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

Kahkashan Tabassum, Hadil Shaiba

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 to 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
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.

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**
- **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.

---

Table 2.1: proposed & similar system comparison.

<table>
<thead>
<tr>
<th>Features</th>
<th>Our System</th>
<th>Namra Cargo Co.</th>
<th>Fly Dubai Cargo</th>
<th>Saudia</th>
<th>Al Fares Cargo Service and Clearance</th>
<th>Emirates Sky Cargo</th>
<th>DHL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem solved</td>
<td>Support transportation needs of Saudi Arabian companies</td>
<td>Logistics and materials management services</td>
<td>Tracking Customer Shipment</td>
<td>Tracking Customer Shipment</td>
<td>Tracking customer Shipment</td>
<td>Industry solutions</td>
<td>Tracking customer shipment</td>
</tr>
<tr>
<td>Design methods</td>
<td>Hub and spoke distribution paradigm</td>
<td>Data collection strategy</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Clear contact, services</td>
<td>-Research Survey</td>
</tr>
<tr>
<td>SW &amp; HW</td>
<td>Android DB</td>
<td>Website FOLEP system SITA network</td>
<td>DB, GPS, IOS Website</td>
<td>IOS Android OS GPS Database</td>
<td>Website, DB, GPS, social Media, computers, phones</td>
<td>Website DB, DW, Google map</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>Android application for Air cargo management</td>
<td>International freight forwarding system</td>
<td>Provide Transportation and tracking Service</td>
<td>Transport and logistics needs</td>
<td>Tracking parcels, customer guarantee</td>
<td>Package (shipment) location</td>
<td>Package recipient</td>
</tr>
<tr>
<td>Features</td>
<td>- Load and store heavy or bulky goods. - High quality customized packaging</td>
<td>Set of options for different kinds of freight goods.</td>
<td>User friendly interface website - International Shipment</td>
<td>International payments like each, Credit Card, MasterCard, And Visa</td>
<td>Multiple shipping methods, contact Apps</td>
<td>International shipping - Secure door-to-door delivery</td>
<td></td>
</tr>
<tr>
<td>Limitations</td>
<td>Business to business approach - Restricted to Saudi companies</td>
<td>Limited number of offices in Saudi Arabia</td>
<td>They have Standard languages</td>
<td>Only English Language</td>
<td>Supports Arabic language but not all pages</td>
<td>Multiple contact methods, Languages, additional support</td>
<td>Support only English language</td>
</tr>
</tbody>
</table>

- Manage the application and ensure that the system is performing correctly.
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](image_url)

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

![Figure 4.2 Tier Architecture](image_url)

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

Frontend:
- Android Studio (GUI)

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](image_url)

![Figure 4.4. Flowchart_2](image_url)
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.

![Storyboard Images]

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 SQLlite 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 is 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 webservers 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].
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” 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).
V. TESTING

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

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

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


