue. It has been found that renting offers potential customers a new way of experiencing a company's offerings (Park and Armstrong, 2019). In addition, FR can also provide the benefit of introducing broader product lines to consumers.

2.4 Rent the Runway

Rent the Runway was founded in 2009 and quickly gained popularity as a pioneer in the fashion rental industry.It operates on a subscription-based model, allowing users to rent clothing items for a fixed monthly fee or rent items on a one-time basis.

The platform offers a wide selection of designer dresses, outfits, accessories, and other fashion items for women. Users can choose between various rental options, including one-time rentals for specific events or occasions and subscription-based plans with a certain number of rentals per month.Rent the Runway promotes sustainability by encouraging users to rent clothing rather than buy single-use outfits. The application provides users with access to a vast inventory of designer clothing and accessories from renowned fashion brands.The platform curates collections for various occasions, such as formal events, parties, weddings, and everyday wear.Users can choose between different tiers of subscriptions, providing access to a certain number of items per month.

2.5 Conclusion

In conclusion, costume rental applications serve as valuable platforms that address the needs of modern consumers and the broader economy. These applications offer numerous benefits that contribute to sustainability, convenience, and cost-effectiveness in the fashion industry.It allow users to access a wide range of costumes for various occasions without the need for permanent ownership. This cost-effective approach enables users to wear stylish and high-quality outfits at a fraction of the cost of purchasing. Renting costumes instead of buying them eliminates the need for storage space and reduces clutter in users' homes. It provides a practical solution, especially for individuals who rarely wear costumes. By promoting a sharing economy model, costume rental applications encourage the reuse and recycling of clothing, reducing the environmental impact of fashion waste and over consumption. This aligns with the growing focus on sustainability and responsible consumption.

Chapter 3

System Analysis

3.1 Expected System Requirements

The system of user which is a smart phone is expected to have the following features:

- Android platform with a version above 8.0.
- Requirement of internet connection to connect to database.
- A storage of 100MB for the application.
- A minimum RAM size of 2GB is required in the device.

3.2 Feasibility Analysis

3.2.1 Technical Feasibility

The project is technically feasible since majority of the population are in possession of smartphones. The app only requires minimum requirements to run on a smartphone .

3.2.2 Operational Feasibility

The operations are built in a simple and easy to use manner for people of all ages. Installation of the app is the only prerequisite operation to be done.

3.2.3 Economic Feasibility

The app can reduce the overhead of expense by saving travelling cost and time. The development of the app is also zero budget as it was built using free resources.

3.3 Hardware Requirements

The following are the system requirements to develop the Corental App. Processor: Intel Core i5 Hard Disk: Minimum 100GB RAM: Minimum 8GB

3.4 Software Requirements

The following are the softwares used in the development of the app.

- Operating System: Windows 11
- Android Studio
- Firebase

3.4.1 Android Studio for flutter app development

Android Studio is a popular Integrated Development Environment (IDE) for developing Flutter apps, as it provides a wide range of tools and features that can help you build high-quality apps faster. Some of the key features of Android Studio for Flutter development include:

A rich set of tools for debugging, testing, and profiling your app. A powerful code editor with support for code completion, refactoring, and more A flexible build system with support for building, testing, and deploying your app. Integration with popular version control systems like Git. A visual layout editor for building attractive user interfaces

3.4.2 Firebase

Firebase is a Backend-as-a-Service (BaaS) app development platform that provides hosted backend services such as a real time database, cloud storage, authentication, crash reporting, machine learning, remote configuration, and hosting for your static files.

Firebase supports Flutter. For more information, see: The Firebase plugins page Getting started with Firebase and Flutter Get to know Firebase for Flutter video workshop based on the code lab Get to know Firebase for Flutter code lab Use Firebase to host your Flutter app on the web

3.4.3 Flutter and flutter plugins

Plugins are the wrapper of the native code like android(java or kotlin) and iOS(swift or Objective C). Plugins are written in platform-specific code to access the platform-specific features. Flutter does support using packages and plugins contributed by other developers to its ecosystem For instance, if you wanted to access a sensor on the phone, the only way is to write a plugin (or use one that's already there). The API of the plugin is written in Dart.

A module is able to integrate the flutter with the help of the existing native application. These are the major differences between the flutter plugin and the flutter module.

3.4.4 Figma

Figma is a collaborative web application for interface design, with additional offline features enabled by desktop applications for macOS and Windows. The feature set of Figma focuses on user interface and user experience design, with an emphasis on real-time collaboration,utilising a variety of vector graphics editor and prototyping tools.

Chapter 4

System Implementation

4.1 Database Design and Firebase Integration

Firebase's NoSQL real-time database structure will be leveraged to create collections and documents to store user data, including usernames, passwords,emails and previous costume booking details. Security rules will be implemented to ensure data privacy and restrict unauthorized access.

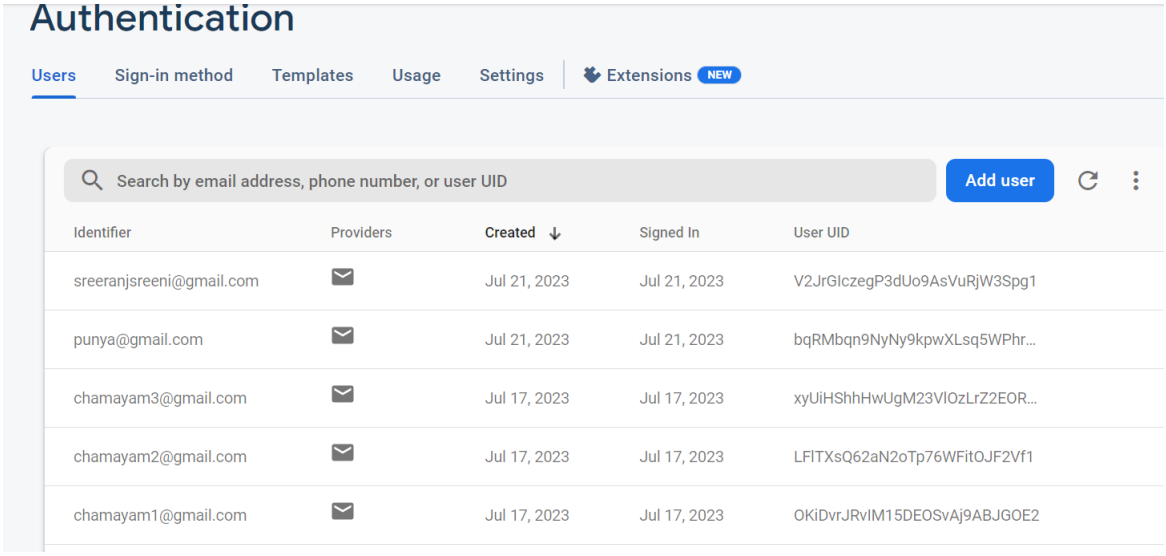

Figure 4.1: Authentication details

In figure[4.1] the authentication details of the user is stored in the firebase database such as the email and password . This ensures privacy and protection of data of one user from the other that is only the user can view his/her previous booking details and account details.

