

ANDROID APPLICATION DEVELOPMENT USING IONIC FRAMEWORK

**Report submitted to
National Institute of Technology Manipur**

**for the award of the degree
of**

**Bachelor of Technology
in Computer Science & Engineering
by**

ARVIND OKRAM (15UCS029)

ROHIT THINGBAIJAM (15UCS024)

THOUNAOJAM CHINGLEMBA (15UCS004)



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY MANIPUR

MAY 2019

NATIONAL INSTITUTE OF TECHNOLOGY MANIPUR

BONAFIDE CERTIFICATE

This is to certify that the dissertation report entitled, “**ANDROID APPLICATION DEVELOPMENT USING IONIC FRAMEWORK**” submitted by **Arvind Okram (15UCS029), Rohit Thingbaijam (15UCS024) & Thounaojam Chinglemba (15UCS004)** to National Institute of Technology Manipur, India, is a record of bonafide project work carried out by them under my supervision and guidance and is worthy of consideration for the award of the degree of bachelor of technology in Computer Science & Engineering of the Institute.

(Dr. Yambem Jina Chanu)

Assistant Professor

Dept. of Computer Science

&

Engineering

NIT MANIPUR, LANGOL

(Dr. Khelchandra Thongam)

Assistant Professor

Dept. of Computer Science

&

Engineering

NIT MANIPUR, LANGOL

NATIONAL INSTITUTE OF TECHNOLOGY MANIPUR

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ARVIND OKRAM (15UCS029)

ROHIT THINGBAIJAM (15UCS024)

THOUNAOJAM CHINGLEMBA (15UCS004)

ACKNOWLEDGEMENTS

We are indebted to our guide Dr. Khelchandra Thongam Singh for his invaluable guidance and the suggestions throughout our project. We thank him for his constant source of encouragement, motivation and expert advice throughout our project.

We thank Mr. Premchand and Globizs, for their continuous support during the course of this project.

Special gratitude to our B.Tech coordinator, Mrs. Maibam Mangalleibi Chanu, for his valuable guidance during the course of the project.

We are very thankful to the Faculty and Staff of the Department of Computer Science & Engineering, NIT Manipur for providing us the opportunity to do project under such innovative minds.

ARVIND OKRAM (15UCS029)

ROHIT THINGBAIJAM (15UCS024)

THOUNAOJAM CHINGLEMBA (15UCS004)

Abstract

In the rapidly advancing world of technology, android application is among the rapidly growing segment of the world mobile market. In this paper, we will look at the Ionic Platform and how to create an Android based application named "Phishakhol", that can help the user customize the products he wants to buy according to his/her requirement. For this project, Ionic framework is used which allows the developers to use one code base for every operating system. Developers using Ionic framework can use most of the code for all platform making it easier to maintain and evolve the application and thus making it to build an application in a fast and inexpensive way.

*Keywords:*Android, Mobile Application, Ionic, Angular.

Contents

List of figures	iv
List of tables	v
List of Abbreviation	vi
1 INTRODUCTION	1
1.1 ANDROID	1
1.1.1 DIFFERENT VERSIONS OF ANDROID	2
1.2 IONIC FRAMEWORK	3
2 TECHNOLOGY STACK	4
2.1 HTML	4
2.2 CSS	4
2.3 JavaScript	4
2.4 ANGULAR	5
2.5 IONIC	5
2.6 Yii Framework	5
3 HOW TO CREATE AN ANDROID APP WITH IONIC FRAMEWORK	6
4 LITERATURE REVIEW	7
5 MOTIVATION	8
6 Proposed Plan	9
6.1 Algorithm	9
6.2 Flowchart	10
6.3 Front End	11
6.4 Back End	12
6.4.1 Yii Framework	12

6.4.2	Database	12
6.5	Filezilla	13
7	RESULTS	14
7.1	Front End	14
7.1.1	Login Page	14
7.1.2	Registration Page	15
7.1.3	Home Page	16
7.1.4	Normal shopping page	17
7.1.5	Customization Page	18
7.1.6	Men's Customization Page	19
7.1.7	Women's Customization Page	20
7.1.8	Mens Custom Shirts page	21
7.1.9	Womens Custom Blouse page	23
7.1.10	Cart page	25
7.1.11	Payment Page	26
7.1.12	Thank You	27
7.1.13	Order Page	28
7.2	Back End	29
7.3	Yii Framework	29
7.4	Database	30
8	CONCLUSION & FUTURE WORK	31
References		32

List of Figures

1	Android pie	1
2	Front End of the application	11
3	YiiFramework	12
4	Back End Database	12
5	Filezilla	13
6	Login Page	14
7	Registration Page	15
8	Home Page	16
9	Normal Shopping Page	17
10	Customization Page	18
11	Men Category Page	19
12	Women's Customization Page	20
13	Mens Custom Shirts page	21
14	Mens Custom Shirts page showing customizations	22
15	Womens Custom Blouse page	23
16	Womens Custom Blouse page showing customizations	24
17	Cart Page	25
18	Payment Page	26
19	Thank You Page	27
20	Order Page	28
21	Back End Page	29
22	Database	30

List of Tables

1	Different versions of Android	2
2	Table containing a list of Ionic CLI commands	3

List of Abbreviation

1 INTRODUCTION

1.1 ANDROID

Android is a mobile operating system developed by Google based on a modified version of a Linux kernel and other open source software and designed primarily for touchscreen mobile devices such as smart-phones and tablets.

In October 2003, the company Android Inc. was founded in Palo Alto, California with a goal to develop smarter mobile devices that are more aware of its owners location and preferences. After the acquirement of Android Inc., by Google, its founding members stayed on to continue to develop the OS under their new owners. The decision was made to use Linux as the basis for the Android OS, and that also meant that Android itself could be offered to third-party mobile phone manufacturers for free. Google and the Android team felt the company could increase the user experience by offering other services that used the OS, including apps. With the use of Android Cupcake Android OS became a huge success in the world market.

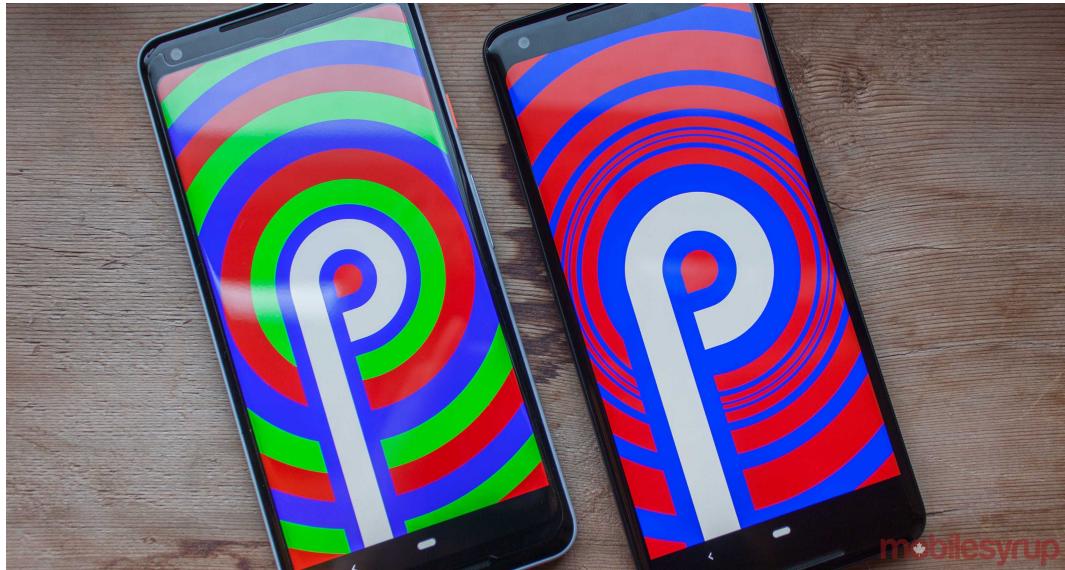


Figure 1: Android pie

Android APIs are a rich set of system services wrapped in an intuitive class files which provides easy access to several features like location, web, telephony, WiFi, media, camera, and so on. All the tools, frameworks and software necessary to de-

velop a mobile application are available for free. Android OS is hardware independent and runs on devices from different vendors, unlike other proprietary operating systems such as iOS (Apple Inc. products), Windows OS (Windows Phone) etc., which are licensed and controlled by certain companies.

1.1.1 DIFFERENT VERSIONS OF ANDROID

Table 1: Different versions of Android

VERSION	CODE NAME	API LEVEL
1.5	CUPCAKE	3
1.6	DONUT	4
2.1	ECLAIR	7
2.2	FROYO	8
2.3	GINGERBREAD	9 & 10
3.1,3.3	HONEYCOMB	12 & 13
4.0	ICE CREAM SANDWICH	15
4.1,4.2,4.3	JELLYBEAN	16,17 & 18
4.4	KIT KAT	19
5.0	LOLLIPOP	21
6.0	MARSHMELLOW	23
7.0	NOUGET	24-25
8.0	OREO	26-27
9.0	PIE	28

NOTE: An application programming interface (API) is a set of subroutine definitions, communication protocols, and tools for building software. In general terms, it is a set of clearly defined methods of communication among various components.

1.2 IONIC FRAMEWORK

In 2013, Drifty released their open source SDK framework Ionic, intended to help developers to build mobile applications using web technologies such as HTML, CSS and JavaScript. Ionic provides users with all the components, tools and functionalities that are used in native mobile Development-Software Development Kit(SDK). Developers can easily design their applications using tools and sample codes provided by the ionic framework documents and help website.

For building the application, Ionic chooses apache Cordova to build on top. It gives Ionic abilities to simply develop mobile applications as well as improving user interface and user experience. Ionic also includes natively looking UI components which have a different style on each platform. To help developer save time, Ionic provides a readymade UI for mobile components, and it automatically is applied based on the platform build.

The Ionic Command Line(CLI) is another essential part of Ionic. This feature allows ionic user to use command line in windows. More specifically, developers can create an Ionic project, Develop and test in the CLI. Ionic generates, build, run sass and so on via Ionic CLI feature. A table containing a list of Ionic Command Line(CLI) is given below.

