A Multipurpose Mobile Application for Air Cargo Management System for Saudi Airlines

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Abstract: Shipping parcels plays a significant role in our lives. It provides us with products that are overseas, the essentials that we lack in our countries no matter whatever the size or quantity. In the shipping system we aim to ship parcels in high speed and high quality by providing several enhancements that demand highly secure systems protecting both the customer's information and the shipment itself. Thus every shipping company strives to accomplish the shipping in a secure and trusted way, putting the customer in the highest priority. This paper explains an implementation of an android application (Airpress) that will help Saudi Airlines and associated companies in import and export of the items needed. The application allows customers to create cargo easily and quickly. A customer can register and create cargo at any time, and track the cargo by a single click. It's a multi-purpose mobile application that aim to help companies to make it easier to have an app that is specialized for serving businesses. Examples of other majors tasks that the app can accomplish are : a) Door ro door delivery by registered to make it easier and more convenient for customers – b) Providing more options for customers to find the suitable and preferred way to make their orders.

Keywords: Cargo, Delivery, Packaging, Receiver, Sender, Shipment, Status, Tracking number, Time frame.

I. INTRODUCTION

Air cargo is essential to many facets of modern life. Moving perishable goods from one side of the world to the other would not be possible without air transport. However, the demand for efficient supply chains is pushing other modes of transport to improve their lead times and compete with air cargo on that front. The air cargo industry continues to face challenges of sustainability, profitability and customer satisfaction. The industry has been slow to adapt to an increasingly electronic world that demands more transparency, speed and efficiency. Global implementation of electronic air waybill to date is less than 50%. Each day millions of pieces of paper air waybill are exchanged across the supply chain increasing the chance of error, reducing the efficiency of the process and causing customers and partners numerous pain points and poor quality of service. Also, criminal activities such as smuggling, theft and mishandled shipment. [1]

1.1 Proposed System:

The Air Cargo Management System that addresses the overall areas of general cargo operations through the aviation. Online Air Cargo management system provides clear information about the banned products to the customers. So customers can avoid all the items listed by the cargo manager. Cargo manager can serve the customers by carrying the goods from one place to another. The customers can use the online cargo management system to access the information about their goods and other material.The aim is to support the transportation needs of Saudi Arabian industrial, commercial and public sectors. [2]

Objectives:
• Create system that arrange logistics services, transfers and delivers goods.
• Provide high quality services to large and small Saudi companies.
• Allow customers to create and track their shipments.
• Provide safest and most economical mode of transport.
• Clarity and ease of the system.
• Provide high quality and secure packaging.
• Ensure goods delivered meet customer's expectations.

1.2 Project Domain & Limitations:

Domain: international and national cargo management for Saudi Arabian companies. Import and export goods via Saudi airline and others.

Limitation: The service only restricted to Saudi Airlines (saudi companies).

After examining the existing methodologies, we decided to follow iterative waterfall model for the following reasons, which are easy to understand and use, save time and allows a return to a previous stage moreover, the changes whenever required. We collected data through the questionnaires then we are going to use the information to help us in the requirements analysis. [3]

II. BACKGROUND INFORMATION & RELATED WORK

2.1. Background Information

Cargo management has been extremely enhanced throughout the years as technology evolved. It has solved many critical issues such as reducing shipping time periods and having more control over the shipment as lack of information about the shipment and poor tracking methods have resulted in many lost, damaged and delayed shipments. Using technology developed by programming languages and

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Table 2.1: proposed & similar system comparison.