The user collection contains the database collection of various users of the app with their saved credentials.

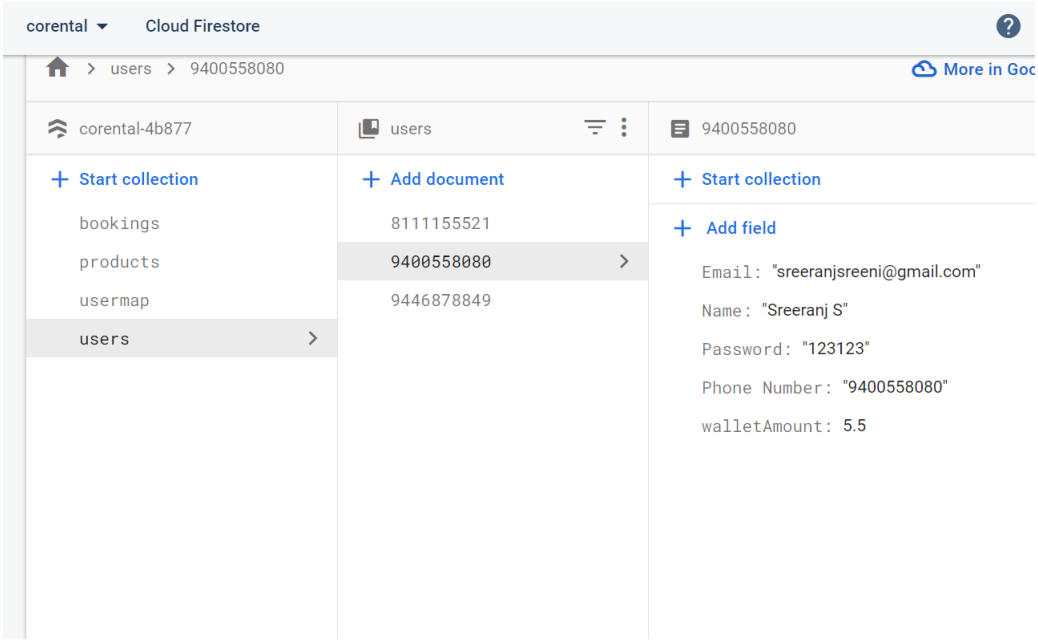

Figure 4.2: User entry details

In product collection contains the details of various products according to various categories as field values.It includes the product category,name,quantity,image url and sizes available.

The booking collection shows the booking details like booking id,date of various bookings are stored to keep track of the booking and to ensure security of the details.

4.2 UI Design Implementation

Asset Export: Export all design assets (icons, images, etc.) from Figma in the required formats and resolutions for app development.

UI Components: Break down the Figma design into reusable UI components, ensuring consistency and facilitating development.

Responsive Design: Ensure that the UI design is responsive and adapts to various screen sizes and orientations, catering to both smartphones and tablets.

4.3 Development (Flutter with Android Studio)

Firebase Project Setup: Create a new Firebase project, configure necessary services(Authentication, Firestore), and obtain API keys for integration with the Flutter app.

Firebase Database: Integrate Firebase Authentication with the Flutter app to enable user registration, login, password and view functionalities. Set up the database structure in Firebase Firestore to store user data,booking details.

4.4 Maintenance and Updates

Monitoring and Bug Fixing: Monitor the app's performance, user feedback, and crash reports. Address and fix any reported bugs or issues promptly.

Continuous Improvement: Continuously gather user feedback to identify areas for improvement and introduce new features or enhancements to enhance the app's functionality and user experience.

4.5 Conclusion

By following this detailed system implementation plan, the 'Corental' application will be developed with the Figma designed User Interface', integrated with Firebase for user authentication, database storage, and real-time data updates using Flutter and Android Studio. The app will provide users with a user friendly interface to browse costumes according to different categories and pre-book them.