Table 2: Table containing a list of Ionic CLI commands

IONIC CODE	COMMAND
\$ npm install -g ionic@latest	CLI command to install latest Ionic Version
\$ ionic start myNewProject	Create a "myNewProject" project by using ionic start
\$ cd ./myNewProject	Go to "myNewProject" folder and preview app in the browser
\$ ionic serve	. Changes made to code will automatically refresh
\$ ionic install -g cordova	Install Cordova to Ionics Project
\$ ionic cordova –help	Getting help and commands from ionic Cordova
\$ ionic cordova build android	Build current project to the native Android application

2 TECHNOLOGY STACK

The technology stack consists of all the programming languages, framework and tools used for the development. There are two main part of any application, which are the client end and back end. The front end is what the user sees, while the back end focuses on servers and databases.

2.1 HTML

HTML stands for Hypertext Markup Language, which is the standard markup language to create websites. Web browsers use HTML to interpret text, images, videos and other content to web pages. HTML elements are the most basic building blocks of the web, which are used as HTML tags written using angle brackets. There are 3 main parts for elements, which are opening tag, content and closing tag.

2.2 CSS

CSS stands for Cascading Style Sheets (CSS). It is a language to add style for HTML and XHTML page. CSS can alter font, color, displace position, font size and picture style for the HTML elements. Browser turns HTML into a DOM when it opens an HTML file. CSS use selector to select HTML elements.

2.3 JavaScript

JavaScript (abbreviated as JS) is the most-known scripting language for web pages. HTML, CSS and JavaScript are three core technologies of the web. JavaScript makes website interactive. JavaScript is one of the most popular and widely used in the world. JavaScript works inside another web browser whether that is IE, Chrome, Safari, Firefox or Opera which has a JavaScript engine inside them. JavaScript was only implemented the client side in the web browsers before the JavaScript run-time environment came out.

2.4 ANGULAR

Angular is an open-source popular JavaScript framework created by Google, which helps developers build modern applications quickly. Angular 2 was rewritten from AngularJS by the same team. Angular offers faster initial loads. Angular works with Typescript and ES6. More than just a framework, Angular is actually a whole platform which comes with a collection of tools like Angular CLI, debugging and testing tools. Angular apps are modular. Modules are the way how Angular organizes the application and works with other third-party libraries. The import statement is used to import JavaScript code from other module, and the export statement is used to export JavaScript code to be available in other JavaScript files.

Angular component controls the logic on the page and the view of the application and on click event execution. It is a fundamental part of the application and it belongs to the controller class. Angular creates, updates and destroys components when the user browses through the application. @Component is used to register a component. @Component is a decorator function which contains component metadata.

2.5 IONIC

Ionic is an open-source JavaScript framework to create hybrid mobile applications. It was released based on AngularJS and Apache Cordova. The newer version has migrated from AngularJS to Angular. Ionic app is created mainly through the ionic CLI (command line utility). CLI makes the development very fast and easy. Ionic CLI tool can install and update Ionic, generate a new page and run server. For example, simply typing ionic start will create a new project.

2.6 Yii Framework

Yii Framework is a generic Web programming framework, meaning that it can be used for developing all kinds of Web applications using PHP. Because of its component-based architecture and sophisticated caching support, it is especially suitable for developing large-scale applications such as portals, forums, content management systems (CMS), e-commerce projects, RESTful Web services, and so on.

3 HOW TO CREATE AN ANDROID APP WITH IONIC FRAMEWORK

The following describes the steps of creating an android app with ionic framework.

Step 1:

Install node.js following its instruction.

Step 2:

Install Cordova and server dependencies.

```
npm install -g Cordova ionic  
npm install
```

Step 3:

Create and start the application in the Ionic CLI.

```
ionic start conference sidemenu  
ionic serve -l
```

Step 4:

Build for Android.

```
ionic platform add android  
ionic build android  
ionic run android
```

4 LITERATURE REVIEW

Zhi Chen et al.(2018)[1] describe the use of Ionic Framework and develop a fully functioning application using the Ionic Framework. They also describe the use of various programing and framework use to develop the front end and back end of the application. They also produce a case study of how to create a language learning application using Ionic.

Aarush Gupta et al.(2016)[2] describe the use of Angular and Cordova in Ionic Framework and how Angular shape to build an application. They also illustrate the installment and deployment of Ionic and Cordova for building an application.

Tobias Krispinsson(2017)[3] gives a detailed comparison between a Native Android application and an Ionic framework application. He performed various tests which mainly focus on performance, deployment, ease of use etc. to present his case. He also gives a detailed structure about angular.

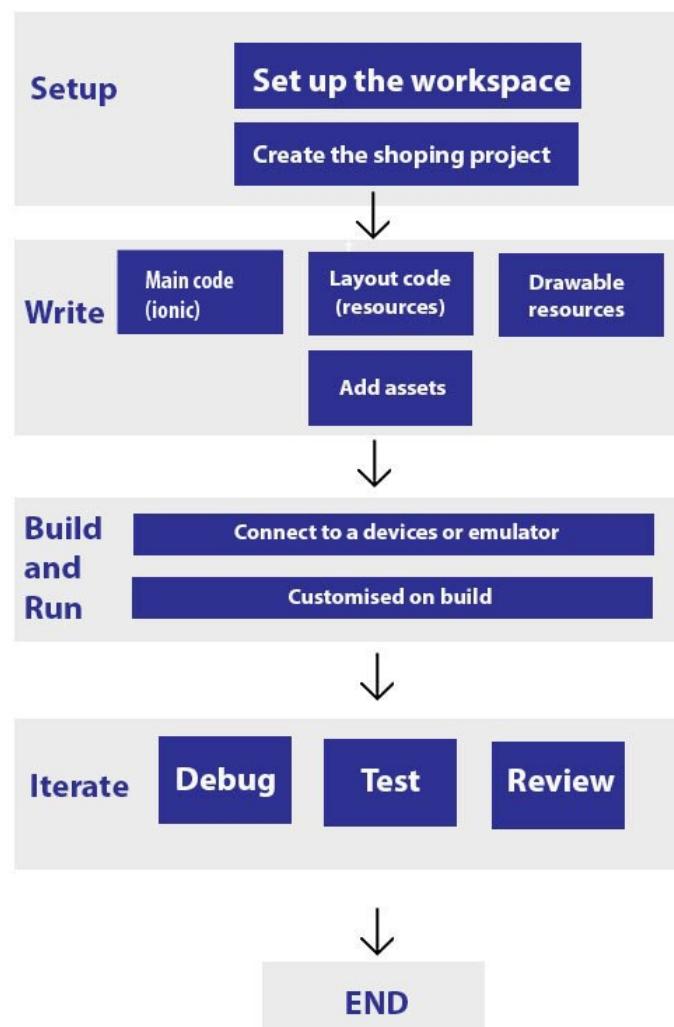
5 MOTIVATION

Online shopping has enabled the customer of researching various products across various platform to their hearts desire. In this Information Age Customer look at the product and research before buying a specific product. The objective of this project was to create an application which is platform independent, which allows for fairly quick development and have developers direct access to APIs with Cordova. We plan to an application which allows any customer to view a product and modify the desired product according to his/her wish by just a click.

6 Proposed Plan

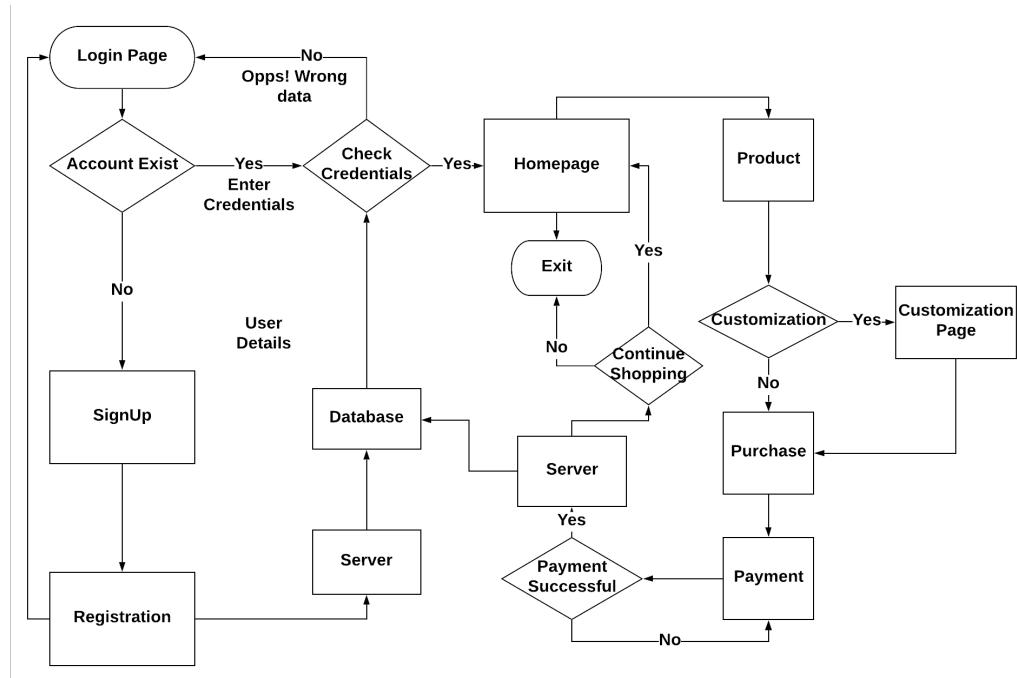
6.1 Algorithm

ALGORITHM:



The algorithm provides us a step to step basis on building the Ionic application. It also provides us a time efficient and scalable method of building the application.

6.2 Flowchart



The flowchart describes how users use the application to buy his/her desired product. At first login the user is directed to the registration page where after successful registration the user can buy product from the application.