Features	Our System	Namma Cargo Co.	Fly Dubai Cargo	Saudia	Al Fares Cargo Service and Clearance	Emirates SkyCargo	DHL
Problem solved	Support transportation needs of Saudi Arabian companies	Logistics and materials management services	Tracking Customer Shipment	Tracking Customer Shipment	Tracking customer shipment.	Industry solutions	Tracking customer shipment
Domain & Users	-International and national - Saudi companies	International Customers Admin	Customer and Admin International	Customer Admin	Customers and Admin Mobile Commerce	Customer, Admin, Employee	International Customer Admin
Design methods	Hub and spoke distribution paradigm	Data collection strategy	-	-	-	Clear contact, services	-Research -Survey
SW & HW	Android DB Other techniques	Website DB POLEP system SITA network	DB, GPS, IOS	DB, GPS, Website	IOS Android OS GPS Database.	Website, DB, GPS, social Media, computers, phones	Website DB DW Google maps
Output	Android application for Air cargo management	International freight forwarding system	Provide Transportation and tracking Service	Track shipment, Route mapper	Transport and logistics needs.	Tracking parcels, customer guarantee	-Package (shipment) location -Package recipient.
Features	- Load and store heavy or bulky goods - High quality customized packaging	- Cargos of any size from Worldwide - Door-to-door move	Set of options for different kinds of freight goods.	User friendly interface website - international Shipping	-International -Different payments like cash, Credit Cards, MasterCard. And Visa.	Multiple shipping methods, contact Apps	-International shipping. -Secure door-to-door delivery.
Limitations	- Business to business approach - Restricted to Saudi companies	Limited number of offices in Saudi Arabia	They have Standard language.	Only English Language	Supports Arabic language but not all pages.	Multiple contact methods, Languages, additional support	Support only English language.

functions such as applications to enable the customer to receive updates and for the employees to manage their shipment [4]. In order to gather information, we used a survey, which consists of nine questions. As a result of that, we found that more than a half of people who answered the questions has experienced a lost/damaged shipment. The majority would like to receive notifications about the status of their shipment.

Similar Systems Comparison:

The comparison of the proposed system is done with respect to existing systems found in [5] [6] [7] [8] [9] [10] [11] and the table below contains the details of comparison.

III. SYSTEM ANALYSIS AND DESIGN

Analysis are there to make difficult ideas simpler by extended and various explanations to reach a better understanding. Best alternatives for certain subjects are chosen. In this section, requirement specifications and analysis will be explained.

3.1. Requirements specification:

Functional Requirements:

1. Manager

• log in or out.
• To display, update, delete a user's request.

• Manage the application and ensure that the system is performing correctly.

2. Customer

• Open a new account and log in or out.
• Make, update, delete, and view delivery orders.
• Ttrack shipments.

3. Airline

• Ship shipments via plane.
• Meeting point for shipments

Nonfunctional Requirements:

• Availability
• Security

Passwords must be highly strong, every account should be linked to the user's phone number, and accounts should be updated regularly.

• Accuracy

all data provided must be accurate with the right value represented in consistent and clear form.

• Performance

Quality of the system's interaction with the user, in terms of its speed, and ease of use, and error level.

3.2 System Architecture:

In this section the architecture will be defined, systems components, modules, interfaces, tools and storyboards will also be done. To make implementations easier, faster, and with less errors.
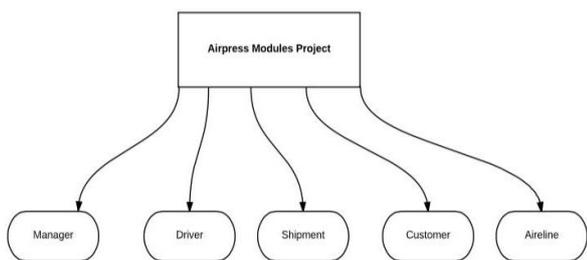

Figure 4.1 modules

Three tier architecture presentation layer, which is the interface, server layer and data layer.
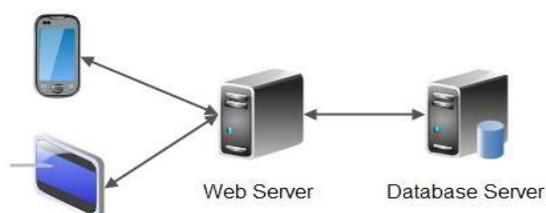

Figure 4.2 Tier Architecture

To implement our application, we will use many tools, which are:

Frontend:

- Android Studio (GUI)

It's a rich application framework that allows you to build innovative apps and games for mobile devices in a Java language environment. [15] [16]

Backend:

- DBMS (Database Management System)
- For the database we will use MySQL phpmyadmin
- FileZilla is a free software, cross-platform FTP application for uploading files
- Text wrangler for writing PHP scripts
- MAMP/WAMP stands for Macintosh, Apache, MySQL, and PHP for accessing local PHP and MySQL server

4.1.1 Flowchart

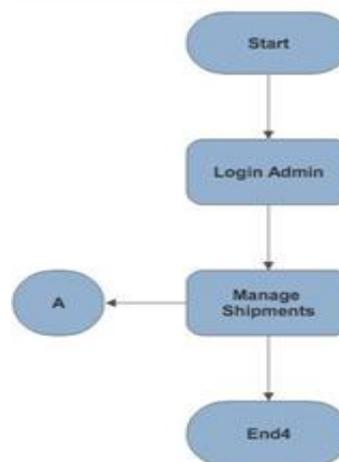The flowcharts in fig 4.3 and 4.4 illustrate the process of work flow in the development of the app.
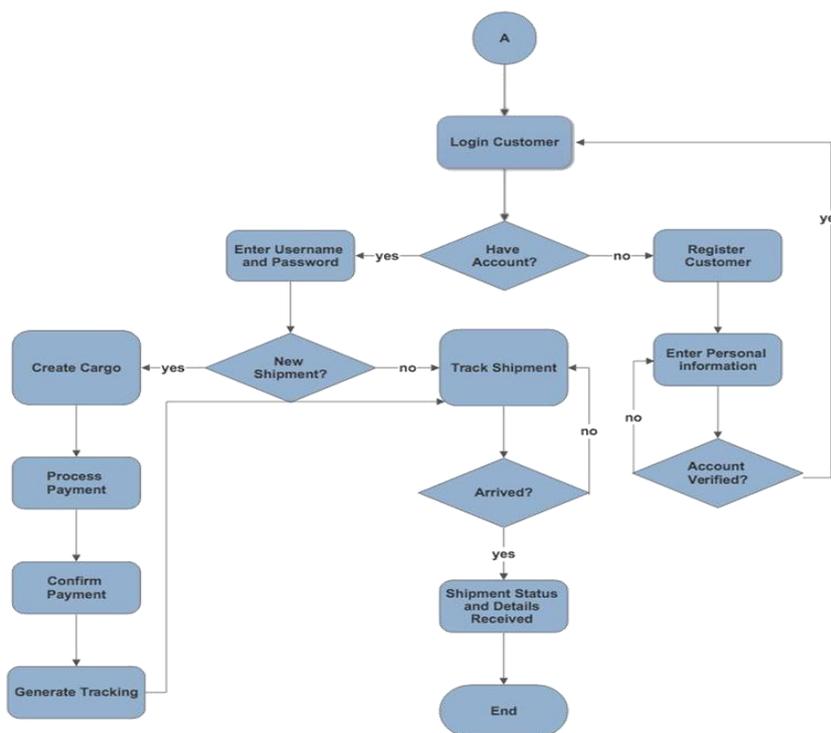

Figure 4.3. Flowchart_1

Figure 4.4. Flowchart_2

4.1.2 Story board

In fig 4-5 an pre-visualization of the mobile data application is depicted using a storyboard tool that is commonly a graphical form of illustration and images displayed in sequences for the purpose of pre visualizing the system.