Chapter 5

System Design

5.1 Architecture Diagram

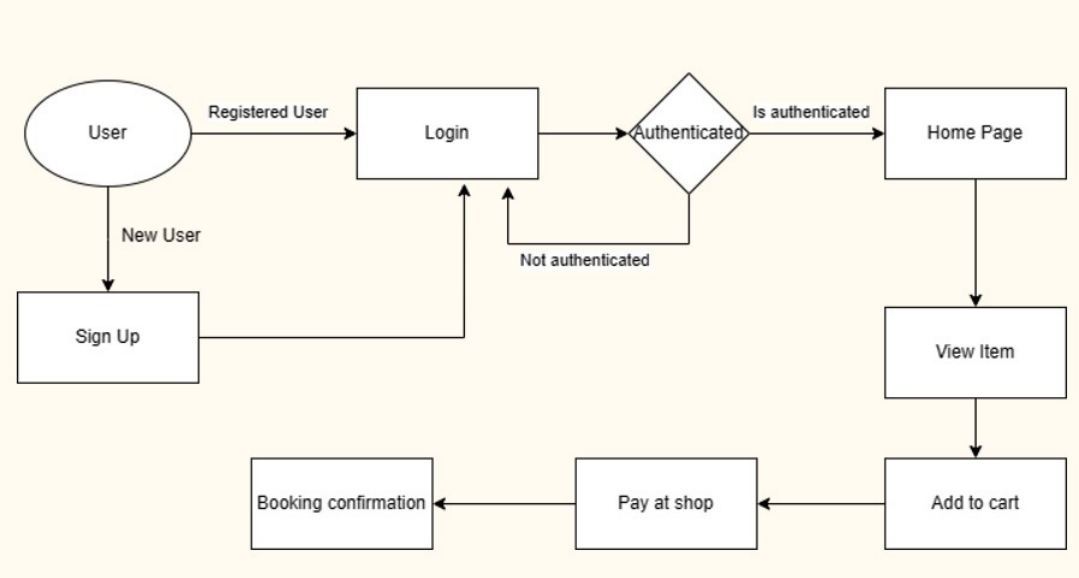

Figure 5.1: Architecture diagram

5.2 Design of the System

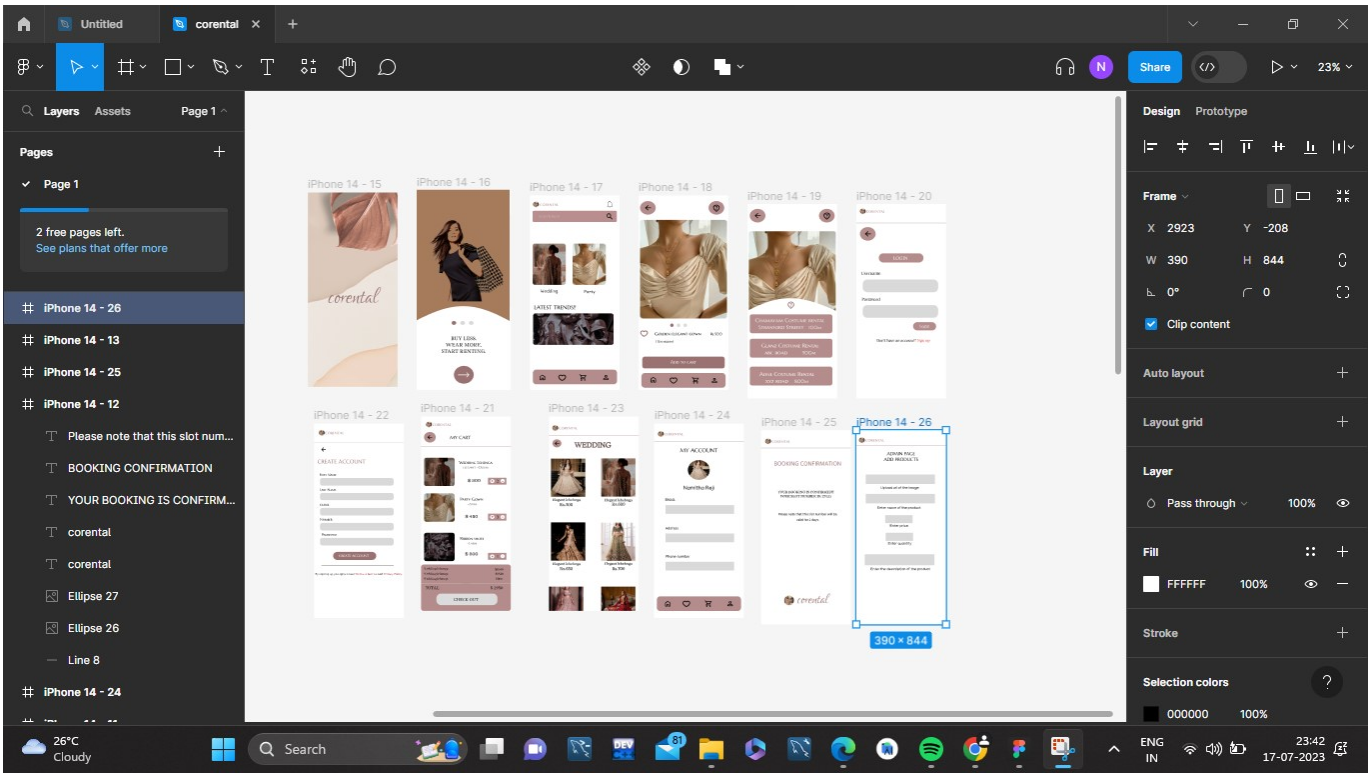

Figure 5.2: Design of the System

5.3 Sequence Diagram

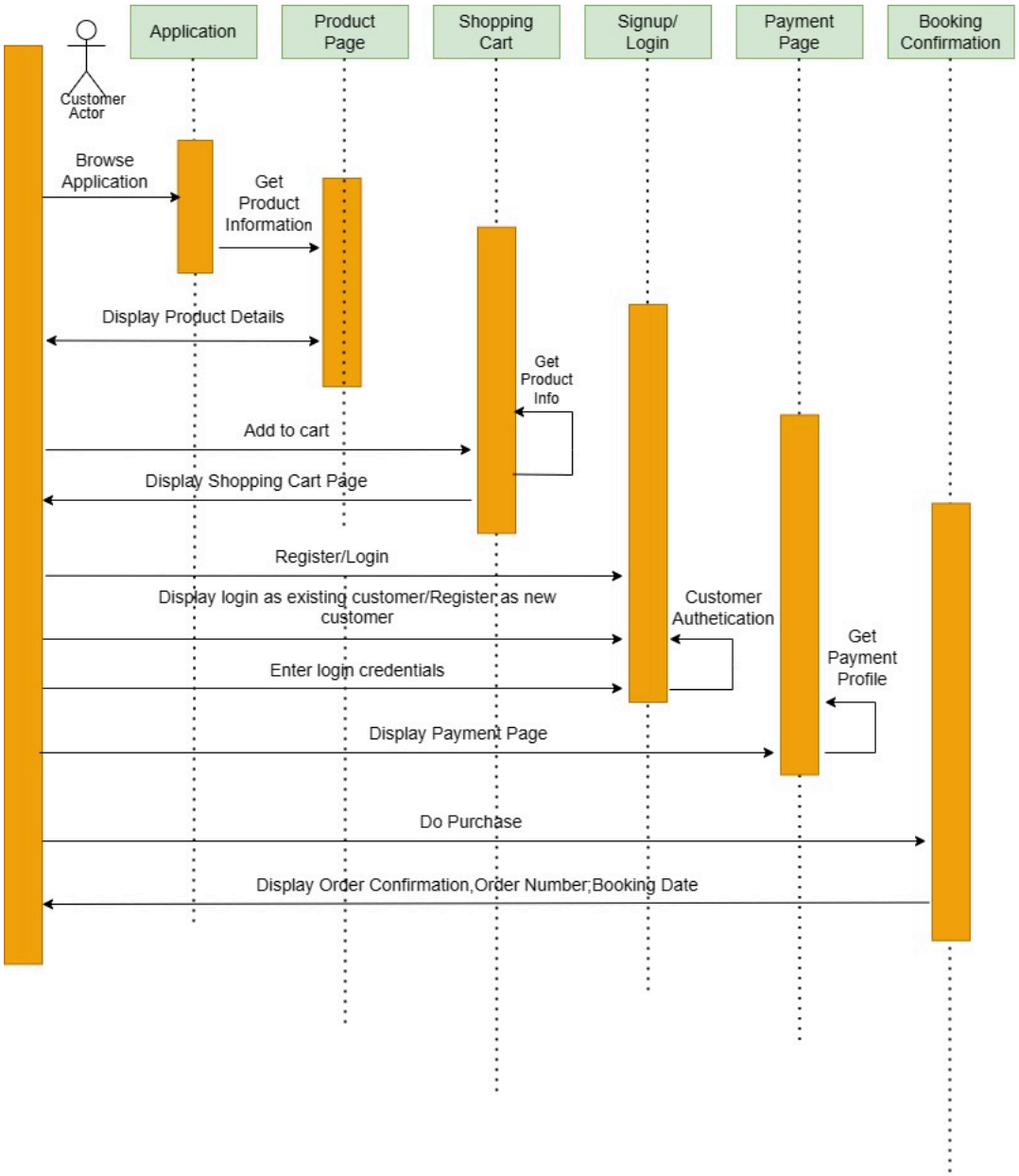

Figure 5.3: Sequence Diagram-Costume Rental Application

5.4 Module Diagram

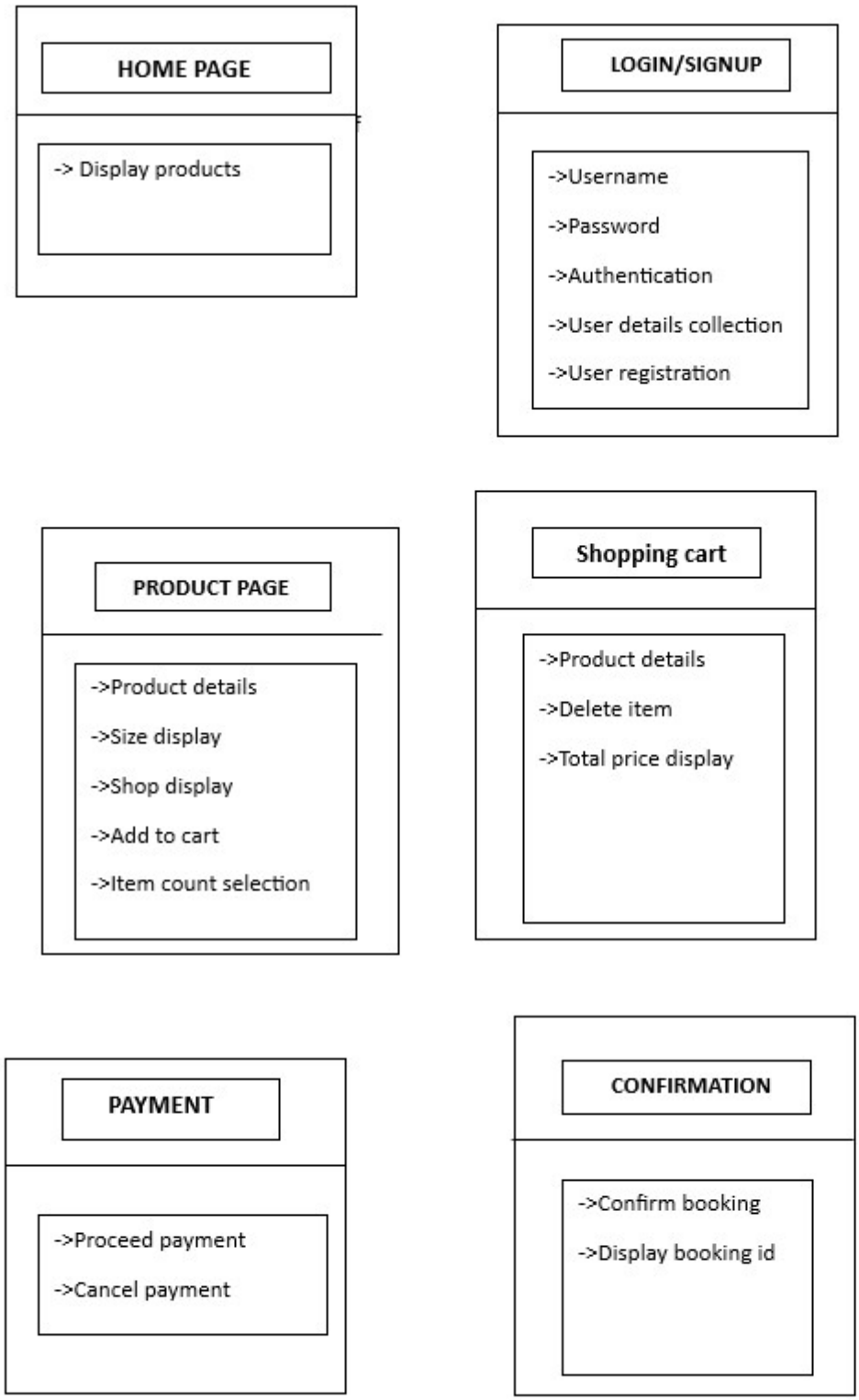

Figure 5.4: Module Based Diagram-Costume Rental Application

Chapter 6

Results and Screens

Figure 6.1: Splash Screen

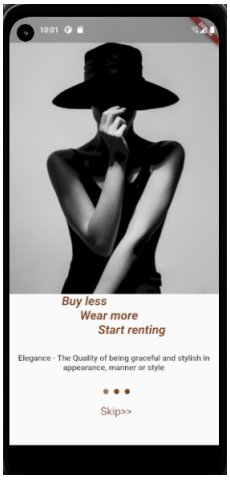

Figure 6.2: Intro Page(1/2)

Figure 6.3: Intro Page(2/2)

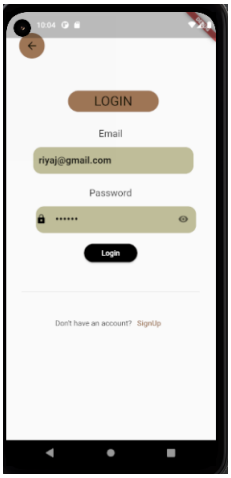

Figure 6.4: Login

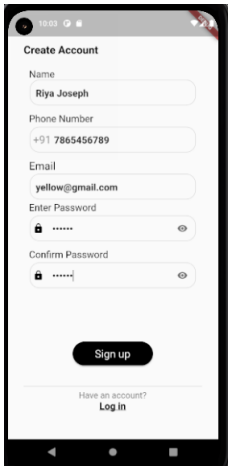