6.3 Front End

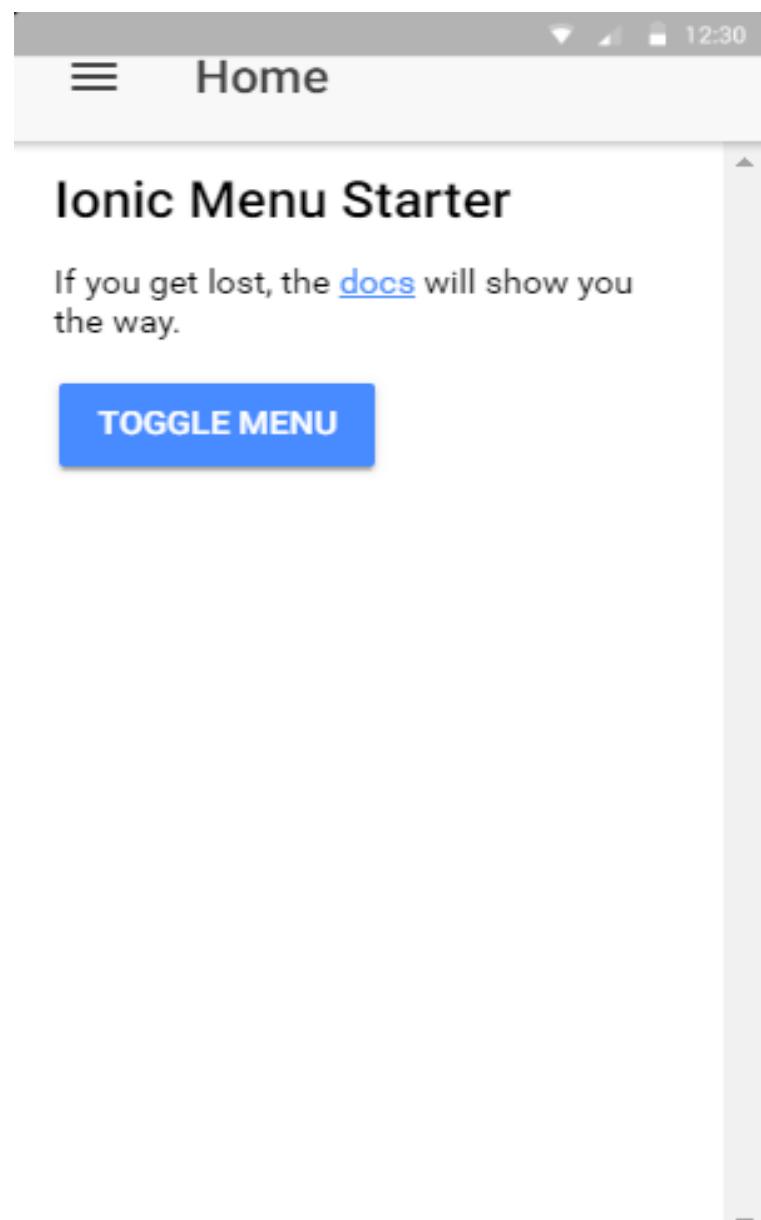


Figure 2: Front End of the application

The figure 2 describes the proposed plan generating an Ionic application and Fig describe how various pages are generated for writing the front end of the application

6.4 Back End

6.4.1 Yii Framework

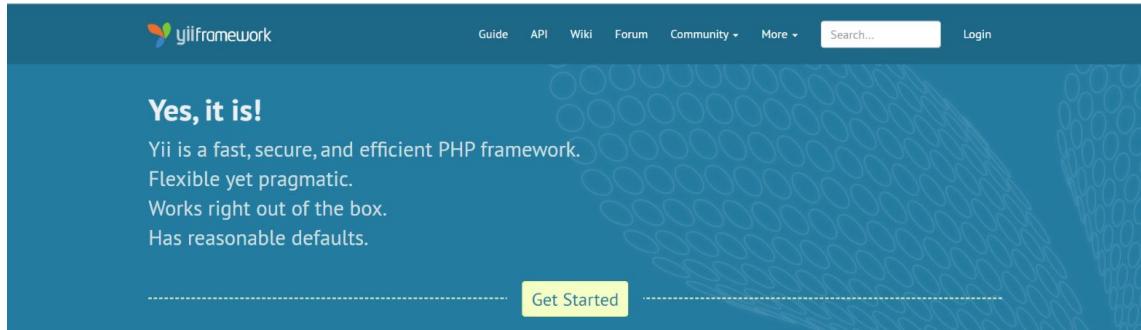


Figure 3: YiiFramework

By using Yii Framework as shown in the above figure 3 it helps to easily access the database where administrator can easily CRUD(Create, Read, Edit and Delete) the database of the application.

6.4.2 Database

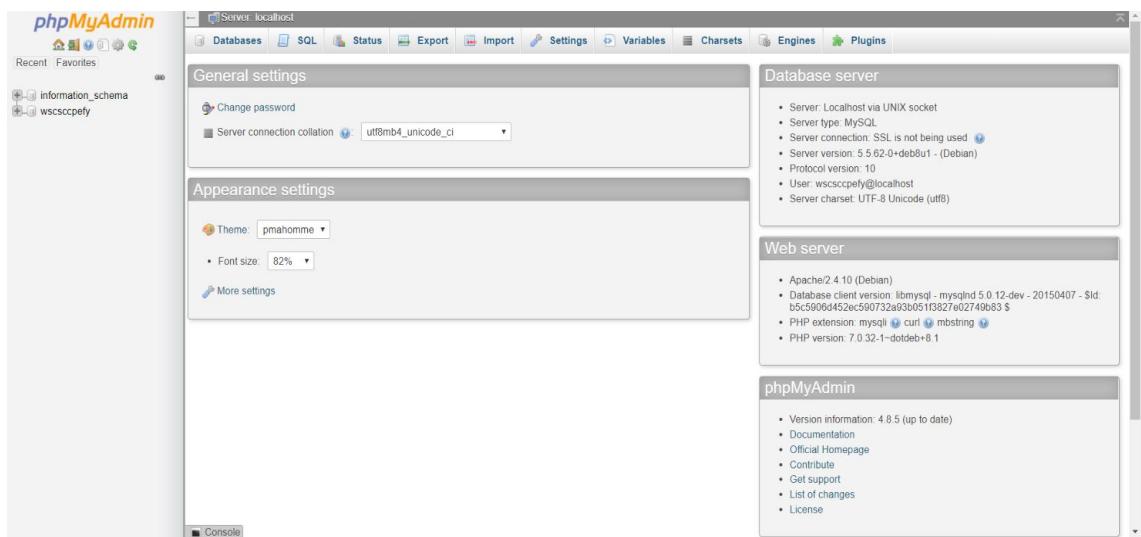


Figure 4: Back End Database

The proposed database allows the developer to easily store the user credentials, sales information, address etc. in a safe server.

6.5 Filezilla

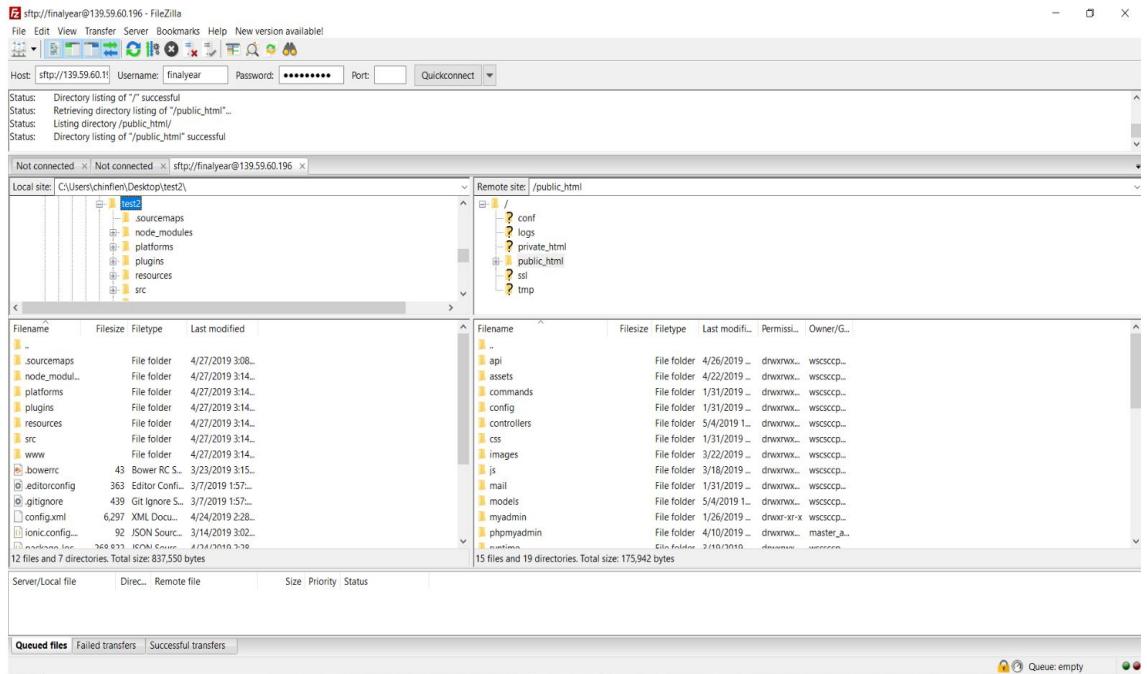


Figure 5: Filezilla

FileZilla Client is a fast and reliable cross-platform FTP, FTPS and SFTP client with lots of useful features and an intuitive graphical user interface.