Starting from top-left:
1- First the customer logs in and places the cargo order.
2- Manager views and manages the cargo.
3- Airline views and processes cargo order.
4- Cargo goes through process.
5- Customer tracks the order status.
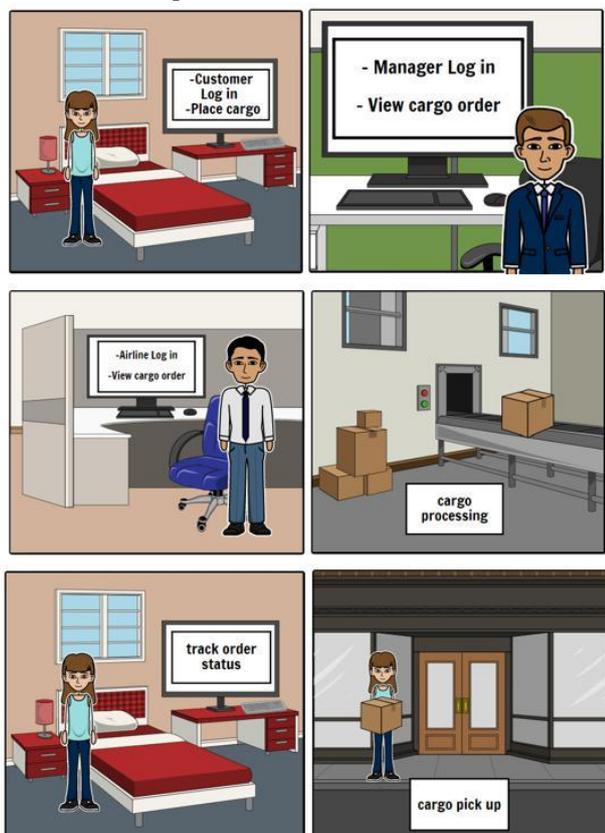6- Customer picks up cargo.
7- Process completed.

Figure 4.5-story board

IV. IMPLEMENTATION

This section gives a brief explanation of the implementation phase of Air Cargo Management Application project. It represents the system implementation, which describe the hardware, software, and platform required to develop the app. In addition, some details of Air Cargo Management Application will be presented. Lastly a snapshot of the main input and output screen will be listed.

For the hardware components, two android galaxy s4 are used to run the application, throughout the whole process. Android studio is the main software we have used to develop the application , it gave us the ability to use java programming language for the implementation. [17]

PHP, PhpMyAdmin and MySQL are used for database creation and connectivity, we tried to work with SQLite and spent around two weeks struggling but then we decided to change it and settled on PhpMyAdmin since we have experience in it. PhpMyAdmin is a free software tool intended to handle the administration of MySQL over the Web. It supports a wide range of operations on MySQL. Frequently used operations (managing database, tables, columns, relations, indexes, users, permissions, etc..) can be performed via the user interface, while we still have the ability to directly execute any SQL statement[18]. Text Wrangler, sublime text and notepad, text editors that used to create PHP files[19]. MAMP/WAMP for housing database and web server. It stands for Macintosh/ Windows, Apache, MySQL, and PHP. They are applications you can install on your device which allow you to have access to a local PHP server and MySQL server[20]. Adobe illustrator is used to design the logo and icons[21]. Microsoft word for documentation.Google Drive for sharing folders.FileZilla is an FTP program for uploading PHP files and folders to control panel [22]. Blue Host web hosting service is used to connect our android application to the server, controlling the database using control panel and uploading all our PHP files [23].

Air cargo management application intended to serve businesses in their transportation need, exporting and importing. To accomplish this the application must allow customers (which in our case companies) to register/sign in to do so. After signing in as customer you have several options in the main menu. The first option is to create a shipment, from there a customer has to enter all shipment details and then processed to payment. The second option is to track shipment, you can that by entering your shipment tracking number and the app will display the shipment status along with expected delivery time Implementing the application went through many phases, first we used android studio to create the required activities and each activity class have its own corresponding layout file stored in the application resources. Each activity has its own user interface The Activity class is central to every Android application. Much of the time, we defined and implemented an activity for each screen in our application [24].