Figure 6.5: Signup

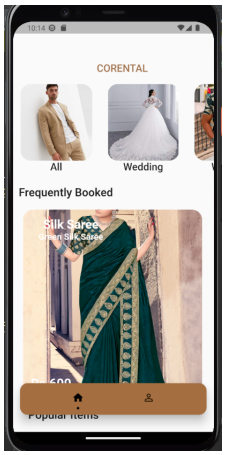

Figure 6.6: Home Page

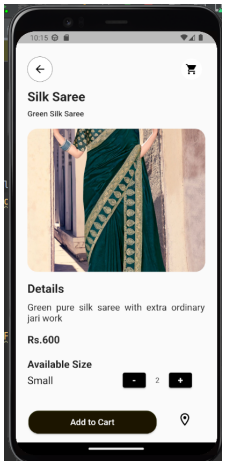

Figure 6.7: Product Page

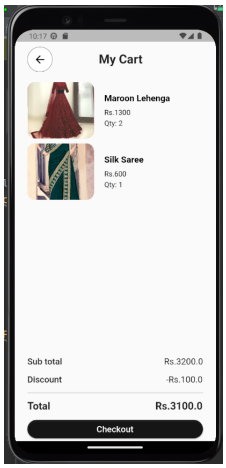

Figure 6.8: Cart Page

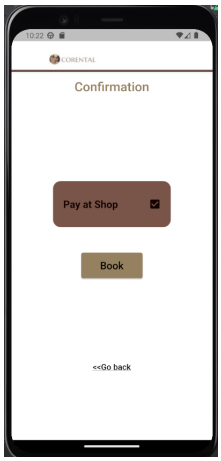

Figure 6.9: Payment Page

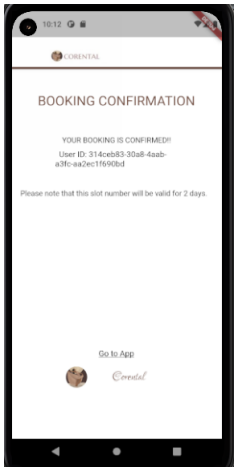

Figure 6.10: Confirmation Page

Chapter 7

Conclusion and Future Scope

7.1 Challenges

Implementation of the application using Flutter and Firebase requires constant upgradation of the versions.Collection of datas from various sources.Adapting to a fast-paced market requires continuous innovation.Difficulty in data collection may arise due to limited access, privacy concerns, and technical limitations.