7 RESULTS

7.1 Front End

7.1.1 Login Page

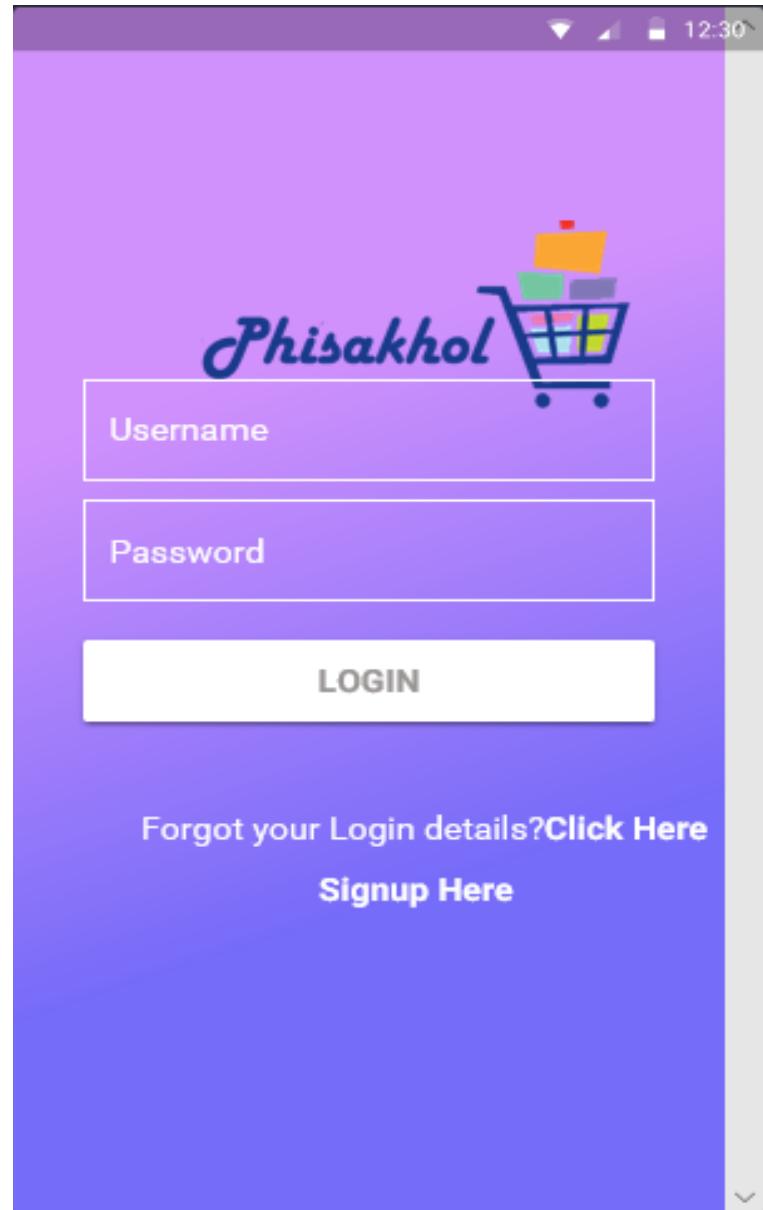


Figure 6: Login Page

The figure 6 shows how a registered user can login in to the Phishakhol application by simply entering his/her username and password. If the user is not a registered user, he can browse the app as a guest

7.1.2 Registration Page

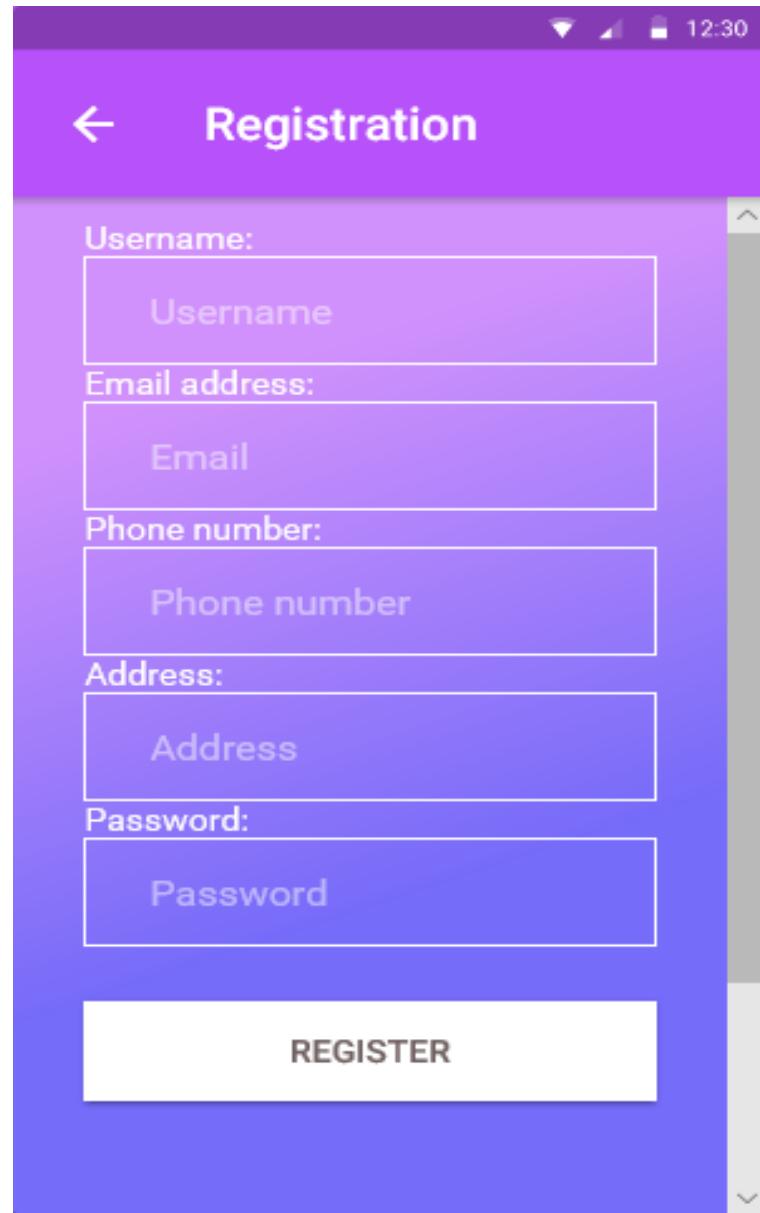


Figure 7: Registration Page

To register a guest simply need to enter his/her credentials such as name, email address etc(figure 7). To complete the registration a verification email will be sent to user email address

7.1.3 Home Page

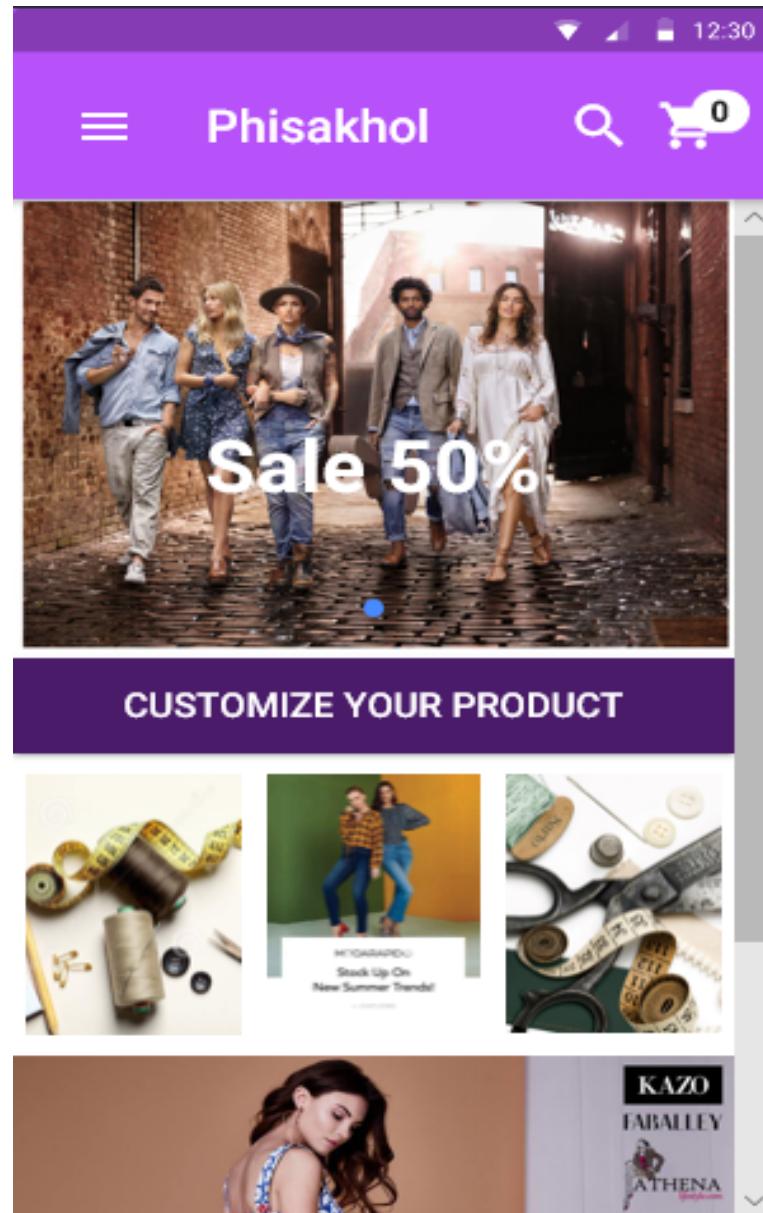


Figure 8: Home Page

In figure 8 after successful registration, the user will be directed to the Home Page. Users can view the home page as a registered user or as a guest. Home page contains links to normal shopping page, cart, customization pages and can access the side menu.

7.1.4 Normal shopping page

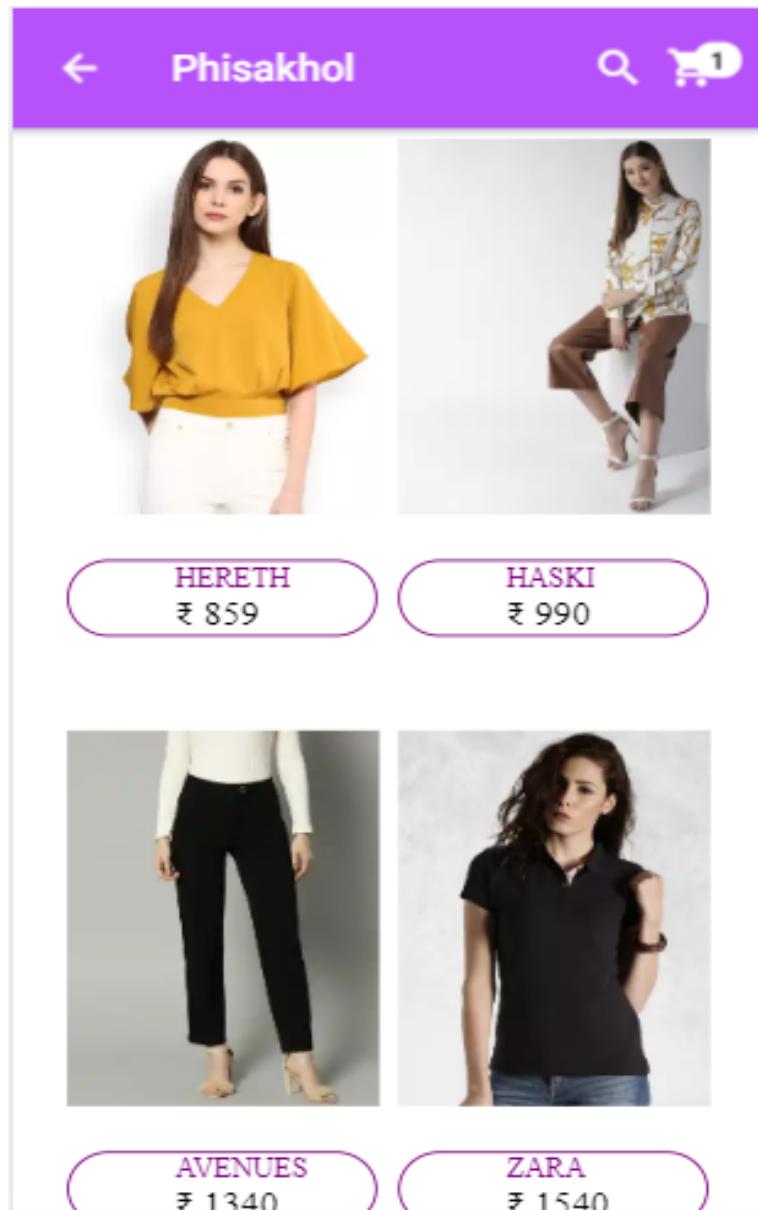


Figure 9: Normal Shopping Page

In figure 9 users can also view the normal shopping page where they can browse products. The functionalities for buying a normal product will be added in future.