In the Air Cargo Management application, we have implemented around fifteen different activity classes. In the course cargo management, the user transitions from one activity to the next, interacting with the layout controls of each activity. For each screen we have added buttons, labels and edit texts depends on the activity needs. After designing each layout we connected the activities together using intents. The intent is an object that provides runtime binding between separate components, such as two activities. It represents an app's "intent to do something." it can be used for a wide variety of task. After that , we have created the database and the tables on a web server via Blue Host as mentioned before. Integrating all PHP files and MYSQL with our android application. In our case we are using a web server, so we want to access its data on our android application. MYSQL is used as a database at the webserver and PHP is used to fetch data from the database. Our application will communicate with the PHP pages with necessary parameters and PHP will contact MYSQL database and will fetch the result and return the results to us[25] [26].
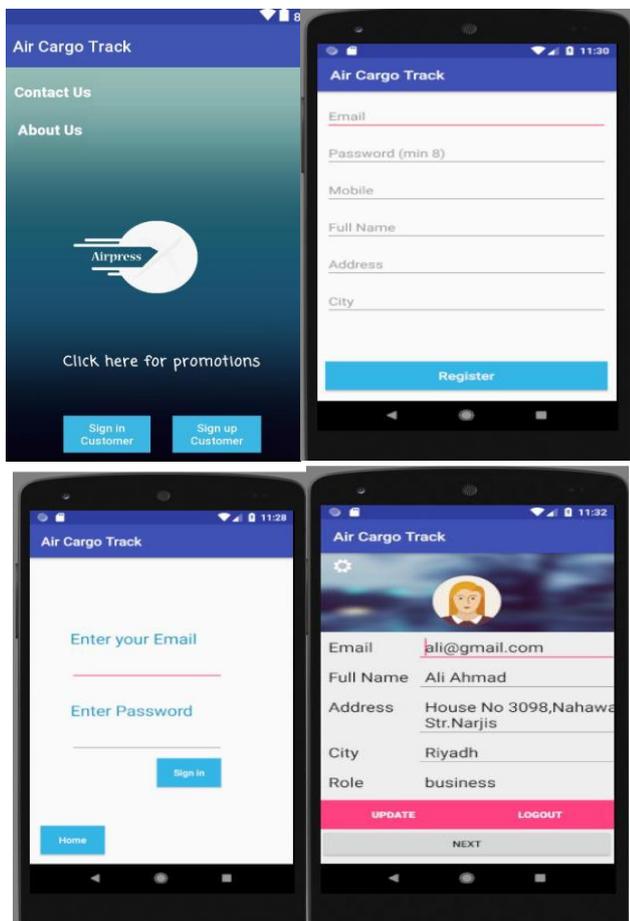
**Figure 5.5 Airpress- a) Home page b) User registration
c) User Login d) User Profile**