7.2 Conclusion

We have developed an android application that allows users to pre-book costumes for rental online. The app consists of the following features: Autherization of the users, screen listing available products, select product according to a specific category, set details of the selected product, add product to the cart, checkout the price details and generation of a unique booking id for confirming the slot . All of these features have been verified to be working as intended.

We have used Android Studio version arctic fox 2020.3.1, Flutter and flutter plugins and Firebase. The initial User Interface designing was done using Figma. We developed all the designed screens using flutter and connected the database using Firebase. The application will work for test purposes and smaller system.

7.3 Scope of Future Work

Future work for the costume rental app requires collecting more resources,adding additional features like shipping and connecting with various rental shops with the service.

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[1] Prachi R. Saraf, Sakshi M. Jadhao, Saurabh J. Wanjari, Shital G. Kolwate, Prof. Ankush D. Patil, A Review on Firebase (Backend as A Service) for Mobile Application Development, IJRASET Journal For Research in Applied Science and Engineering Technology, ijraset.2022.39958

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Appendix A: Sample Code

Login

```
import 'package:corental/screen/loginpage/components/loginpagebody.dart';
import 'package:corental/screen/signuppage/components/signuppagebody.dart';
import 'package:flutter/material.dart';
class LoginPage extends StatelessWidget {
  const LoginPage({Key? key}) : super(key: key);
  @override
  Widget build(BuildContext context) {
    return Scaffold(body: LoginPageBody()) }import
'package:corental/screen/accountpage/accountpage.dart';
import 'package:corental/screen/coverpage/components/coverpagebody.dart';
import 'package:corental/screen/coverpage/coverpage.dart';
import 'package:corental/screen/firstpage/firstpage.dart';
import 'package:corental/screen/openpage/openpage.dart';
import 'package:corental/screen/signuppage/signuppage.dart';
import 'package:flutter/cupertino.dart';
import 'package:flutter/material.dart';
import 'package:firebase_core/firebase_core.dart';
import 'package:firebase_auth/firebase_auth.dart';
import 'package:cloud_firestore/cloud_firestore.dart';
import 'package:shared_preferences/shared_preferences.dart';
class LoginPageBody extends StatefulWidget {
  const LoginPageBody({Key? key}) : super(key: key);  @override
  State<LoginPageBody> createState() => _LoginPageBodyState();}
class _LoginPageBodyState extends State<LoginPageBody> {
  final emailController = TextEditingController();
  final passwordController = TextEditingController();
  bool _passwordVisible = false;
  Future<void> _storeDocumentIdInSharedPreferences(String documentId) async {
    final SharedPreferences prefs = await SharedPreferences.getInstance();
    prefs.setString('documentId', documentId);}
  Future<void> _storeMobileNumberInSharedPreferences(String mobileNumber) async {
    final SharedPreferences prefs = await SharedPreferences.getInstance();
    prefs.setString('mobileNumber', mobileNumber); }
  void _showSnackBar(BuildContext context, String message) {
    ScaffoldMessenger.of(context).showSnackBar(
      SnackBar(content: Text(message)),);}
  Future<String?> getMobileNumberFromFirestore(String documentId) async {
    final DocumentSnapshot snapshot =await
FirebaseFirestore.instance.collection('usermap').doc(documentId).get();
    if (snapshot.exists) final data = snapshot.data() as Map<String, dynamic>?;
      if (data != null) {
        return data['Phone Number'] as String?;}}
    return null; }
  @override
  Widget build(BuildContext context) return SingleChildScrollView(
        child: Column( children: [
```

```
        Container(margin: EdgeInsets.only(top: 40,right: 295,),
          decoration: BoxDecoration(shape: BoxShape.circle,color: Color.fromRGBO(158, 117, 85,1),),
          child: IconButton(icon: Icon(Icons.arrow_back),
            onPressed: (){Navigator.push(context, MaterialPageRoute(builder: (context)=>
CoverPage(),));
            },)),
        Column(mainAxisAlignment: MainAxisAlignment.center,
         crossAxisAlignment: CrossAxisAlignment.center,
         children: [
          Container(height: 40,width: 170,
            margin: EdgeInsets.only(top: 60,bottom: 30,left: 10),
            decoration: BoxDecoration(borderRadius: BorderRadius.all(Radius.circular(20.0)),color:
Color.fromRGBO(158, 117, 85,1),),
            child: Center(child: Text("LOGIN",style: TextStyle(fontSize: 25),))),],),
        Container(
          child: Text("Email",style: TextStyle(fontSize: 18),textAlign: TextAlign.left,)),
        Container(height: 50,width: 300,padding: EdgeInsets.symmetric(horizontal: 10),
         margin: EdgeInsets.only(left: 25,right: 15,top: 15,bottom:
25),decoration:BoxDecoration(borderRadius:BorderRadius.all(Radius.circular(15)),color:
Color.fromRGBO(191, 189, 153, 1)),child: SizedBox(width: 200,child:TextField(controller:
emailController,style: TextStyle(fontSize: 18,fontWeight: FontWeight.bold),
cursorColor: Colors.black,cursorWidth: 1,keyboardType: TextInputType.emailAddress, decoration:
InputDecoration(prefixStyle: TextStyle(fontSize:20,color:Colors.black45),border:
InputBorder.none,counterText: "",),),), ),
        Container(
          child: Text("Password",style: TextStyle(fontSize: 18),textAlign: TextAlign.left,)),
        Container(height: 50,width: 300,
         margin: EdgeInsets.only(left: 35,right: 15,top: 15,bottom: 20),
         decoration: BoxDecoration(borderRadius: BorderRadius.all(Radius.circular(15)),
           color: Color.fromRGBO(191, 189, 153, 1)),
         child: TextFormField(
          obscureText: !_passwordVisible,controller: passwordController,style: TextStyle(fontSize:
20,fontWeight: FontWeight.bold),
           maxLength: 8,cursorColor: Colors.black,cursorWidth: 1,
           decoration: InputDecoration(
            icon: Container( padding: EdgeInsets.only(left: 10),
              child: Icon(Icons.lock,color: Colors.black,size: 20,)),
            suffixIcon: InkWell( onTap: (){ setState(() {passwordVisible = !_passwordVisible; });},
             child: Icon(Icons.remove_red_eye,color: Colors.black54,size: 20,), ),
            border: InputBorder.none,counterText: "",),),),
        Center(   child: Container(height: 35,width: 100,margin: EdgeInsets.only(bottom: 20),
           decoration: BoxDecoration(color: Color.fromRGBO(158, 117, 85,1),
             borderRadius: BorderRadius.all(Radius.circular(30))),
           child: ElevatedButton(child: Text("Login"),
            style: ElevatedButton.styleFrom(backgroundColor: Colors.black,
             shape: RoundedRectangleBorder(borderRadius: BorderRadius.circular(30)),),
            onPressed: (){ setState(() {  FirebaseAuth.instance.signInWithEmailAndPassword(
   email: emailController.text, password: passwordController.text) .then((value) async {    final user =
```

```
FirebaseAuth.instance.currentUser; if (user != null) {
                    final documentId = user.uid;
                    final mobileNumber =await getMobileNumberFromFirestore(documentId);
                    if (mobileNumber != null) {
  _storeDocumentIdInSharedPreferences(documentId);
  _storeMobileNumberInSharedPreferences(mobileNumber);
                     SharedPreferences pref = await SharedPreferences.getInstance();
                     pref.setString("phone", mobileNumber);
                     Navigator.push(context, MaterialPageRoute(builder: (context) => HomePage()));
                    } else {
                     _showSnackBar(context, 'Email not found.');
                    }}}).catchError((error) {
             showSnackBar(context, 'Password does not match.');
                 print("Error ${error.toString()}");}); });}, )),),
          Divider(
            height: 70,
            indent: 30,
            endIndent: 30,
            color: Colors.black45,
          ),
          Container(child: Row(mainAxisAlignment: MainAxisAlignment.center,
            children: [
              Text("Don't have an account?",style: TextStyle(fontSize: 14),),
              TextButton(onPressed: (){Navigator.push(context, MaterialPageRoute(builder: (context)=>
SignUpPage(),));},
                  child: Text("SignUp", style: TextStyle(color: Color.fromRGBO(158, 117, 85,1),fontSize:
14),)) ], )), ], ),  );}}
```