7.1.5 Customization Page

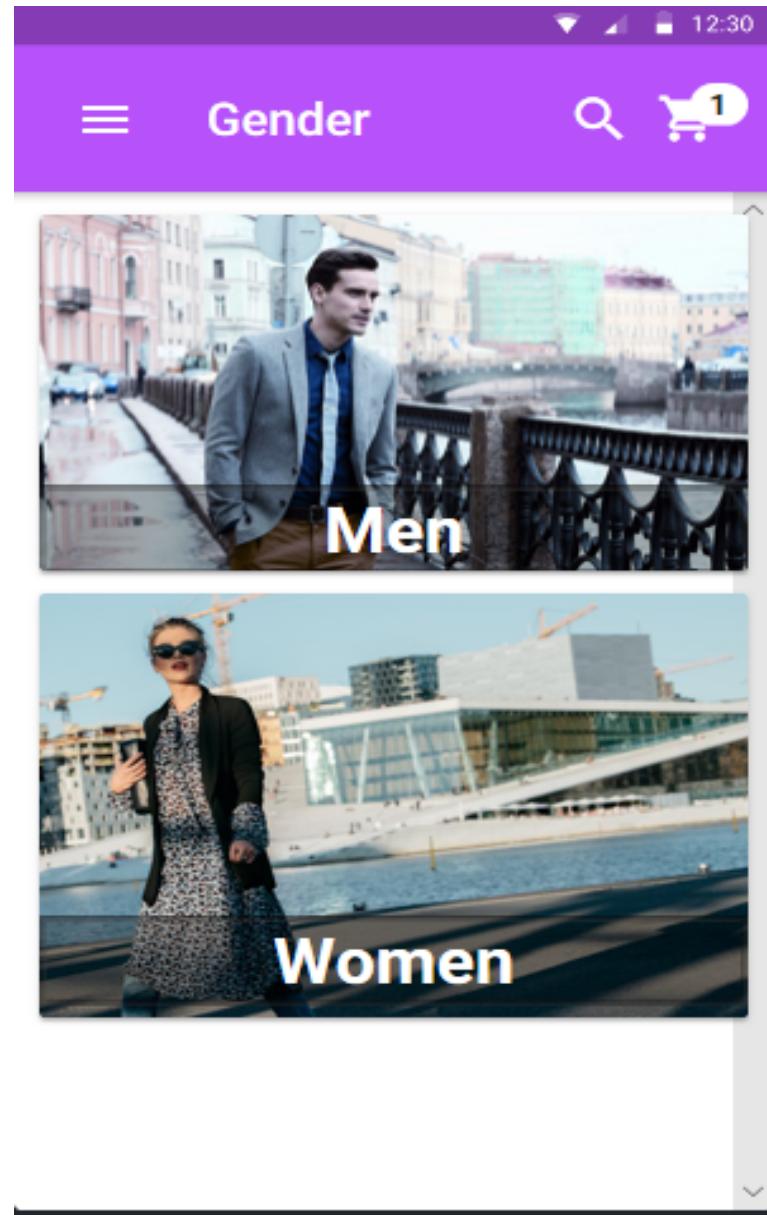


Figure 10: Customization Page

In figure 10 after successful registration, the user will be directed to the Home Page. Users can view the home page as a registered user or as a guest. Home page contains links to normal shopping page, cart, customization pages and can access the side menu.

7.1.6 Men's Customization Page

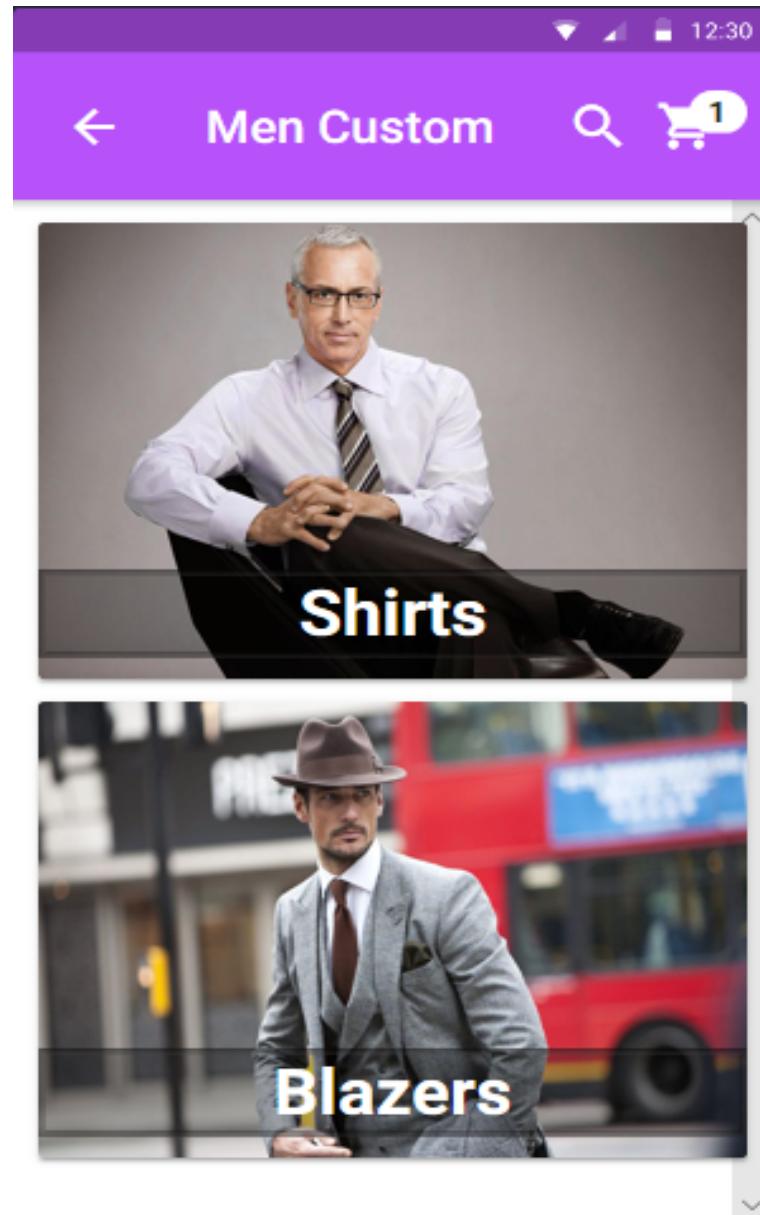


Figure 11: Men Category Page

In figure 11 user is directed to the men's customization page, where can chose whether to go to Men's shirt or Men's Blazers. After choosing, he/she will be directed to either Men's shirts/Men's blazers where he/she can customize his product.

7.1.7 Women's Customization Page

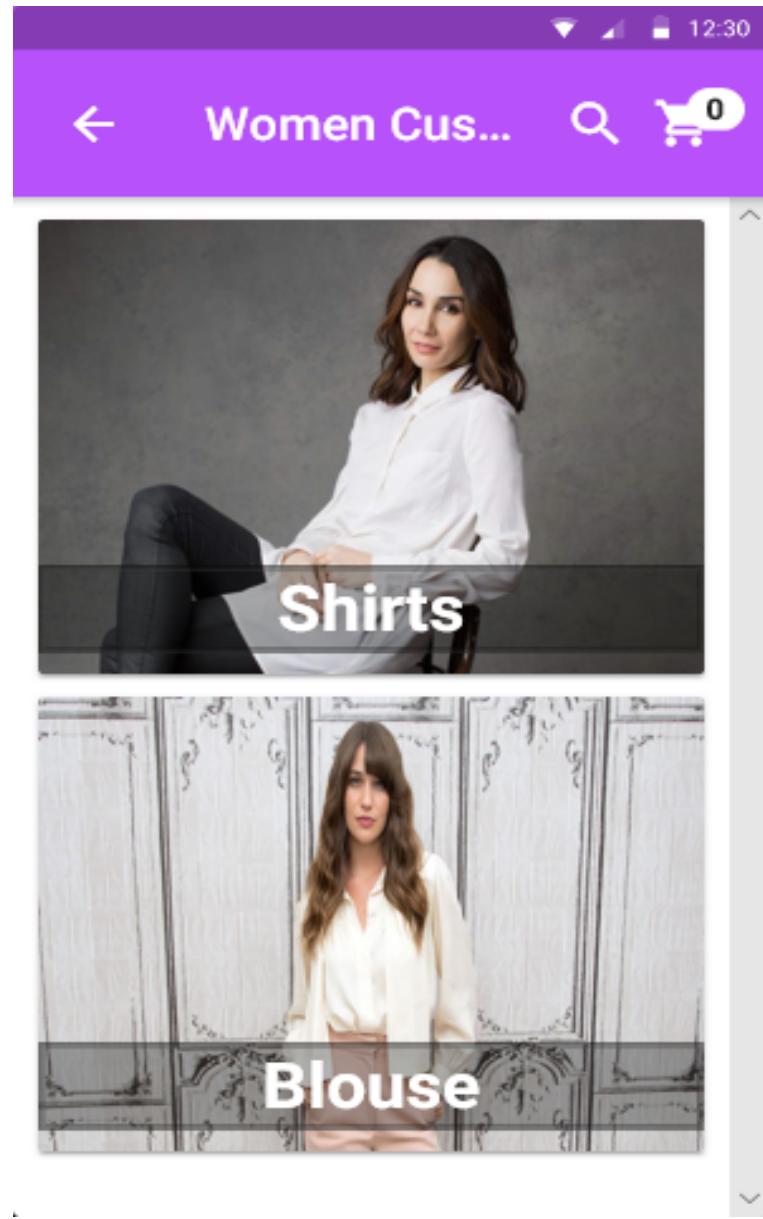


Figure 12: Women's Customization Page

In figure 15 user is directed to the womens customization page, where can chose whether to go to Womens shirt or Womens Blouse page . After choosing, he/she will be directed to either Womens shirt or Womens Blouse page where he/she can customize his product.