**Figure 5.5 Airpress- a) user main page b) create
shipment c) payment and d)track shipment**

The app supports major capabilities such as the main user options, creation of shipment by user, payment options, tracking shipment, contact/support, promotions, etc. Fig 5.5 (a) and (b) represent the home page of the app and Registration page respectively. A new user may have to sign up to enter the app by clicking "Register button" followed by the need to fill all the required information by ensuring that the password is more than 8 characters. Is process completes the users will be redirected automatically into their profile account where they can even update their information and save it. For an existing user to sign in, one can enter email and password and they will be redirected to the main page shown in fig 5.5(c) which contains three buttons , one for creating shipment and two others for tracking the shipment. When a user registers, a user profile is created automatically containing all user personal information as shown in figure 5.5(d). In fig 5.6(a), it is depicted that the user has to enter all shipment information like number of packages, shipment weight along with sender and receiver information. After shipment creation in fig 5.5 (b) is completed and confirmed, its information will be made available in the payment page shown in fig. 5.5 (c) with several payment options. Finally the user enters shipment tracking number in order to check shipment status along with expected delivery time as shown in fig 5.5(d).
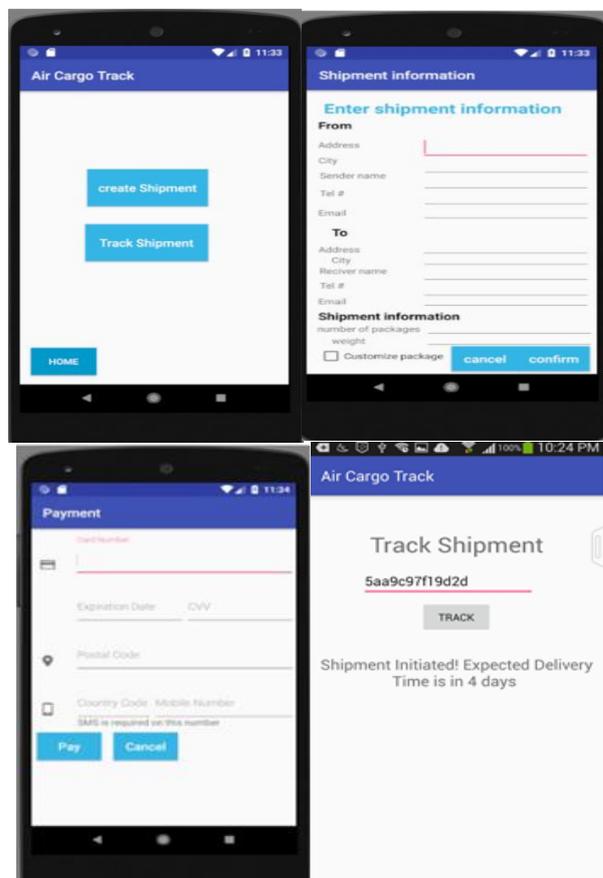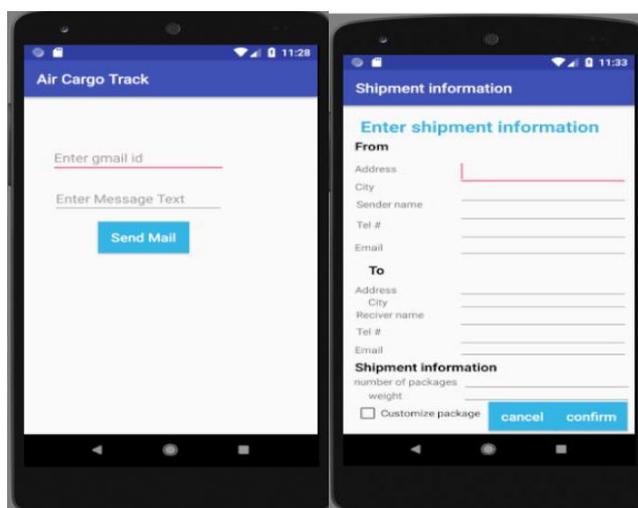
The fig. 5.6 (a) illustrates a page through which the customer can contact (or email or send a message) with the support in case of an issue or a feedback. The pages in fig. 5.6 (b & c) may be updated in the event of promotions (available offers) and information about us and our policies.
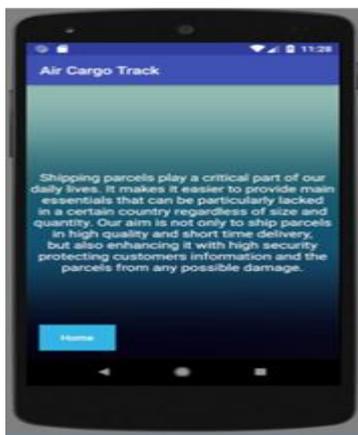
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Figure 5.10 Airpress- a)contact us/support b) promotion c) About us

The implementation was tested by means of unit testing strategy that is created ten by the programmer to verify every minimal piece of code performance whether it is accomplishes the functions as were intended to do followed by integrated testing checking issues such as Application Design, User interface, functionality, Usability, Security issues and coding.