ProductList

```
import 'package:cloud_firestore/cloud_firestore.dart';
import 'package:corental/screen/productlist/components/productlistbody.dart';
import 'package:flutter/foundation.dart';
import 'package:flutter/material.dart';
class ProductList extends StatefulWidget {
   ProductList({Key? key,required this.Category}) : super(key: key);
   String Category;
  @override
  State<ProductList> createState() => _ProductListState();}
class _ProductListState extends State<ProductList> {
  List list1 = [];
  @override
  Widget build(BuildContext context) {
    return Scaffold(
      body: ProductListBody(list:list1,Category:widget.Category),); }
  List docIDs=[];
  @override
  void initState() {
    // TODO: implement initState
```

```
    super.initState();
    getDocId()  }
  Future getDocId() async{
    var snap = await FirebaseFirestore.instance.collection('products').get();
    docIDs = snap.docs.map((e) => e.data() as Map<String,dynamic>).toList();
    print(widget.Category);
    if (widget.Category != "All") {
      docIDs.forEach((element) {
        if(element["Category"] == widget.Category){
          list1.add(element); } });
    }else{list1 = docIDs;}
    setState(() { });
    print(list1);
    print(docIDs[0]["Category"]);}}

import 'package:cloud_firestore/cloud_firestore.dart';
import 'package:corental/screen/firstpage/firstpage.dart';
import 'package:corental/screen/productpage/productpage.dart';
import 'package:flutter/cupertino.dart';
import 'package:flutter/material.dart';
class ProductListBody extends StatefulWidget {
   ProductListBody({Key? key,required this.list,required this.Category}) : super(key: key);
   List list;
   String Category;
  @override
  State<ProductListBody> createState() => _ProductListBodyState();
}
class _ProductListBodyState extends State<ProductListBody> {
  List list2=[];
  @override
  Widget build(BuildContext context) {
    return SingleChildScrollView(
      child: SafeArea(
        child: Container(
          margin: EdgeInsets.only(left: 10,right: 10,top: 30),
          child: Column(
            crossAxisAlignment: CrossAxisAlignment.start,
            children: [
              InkWell( onTap: (){
                  Navigator.push(context, MaterialPageRoute(builder: (context) => HomePage(),));  },
                child: Container( height: 45,width: 45,
                  decoration: BoxDecoration(borderRadius: BorderRadius.circular(50),color:
Color.fromRGBO(180,140,140,1)), child: Icon(Icons.arrow_back),   ),  ),
              SizedBox(height: 20,),
              Container(padding: EdgeInsets.only(left: 15),
 child: Text("${widget.Category}",style: TextStyle(fontWeight: FontWeight.w500,fontSize: 25,))),
              child: GridView.count(  crossAxisCount: 2, shrinkWrap: true,  childAspectRatio: 1 / 1.3,
  primary: false,   padding: EdgeInsets.zero,
```

```
            children:   List.generate(  widget.list.length,
                (index) => InkWell(onDoubleTap: ()

                { Navigator.push(context, MaterialPageRoute(builder: (context) =>
Product(list3:widget.list[index])));},
                  child: Container(height: 230, width: 90,
                  margin: EdgeInsets.only(top: 15,left: 10,right: 10),
                  decoration: BoxDecoration(
                  borderRadius: BorderRadius.circular(10),  ),
                  child: Column(crossAxisAlignment: CrossAxisAlignment.start, children: [
                  Container(  height: 170,width: 170,  decoration: BoxDecoration(
 image: DecorationImage(image:NetworkImage("${widget.list[index]['ProductImageUrl']}")
 ,fit: BoxFit.cover )), ),
                  SizedBox(height: 10,),
                  Container(//padding: EdgeInsets.only(right: 55,),
                    child: Column(crossAxisAlignment: CrossAxisAlignment.start,
                      children: [
                        Text("${widget.list[index]["ProductName"]}",
                          style: TextStyle(fontSize: 15),textAlign: TextAlign.left,),
                        Text("Rs."+"${widget.list[index]["Price"]}",style: TextStyle(fontWeight:
FontWeight.w600,fontSize: 14,),textAlign: TextAlign.left,),
 ],),]),),)),),),], ),),),);}}
```