7.1.8 Mens Custom Shirts page

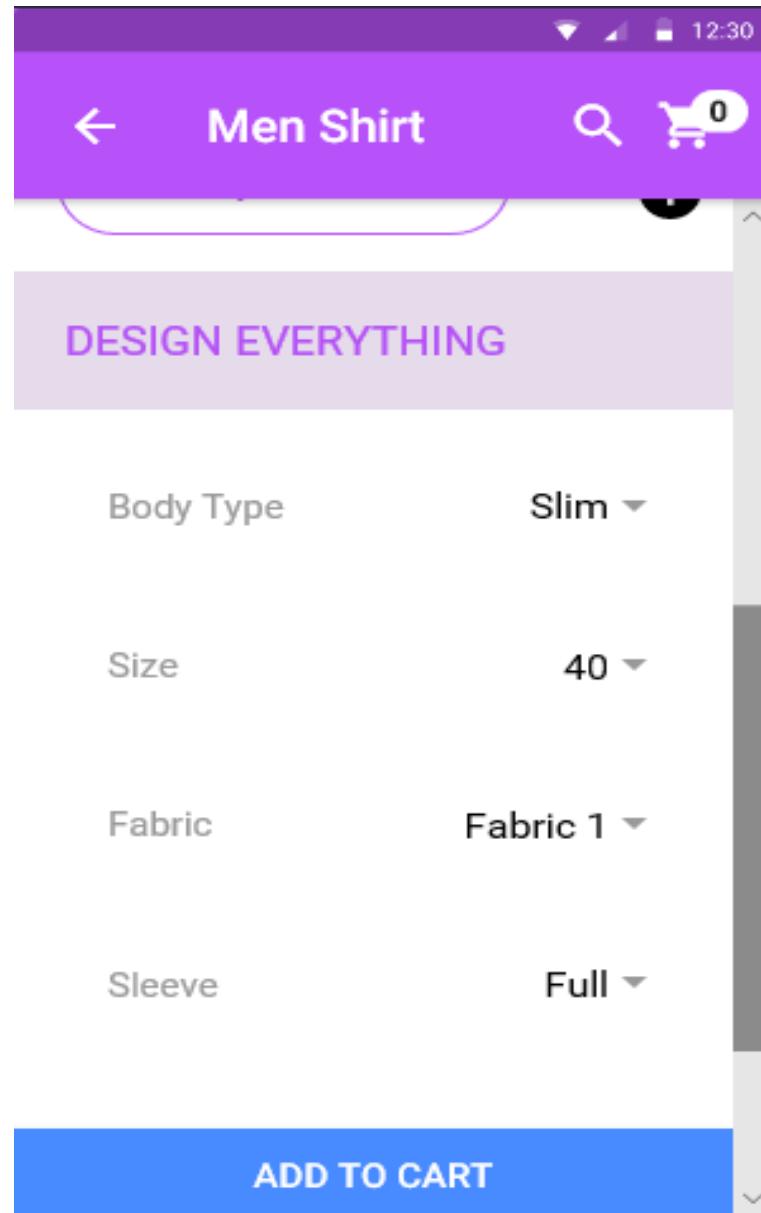


Figure 13: Mens Custom Shirts page

In figure 13 users will be provided with the options to choose from 4 features i.e. body type (Slim, custom and Healthy), Sleeve (32,33, 34,40), Fabric (Fabric1, Fabric2 and Fabric3) and Sleeve (Half or full). After the user selects his/her desired features an image relevant to his/her choice will appear from which the user can either change or order.

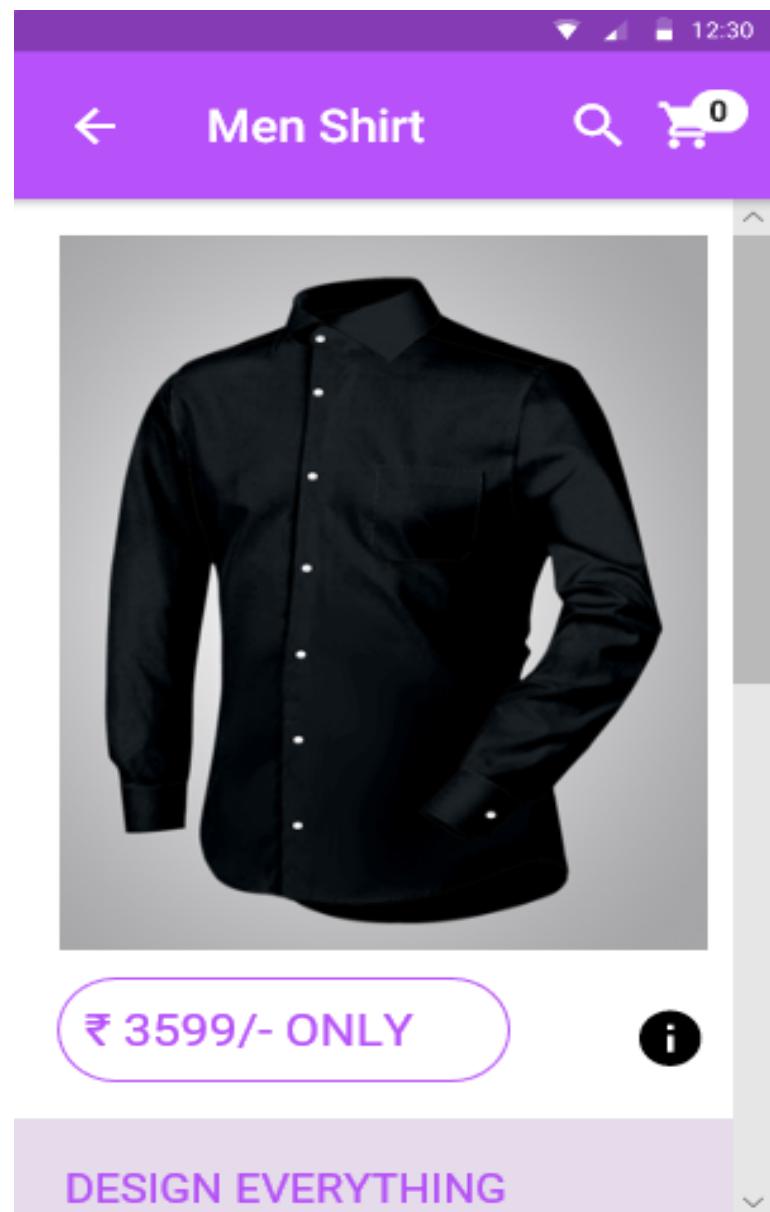


Figure 14: Mens Custom Shirts page showing customizations

In figure 13, after the user selects his/her desired features an image relevant to his/her choice will appear from which the user can either change or order.

7.1.9 Womens Custom Blouse page

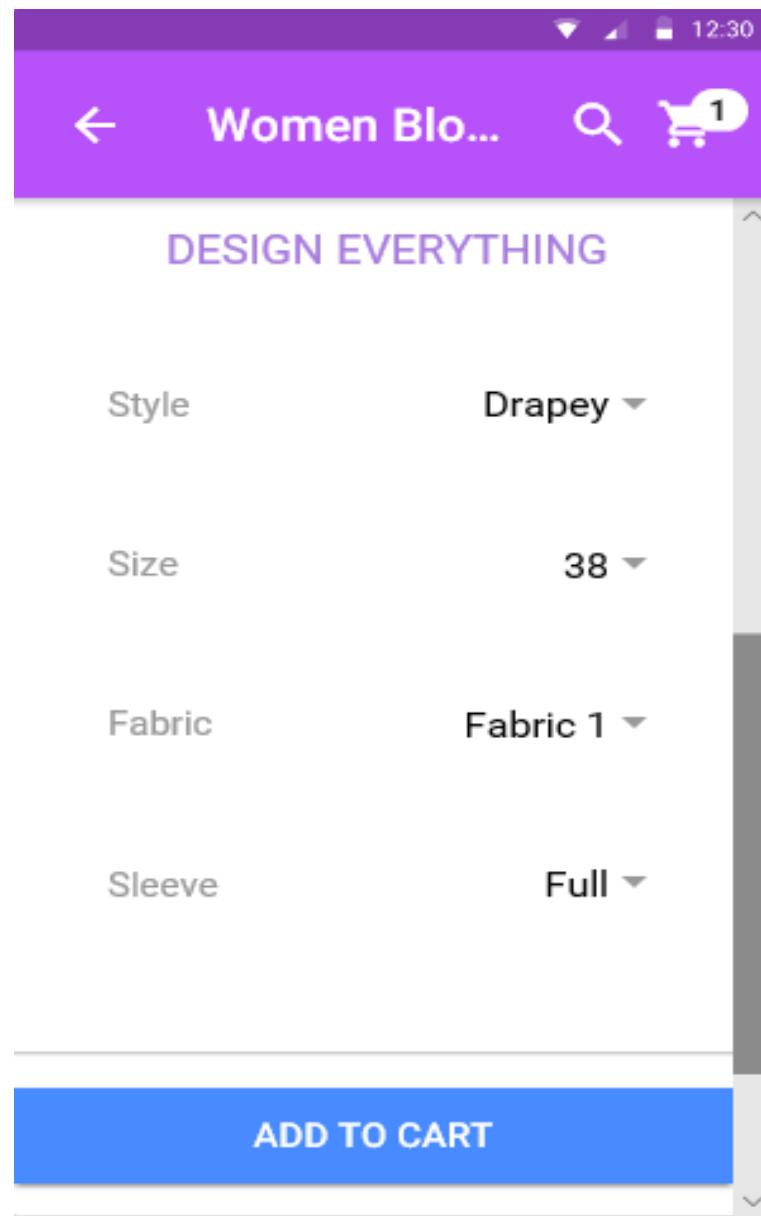


Figure 15: Womens Custom Blouse page

In figure 15 users will be provided with the options to choose from 4 features i.e. body type (Drapey, Pleated and Placket), Sleeve (32,33, 34.40), Fabric (Fabric1, Fabric2 and Fabric3) and Sleeve (Half or full).