Test results

At the end, we cover all test casing that my user face in our application. We try 8 test cases, inside those cases we also try invalid entry to check out that code is working as expected

Table 6.1: Test Results

| Case	Description	Expected Result	Actual Result	Test Result
Customer register	Customer register with valid entry	Successfully registered	Successfully registered	PASS
Customer register2	Customer register with invalid entry ex, email: Ahmed password: ***	Please enter a valid email. Password is too short	Please enter a valid email. Password is too short	PASS
Customer sign in	Customer sign with valid entry	Successfully signed in	Customer successfully signed in	PASS
Customer sign in2	Customer sign with invalid entry	Wrong password	Wrong password	PASS
Update profile	Customer edit profile info	User updated successfully	User updated successfully	PASS
Create shipment	Test process of creating shipment	Create shipment successfully	Create shipment successfully	PASS
Payment	Test payment with invalid card	Confirmation message with payment info	Confirmation message with payment info	FAIL
Track shipment	Customer enter invalid track number	Invalid number. Retry	Invalid number. Retry	PASS
Contact us	Receiving customer email	Message from customer Subject : about my shipment	Message from customer Subject : about my shipment	PASS

VI. CONCLUSION AND FUTURE

In our daily life, companies need to transport and import products and goods. Therefore, there is a great demand for cargo companies, especially air cargo, to be transported between cities. The idea of this project is to achieve this need and the ease of use of the application and access to customer data also enables them to track their shipments easily.

This application is created for the shipping company. Several phases of this project have been completed, and for future there will be many services in better quality form and more achievements are making their way in the domain of air cargo.Air Cargo Mobile App has achieved its main task. Which is going to be launched on the Android play store. It is going to be launched and ready to be used by our customers. It is properly working with all the functions that we designed and implemented. A user can sign in, make an order and the order will be shipped. While the manager can access and handle the management related tasks.

For future work, our aim is to add some enhancements. For example, having drivers delivering the orders to the door, in order to make it easier and more convenient for our customers. In addition, we want to spread wider to more customer access points. Such as, launching an application in IOS and publishing a website, providing more options for customers to find the suitable and preferred way to make their orders. Feedback from customers has a high priority and for that we plan to increase the number of orders made per day. Hopefully, on the long run we would be a very well known , trustworthy and a reliable shipping company.

CHAT APP FOR MANAGEMENT SYSTEM

We developed a live chat that help customer communicate with Support faster than traditional ways. The customer have to sign in first customer send a message to our Support via live chat. Customer Support respond quickly in real time
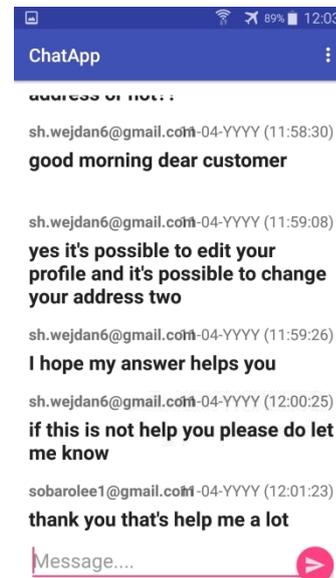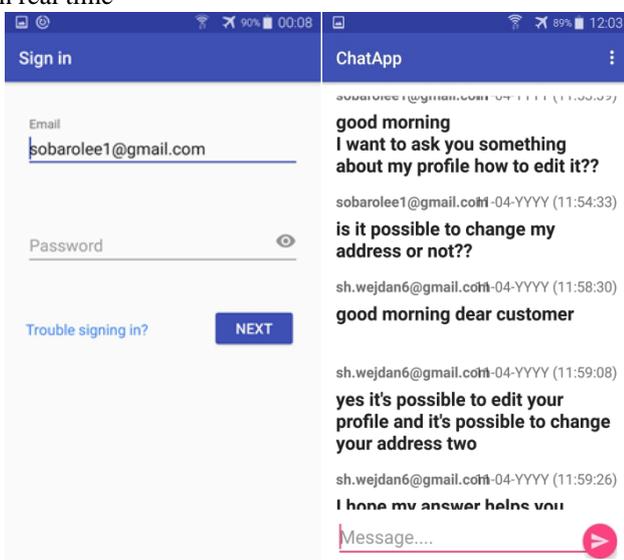
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