Cart

```
import 'package:corental/screen/cart/components/cartbody.dart';
import 'package:flutter/material.dart';
import 'package:cloud_firestore/cloud_firestore.dart';
class Cart extends StatefulWidget {
  Cart({Key? key}) : super(key: key);
  //List docIDs2;
  @override
  State<Cart> createState() => _CartState();}
class _CartState extends State<Cart> {
  List docIDs2 = [];
  double subtotal= 0;
  @override
  Widget build(BuildContext context) {
    return Scaffold(
      body: CartBody(list4:docIDs2,subtotal:subtotal,total:total,discount:discount),); }
  @override
  void initState() {
    // TODO: implement initState
    super.initState();
    getDocId2();}
  double discount=100.0;
  double total=0.0;
  Future getDocId2() async {
    var snap = await FirebaseFirestore.instance.collection('cart').get();
```

```
    docIDs2 = snap.docs.map((e) => e.data() as Map<String, dynamic>).toList();
    docIDs2.forEach((element) { subtotal = subtotal +
        (int.parse(element['Price']) * int.parse(element['Quantity']));
      print("test ${subtotal.toString()}"); });
    if(subtotal==0||subtotal<1000){
      discount=0.0;}
     total=subtotal-discount; setState(() {});}}

import 'package:corental/screen/confirmation/confirmation.dart';
import 'package:corental/screen/firstpage/firstpage.dart';
import 'package:corental/screen/payment/payment.dart';
import 'package:corental/screen/productpage/productpage.dart';
import 'package:flutter/material.dart';
import 'package:cloud_firestore/cloud_firestore.dart';
class CartBody extends StatefulWidget {
   CartBody({Key? key,required this.list4,required this.subtotal,required this.total,required
this.discount}) : super(key: key);
  List list4;
double subtotal;
double total;
double discount;
  @override
  State<CartBody> createState() => _CartBodyState();}
class _CartBodyState extends State<CartBody> {
  int counter = 0;double tax = 10.0;
  @override
  Widget build(BuildContext context) {
    print("cart");
    return SafeArea(
      child: Column(
        children: [
          Expanded(
            child: Container(
              margin: EdgeInsets.only(top: 10),
              padding: EdgeInsets.only(left: 25, right: 25),
              child: SingleChildScrollView(
                child: Column(
                  children: [
                    Container(
                      child: Row(
                        children: [
                          Ink(
                            decoration: BoxDecoration(
                               color: Colors.white,
                               border: Border.all(width: 0.5),
                               shape: BoxShape.circle),
                            child: IconButton(
                              iconSize: 10,
```

```
                    onPressed: () {
                      Navigator.push(context, MaterialPageRoute(
                        builder: (context) => HomePage()));},
icon: Icon(Icons.arrow_back,color: Colors.black,                    SizedBox( width: 90,),Text("My
Cart",style: TextStyle(fontWeight: FontWeight.bold,fontSize: 24,),
                  textAlign: TextAlign.center, ),],),),
              SizedBox(height: 20),
              Container(child: ListView.builder(shrinkWrap: true,primary: false,itemCount:
widget.list4.length,itemBuilder: (context, height: 110,width: 130,decoration: BoxDecoration(color:
Colors.red,
borderRadius: BorderRadius.circular(15),image: DecorationImage(image:
NetworkImage("${widget.list4[index]['ProductImageUrl']}"),
fit: BoxFit.cover),), ),
                        SizedBox(width: 20),
Column(crossAxisAlignment: CrossAxisAlignment .start, children: [
Text("${widget.list4[index]['ProductName']}",style: TextStyle(
 fontSize: 17,fontWeight: FontWeight.bold,color: Colors.black),),
                          SizedBox(height: 10, ),Text("Rs." +"${widget.list4[index]["Price"]}",
style: TextStyle( fontSize: 14, color: Colors.black),),
SizedBox(height: 5),
Row(children: [Text("Qty: "),
Text('${widget.list4[index]['Quantity']}',
style: TextStyle(fontSize: 14),),
SizedBox(width: 40,),              SizedBox(height: 30), ),),),),
      Container(padding: EdgeInsets.only(left: 25, right: 25),
        child: Column(
          children: [
            Row(
              mainAxisAlignment: MainAxisAlignment.spaceBetween,
              children: [
                Text(
                  "Sub total",
                  style: TextStyle(
                    fontSize: 17, fontWeight: FontWeight.w500),
                ),
Text("Rs."+"${widget.subtotal}",
                  style: TextStyle(fontSize: 17),)],),
            SizedBox( height: 15,),
            Row(
              mainAxisAlignment: MainAxisAlignment.spaceBetween,
              children: [
                Text(  "Discount", style: TextStyle(fontSize: 17, fontWeight: FontWeight.w500),),
                Text(
                  "-Rs."+"${widget.discount}",
                  style: TextStyle(fontSize: 17),)],),
            SizedBox(height: 15,),
            Container(
              decoration: BoxDecoration(color: Colors.black12),
```

```
              height: 2,
            ),
            SizedBox(
              height: 13,
            ),
            Row(
              mainAxisAlignment: MainAxisAlignment.spaceBetween,
              children: [
                Text(
                  "Total",
                  style: TextStyle(
                      fontSize: 20, fontWeight: FontWeight.bold),
                ),Text("Rs."+"${widget.total}",
style: TextStyle( fontSize: 20, fontWeight: FontWeight.bold),)],),
              ],
            ),
          ),

          /// Button
          Container(
            width: 350,
            decoration: BoxDecoration(
              borderRadius: BorderRadius.circular(20),
            ),
            margin: EdgeInsets.only(left: 25, right: 25, top: 10),
            child: ElevatedButton(
                style: ElevatedButton.styleFrom(
                    backgroundColor: Colors.black87,
                    shape: RoundedRectangleBorder(
                        borderRadius: BorderRadius.circular(20))),
                onPressed: () {
                  Navigator.push(context,
                      MaterialPageRoute(builder: (context) => Payment(total:widget.subtotal),));
                },
                child: Text(
                  "Checkout",
                  style: TextStyle(fontSize: 17), )),
          )],),);}}
```

Appendix B: CO PO MAPPING

COURSE OUTCOMES:

After completion of the course the student will be able to

SL. NO	DESCRIPTION	Blooms' Taxonomy Level
CO1	Identify technically and economically feasible problems (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO2	Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO3	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO4	Prepare technical report and deliver presentation (Cognitive Knowledge Level: Apply)	Level 3: Apply
CO5	Apply engineering and management principles to achieve the goal of the project (Cognitive Knowledge Level: Apply)	Level 3: Apply

CO-PO AND CO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	3	3	3	3		2	2	3	2	2	2	3	2	2	2
CO2	3	3	3	3	3	2		3	2	3	2	3	2	2	2
CO3	3	3	3	3	3	2	2	3	2	2	2	3			2
CO4	2	3	2	2	2			3	3	3	2	3	2	2	2
CO5	3	3	3	2	2	2	2	3	2		2	3	2	2	2

3/2/1: high/medium/low

JUSTIFICATIONS FOR CO-PO MAPPING

MAPPING	LOW/ MEDIUM/ HIGH	JUSTIFICATION
100003/CS622T.1-PO1	**HIGH**	Identify technically and economically feasible problems by applying the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
100003/CS622T.1-PO2	**HIGH**	Identify technically and economically feasible problems by analysing complex engineering problems reaching substantiated conclusions using first principles of mathematics.
100003/CS622T.1-PO3	**HIGH**	Design solutions for complex engineering problems by identifying technically and economically feasible problems.
100003/CS622T.1-PO4	**HIGH**	Identify technically and economically feasible problems by analysis and interpretation of data.
100003/CS622T.1-PO6	**MEDIUM**	Responsibilities relevant to the professional engineering practice by identifying the problem.
100003/CS622T.1-PO7	**MEDIUM**	Identify technically and economically feasible problems by understanding the impact of the professional engineering solutions.
100003/CS622T.1-PO8	**HIGH**	Apply ethical principles and commit to professional ethics to identify technically and economically feasible problems.
100003/CS622T.1-PO9	**MEDIUM**	Identify technically and economically feasible problems by working as a team.
100003/CS622T.1-PO10	**MEDIUM**	Communicate effectively with the engineering community by identifying technically and economically feasible problems.
100003/CS622T.1-P011	**MEDIUM**	Demonstrate knowledge and understanding of engineering and management principles by selecting the technically and economically feasible problems.
100003/CS622T.1-PO12	**HIGH**	Identify technically and economically feasible problems for long term learning.
100003/CS622T.1-PSO1	**MEDIUM**	Ability to identify, analyze and design solutions to identify technically and economically feasible problems.
100003/CS622T.1-PSO2	**MEDIUM**	By designing algorithms and applying standard practices in software project development and Identifying technically and economically feasible problems.
100003/CS622T.1-PSO3	**MEDIUM**	Fundamentals of computer science in competitive research can be applied to Identify technically and economically feasible problems.
100003/CS622T.2-PO1	**HIGH**	Identify and survey the relevant by applying the knowledge of mathematics, science, engineering fundamentals.