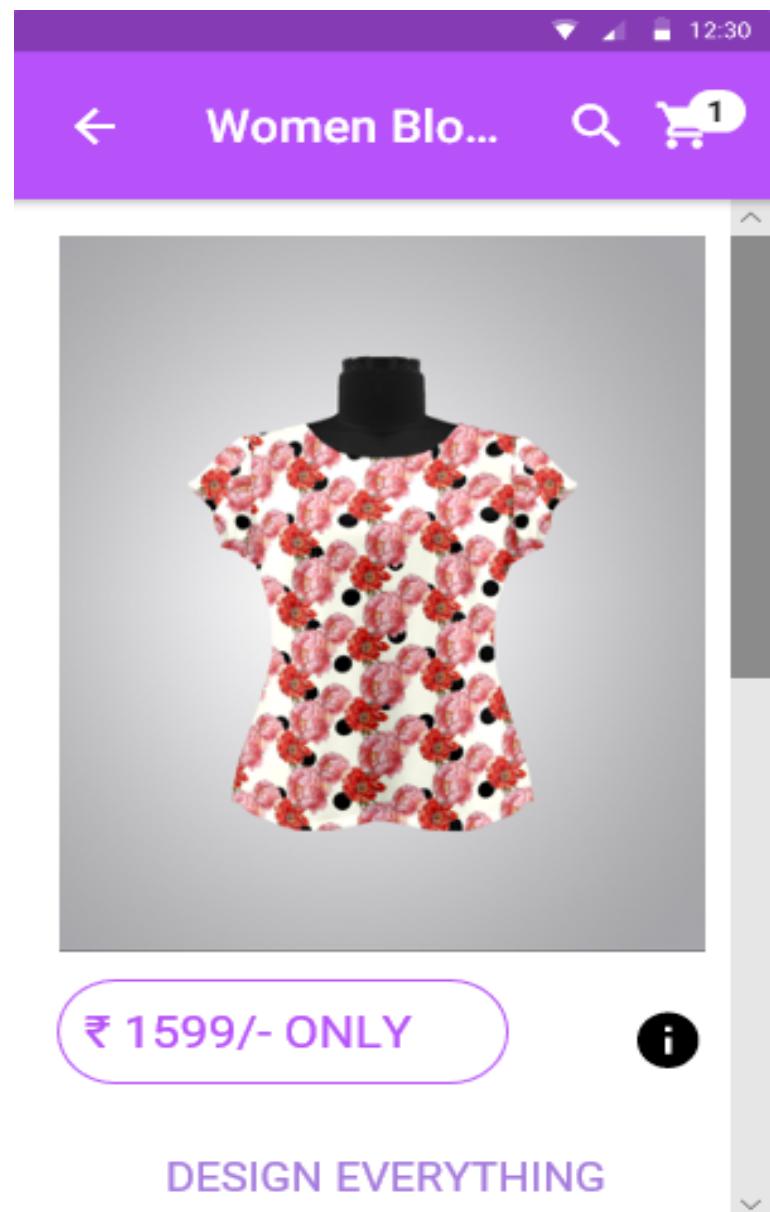


Figure 16: Womens Custom Blouse page showing customizations

In figure 16 users will be provided with the options to choose from 4 features i.e. body type (Drapey, Pleated and Placket), Sleeve (32,33, 34,40), Fabric (Fabric1, Fabric2 and Fabric3) and Sleeve (Half or full).

7.1.10 Cart page

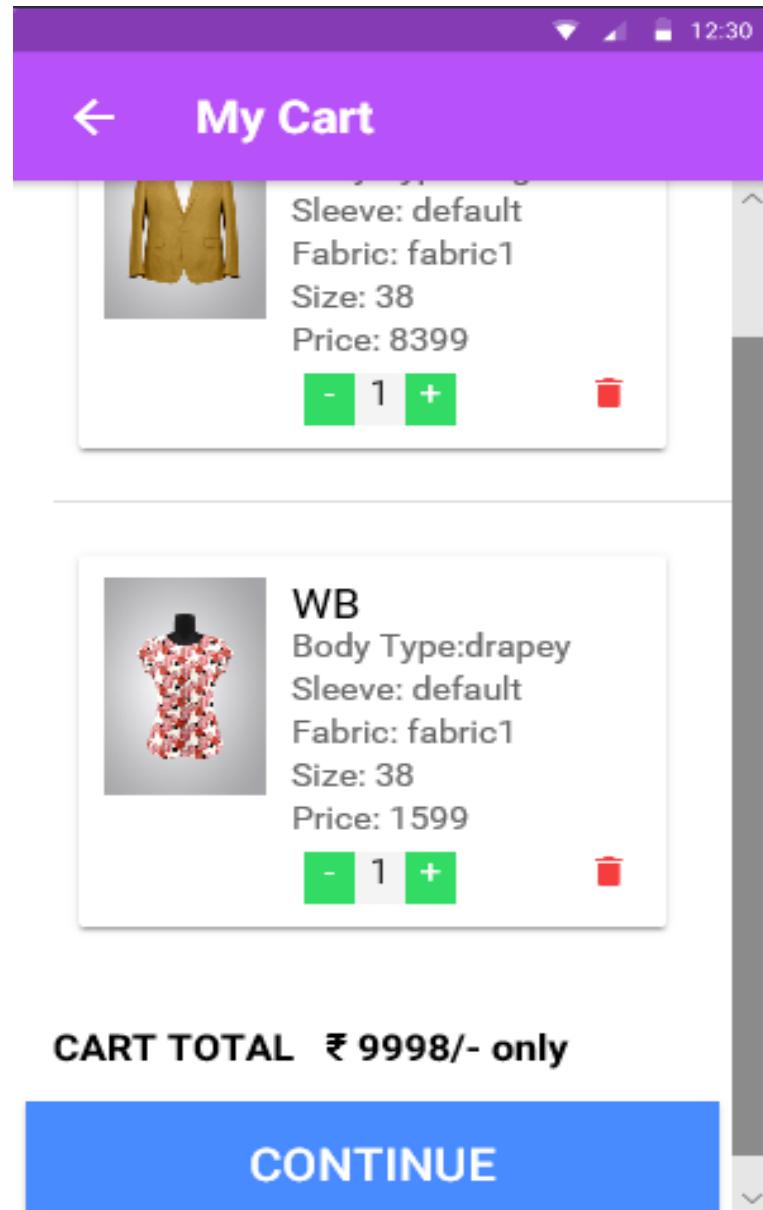


Figure 17: Cart Page

In figure 17 after successfully adding to the cart, The user can go to the cart page where he can either order his product, increment the quantity or simply delete the product from the cart.

7.1.11 Payment Page

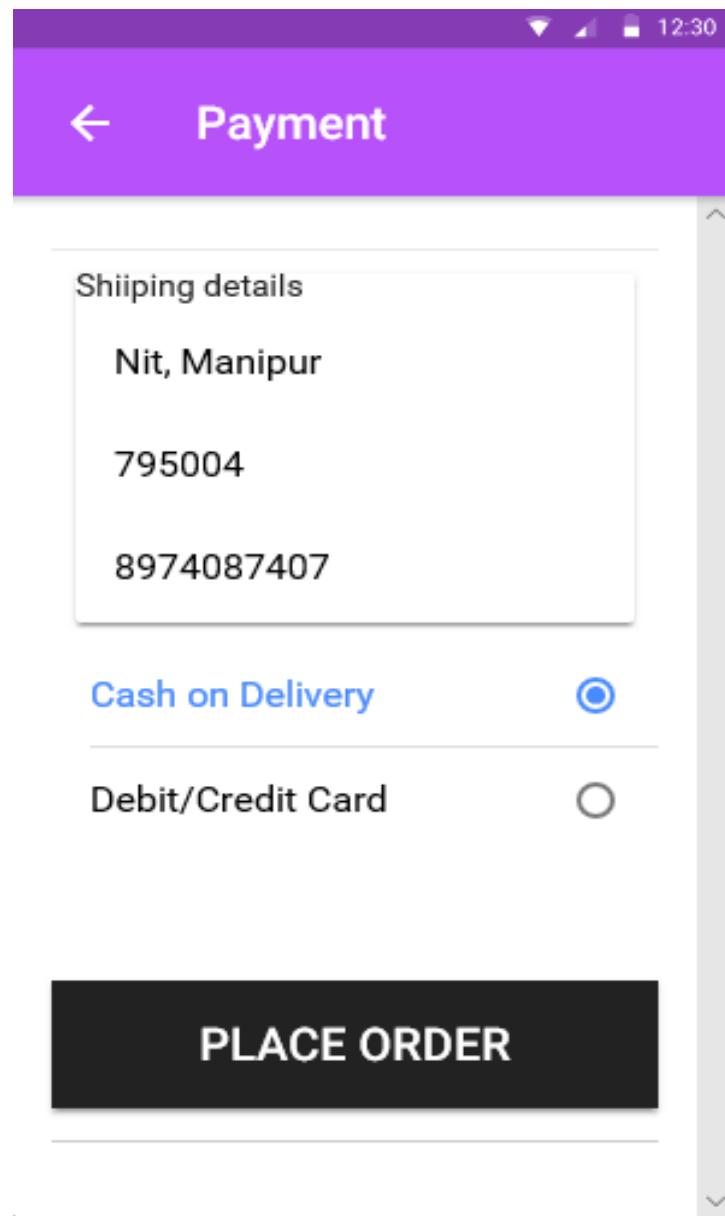


Figure 18: Payment Page

After the user proceeds from the cart page, the user is directed to the payment page where he is asked to provide his/her shipping address(figure 18). After successfully providing his shipping page the user Is asked to choose the payment type, from which he/she will be directed to the Thank You Page.

7.1.12 Thank You

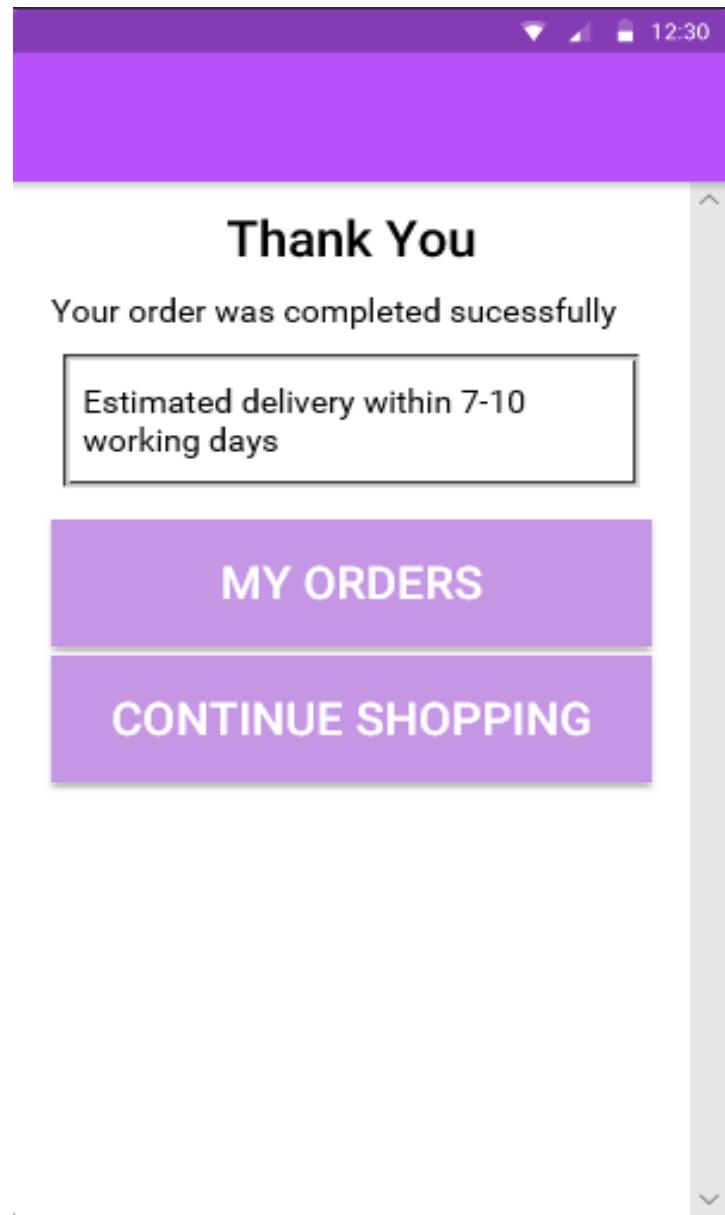


Figure 19: Thank You Page

In the figure 18 user is directed to the Thank You page where He/she will be provided with the time of delivery of the desired product. The user is provided to go the order page or to continue shopping or simply exit the application.

7.1.13 Order Page

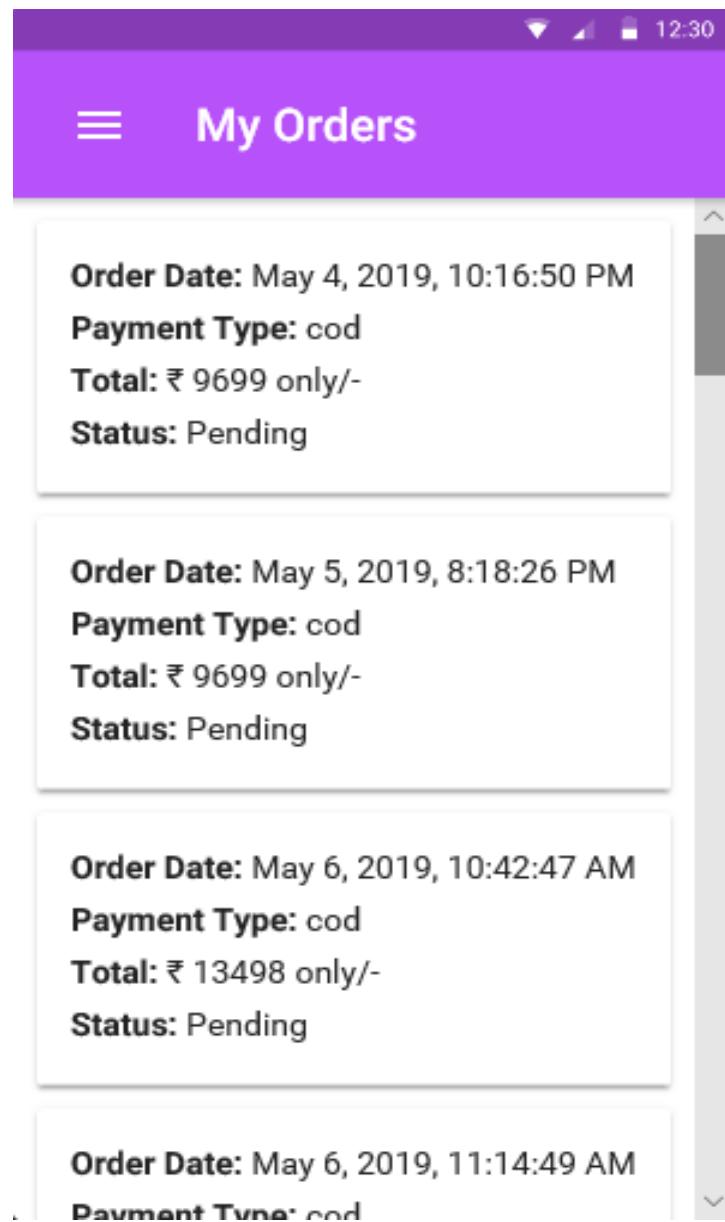


Figure 20: Order Page

In the figure 20 the order page shows the order date, payment type, total amount and status of order for the user to know.

7.2 Back End

7.3 Yii Framework

The screenshot displays the Yii Framework's administrative interface. The top navigation bar includes a user icon labeled 'admin'. On the left, a sidebar menu lists 'Dashboard' and 'Settings'. The main content area has a header 'Phisakhol' and a sidebar with 'Product', 'Custom', 'Sales', and 'Sales List' options. The bottom section, titled 'Customs', shows a table of data with the following columns: #, ID, Name, Bodytype, Fabric, and Sleeve. Each row includes edit and delete icons. The table data is as follows:

#	ID	Name	Bodytype	Fabric	Sleeve
1	1	ms	slim	default	default
2	2	ms	slim	fabric1	default
3	3	ms	slim	fabric2	default
4	4	ms	slim	fabric3	default
5	5	ms	slim	default	half
6	6	ms	slim	fabric1	half
7	7	ms	slim	fabric2	half
8	8	ms	slim	fabric3	half
9	9	ms	healthy	default	default
10	10	ms	healthy	fabric1	default
11	11	ms	healthy	fabric2	default
12	12	ms	healthy	fabric3	default
13	13	ms	healthy	default	half

Figure 21: Back End Page

Using Yii Framework we have successfully CRUD all the database which will be used in the building the application. The administration doesn't need to go to the database, he simply can make changes from the Yii framework page for every database.

7.4 Database

The screenshot shows the phpMyAdmin interface for the database 'wsccscpefy'. The left sidebar lists the schema structure, including tables like address, auth_assignment, auth_item, auth_item_child, auth_rule, custom, gender, migration, product, registration, sales, sales_item1, and user. The main area displays a table of 13 tables with columns for Action, Table, Rows, Type, Collation, Size, and Overhead. The 'sales' table is highlighted. At the bottom, there is a 'Create table' section with fields for Name and Number of columns.

Action	Table	Rows	Type	Collation	Size	Overhead
Browse Structure Search Insert Empty Drop	address	2	InnoDB	latin1_swedish_ci	16 kB	-
Browse Structure Search Insert Empty Drop	auth_assignment	32	InnoDB	utf8_unicode_ci	32 kB	-
Browse Structure Search Insert Empty Drop	auth_item	4	InnoDB	utf8_unicode_ci	4 kB	-
Browse Structure Search Insert Empty Drop	auth_item_child	32	InnoDB	utf8_unicode_ci	32 kB	-
Browse Structure Search Insert Empty Drop	auth_rule	16	InnoDB	utf8_unicode_ci	16 kB	-
Browse Structure Search Insert Empty Drop	custom	64	InnoDB	latin1_swedish_ci	16 kB	-
Browse Structure Search Insert Empty Drop	gender	2	InnoDB	latin1_swedish_ci	16 kB	-
Browse Structure Search Insert Empty Drop	migration	3	InnoDB	latin1_swedish_ci	16 kB	-
Browse Structure Search Insert Empty Drop	product	24	InnoDB	latin1_swedish_ci	16 kB	-
Browse Structure Search Insert Empty Drop	registration	12	InnoDB	latin1_swedish_ci	16 kB	-
Browse Structure Search Insert Empty Drop	sales	8	InnoDB	latin1_swedish_ci	16 kB	-
Browse Structure Search Insert Empty Drop	sales_item1	11	InnoDB	latin1_swedish_ci	16 kB	-
Browse Structure Search Insert Empty Drop	user	8	InnoDB	utf8_unicode_ci	8 kB	-
Sum		154	InnoDB	latin1_swedish_ci	356 kB	0 kB

Figure 22: Database

The project contains all the database required to make the application fully functional. It contains database of users, addresses, sales, products etc.

8 CONCLUSION & FUTURE WORK

In this chapter, the report is wrapped together with a conclusion and finally future research is proposed for an extension of this study and further investigation in the area of Ionic Framework.

In this project we have built a fully functional Android application using Ionic framework and worked on providing a fully customizable shopping experience where users can purchase their product according to their wish. We have also worked on how front end (homepage, shopping page, cart page) and back end (Server, Yii framework) combine together to validate and produce what the users wants in the application. The creation of an Ionic application was really easy. You created a project with one command and then started developing. Since Ionic builds on web technology it is easy to understand the logic if you are familiar with web development. The documentation is really good and well organized. Clear structure with code snippets and an interactive example for each component makes it easy to use but also to get inspiration. This thesis also provides how time efficient and cost efficient method it is to build a cross platform application.

In Future works, the design of the application can be increased to make the user experience a wholesome experience. The framework of the normal shopping can also be developed further to allow customers to buy ready made product. For existing users, work can also be done to allow users to update their existing address. Developers also increase the feature of the customization page for a lucrative user experience.

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