100003/CS622T.2-PO2	**HIGH**	Identify, formulate, review research literature, and analyze complex engineering problems get familiarized with software development processes.
100003/CS622T.2-PO3	**HIGH**	Design solutions for complex engineering problems and design based on the relevant literature.
100003/CS622T.2-PO4	**HIGH**	Use research-based knowledge including design of experiments based on relevant literature.
100003/CS622T.2-PO5	**HIGH**	Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes by using modern tools.
100003/CS622T.2-PO6	**MEDIUM**	Create, select, and apply appropriate techniques, resources, by identifying and surveying the relevant literature.
100003/CS622T.2-PO8	**HIGH**	Apply ethical principles and commit to professional ethics based on the relevant literature.
100003/CS622T.2-PO9	**MEDIUM**	Identify and survey the relevant literature as a team.
100003/CS622T.2-PO10	**HIGH**	Identify and survey the relevant literature for a good communication to the engineering fraternity.
100003/CS622T.2-PO11	**MEDIUM**	Identify and survey the relevant literature to demonstrate knowledge and understanding of engineering and management principles.
100003/CS622T.2-PO12	**HIGH**	Identify and survey the relevant literature for independent and lifelong learning.
100003/CS622T.2-PSO1	**MEDIUM**	Design solutions for complex engineering problems by Identifying and survey the relevant literature.
100003/CS622T.2-PSO2	**MEDIUM**	Identify and survey the relevant literature for acquiring programming efficiency by designing algorithms and applying standard practices.
100003/CS622T.2-PSO3	**MEDIUM**	Identify and survey the relevant literature to apply the fundamentals of computer science in competitive research.
100003/CS622T.3-PO1	**HIGH**	Perform requirement analysis, identify design methodologies by using modern tools & advanced programming techniques and by applying the knowledge of mathematics, science, engineering fundamentals.
100003/CS622T.3-PO2	**HIGH**	Identify, formulate, review research literature for requirement analysis, identify design methodologies and develop adaptable & reusable solutions.

100003/CS622T.3-PO3	**HIGH**	Design solutions for complex engineering problems and perform requirement analysis, identify design methodologies.
100003/CS622T.3-PO4	**HIGH**	Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
100003/CS622T.3-PO5	**HIGH**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools.
100003/CS622T.3-PO6	**MEDIUM**	Perform requirement analysis, identify design methodologies and assess societal, health, safety, legal, and cultural issues.
100003/CS622T.3-PO7	**MEDIUM**	Understand the impact of the professional engineering solutions in societal and environmental contexts and Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions.
100003/CS622T.3-PO8	**HIGH**	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions by applying ethical principles and commit to professional ethics.
100003/CS622T.3-PO9	**MEDIUM**	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
100003/CS622T.3-PO10	**MEDIUM**	Communicate effectively with the engineering community and with society at large to perform requirement analysis, identify design methodologies.
100003/CS622T.3-PO11	**MEDIUM**	Demonstrate knowledge and understanding of engineering requirement analysis by identifying design methodologies.
100003/CS622T.3-PO12	**HIGH**	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change by analysis, identify design methodologies and develop adaptable & reusable solutions.
100003/CS622T.3-PSO3	**MEDIUM**	The ability to apply the fundamentals of computer science in competitive research and prior to that perform requirement analysis, identify design methodologies.
100003/CS622T.4-PO1	**MEDIUM**	Prepare technical report and deliver presentation by applying the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
100003/CS622T.4-PO2	**HIGH**	Identify, formulate, review research literature, and analyze complex engineering problems by preparing technical report and deliver presentation.

100003/CS622T.4-PO3	**MEDIUM**	Prepare Design solutions for complex engineering problems and create technical report and deliver presentation.
100003/CS622T.4-PO4	**MEDIUM**	Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions and prepare technical report and deliver presentation.
100003/CS622T.4-PO5	**MEDIUM**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools and Prepare technical report and deliver presentation.
100003/CS622T.4-PO8	**HIGH**	Prepare technical report and deliver presentation by applying ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
100003/CS622T.4-PO9	**HIGH**	Prepare technical report and deliver presentation effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings.
100003/CS622T.4-PO10	**HIGH**	Communicate effectively with the engineering community and with society at large by prepare technical report and deliver presentation.
100003/CS622T.4-PO11	**MEDIUM**	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work by prepare technical report and deliver presentation.
100003/CS622T.4-PO12	**HIGH**	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change by prepare technical report and deliver presentation.
100003/CS622T.4-PSO1	**MEDIUM**	Prepare a technical report and deliver presentation to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas.
100003/CS622T.4-PSO2	**MEDIUM**	To acquire programming efficiency by designing algorithms and applying standard practices in software project development and to prepare technical report and deliver presentation.
100003/CS622T.4-PSO3	**MEDIUM**	To apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs by preparing technical report and deliver presentation.
100003/CS622T.5-PO1	**HIGH**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
100003/CS622T.5-PO2	**HIGH**	Identify, formulate, review research literature, and analyze complex engineering problems by applying engineering and management principles to achieve the goal of the project.

100003/CS622T.5-PO3	**HIGH**	Apply engineering and management principles to achieve the goal of the project and to design solutions for complex engineering problems and design system components or processes that meet the specified needs.
100003/CS622T.5-PO4	**MEDIUM**	Apply engineering and management principles to achieve the goal of the project and use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
100003/CS622T.5-PO5	**MEDIUM**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools and to apply engineering and management principles to achieve the goal of the project.
100003/CS622T.5-PO6	**MEDIUM**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities by applying engineering and management principles to achieve the goal of the project.
100003/CS622T.5-PO7	**MEDIUM**	Understand the impact of the professional engineering solutions in societal and environmental contexts, and apply engineering and management principles to achieve the goal of the project.
100003/CS622T.5-PO8	**HIGH**	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice and to use the engineering and management principles to achieve the goal of the project.
100003/CS622T.5-PO9	**MEDIUM**	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings and to apply engineering and management principles to achieve the goal of the project.
100003/CS622T.5-PO11	**MEDIUM**	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments and to apply engineering and management principles to achieve the goal of the project.
100003/CS622T.5-PO12	**HIGH**	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change and to apply engineering and management principles to achieve the goal of the project.
100003/CS622T.5-PSO1	**MEDIUM**	The ability to identify, analyze and design solutions for complex engineering problems in multidisciplinary areas. Apply engineering and management principles to achieve the goal of the project.

100003/CS622T.5-PSO2	**MEDIUM**	The ability to acquire programming efficiency by designing algorithms and applying standard practices in software project development to deliver quality software products meeting the demands of the industry and to apply engineering and management principles to achieve the goal of the project.
100003/CS622T.5-PSO3	**MEDIUM**	The ability to apply the fundamentals of computer science in competitive research and to develop innovative products to meet the societal needs thereby evolving as an eminent researcher and entrepreneur and apply engineering and management principles to achieve the goal of the project.