

Overcoming Unemployment of Computer Science Alumni through Mobile Apps Utilization

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Abstract

Mobile phones are considered extremely crucial for their daily usage due to their unique features such as mobility, availability, and compatibility. Moreover, the need for mobile apps periodically increases in terms of the variety of end-users as well as mobile platforms. Iraq is an emerging country concerning the development and requirements of mobile apps. There are numerous challenges faced by this trend on mobile phone app requirements, development, and usage. Consequently, the major consideration is how to build a suitable mobile app that can be adopted, adapted, and customized according to Iraqi market requirements. An essential fact worth mentioning is the increase in unemployed computer departments alumni in Iraq. Those who can develop mobile apps and software need to recruit suitable candidates. The purpose of this article is to develop a customized flight booking mobile application to partially reduce and solve the problem of unemployed computer alumni. The target of this application is to reduce time and effort for passengers and offer unique features. The developed application is the adoption of previous applications and the improvement of their inadequacies. By following a six-phase methodology to set a procedural technique for optimizing the use of the mobile application as a source of revenue for unemployed alumni as well as being beneficial for the customer. The validation and verification of the proposed

application of this current research are done by evaluating and executing the mobile application. The results of this paper meet the main objective, where, the special features have been implemented and tested. In addition, the application has been installed on mobile phones and tested. Furthermore, the income from this application is obtained through purchasing it or subscribing to it for a specific duration. We encourage researchers as well as alumni who are targeted in this field to be attentive to cutting-edge technology and advancement and the concept of this paper.

Keywords

Booking, Unemployed, Application.

Introduction

The software industry in Iraq is struggling in the face of many challenges, namely, meeting the market's demands. The industry is still young, both in infrastructure and environment, and there is a need to initiate the first step to accommodate this growing industry. On the other hand, the number of alumni from computer fields is steadily increasing with the majority of alumni being unemployed.

There is no doubt about the need for an easy and accurate system in terms of usability and availability to meet the users' requirements and expectations. Therefore, the online ticket reservation system frequently needs to cater to users' demands and requires optimizing attempts in order to be more suitable. The smartphone era witnesses its utilization in various fields to address the daily demands of life through its numerous applications. However, each application is service-specific and performs a particular purpose. Thus, smartphone requirements are constantly expanding. The concept of an online ticket reservation system has been applied in diverse smartphone environments, with a huge majority of android end-users (Chua et al., 2010; Hasani et al., 2017). The business and industry sectors in Iraq require many applications and infrastructure to address the needs of various industries. This is especially in relation to the online ticket reservations, as the customized mobile applications available to meet the Iraqi market are very small. Moreover, the phenomena of high unemployment rate have a negative impact on graduates, particularly on Computer Science (CS) graduates. Moreover, there are no job prospects for Computer Science graduates, with the Iraqi government to offer for all of them. Subsequently, this situation has led to a crisis, with no reliable recourses or references that highlighted the aforementioned problems, unfortunately (Geneiatakis et al., 2015).

Most of the applications that have been produced or which already have been used in Iraq seem inadequate endeavors in programming applications and attempts in meeting the users' needs on the one hand and the requirements of the business market on the other hand (Srivastava et al., 2021).

The survey conducted on the mobile app online airline tickets booking, specifically on the customized application for Iraq purposes did not discover specialized application supports. Thus, this finding demonstrates the need of the Iraqi users and the requirements of the market which are adaptable to the infrastructure of Iraq.

More precisely, this type of application needs certain special features that will enable it to be more suitable to meet the needs of the user in terms of differentiation and differences in services within the application, and that the principle was used in previous applications (Mohapatra, 2013). As a matter of specialization, there are no discount in-flight charges to any specific passenger if he/she travels on a certain number of flights, for the same passenger through the same airlines. This is in addition with regards to the refund of travel fees in the case of the passenger wishing to cancel his/her trip for a specific reason and travel before a specific agreed period. In addition, the passenger is given a traveler-tracking ID instead of trip tracking only (Hasani et al., 2017).

In fact, despite the limited number of applications allocated to the Iraqi market to meet the users' needs, regrettably, the fresh programmer or developers were not enrolled or integrated into the industrial market, However, there has been no research or previous studies that highlighted the problem of unemployment among graduates in the field of Computer Science (Geneiatakis et al., 2015). The neglect in this aspect of the market does not play any creative role nor does it create a mature level of competition and motivation for graduates. In addition, it does not expand the capabilities of skilled developers in terms of providing professional services to substitute for the lack of government employment for the aforementioned graduates.

The solution for the unemployment problem within Iraq was not specifically addressed through an application that ensures user satisfaction in terms of services while creating actual jobs prospects for unemployed programmers, the upgrading of skills, quality of services, and raising the level of competitiveness.

Literature Review

This section will discuss aspects related to computer programs developed to function on smartphones, mobile apps, Personal Computers in the form of tablets in addition to

additional portable gadgets. Prevalently, a large number of airlines and ticketing companies have permitted online booking conducted through e-booking done by costumers' using online booking via specialized apps at the global level. This application will enable ease in booking airline tickets without a customer having to physically go to an airline office/counter, and enable them to conduct the booking on their own. Lastly, the final aspect being considered and discussed are with regards to the current research study, and pass work problems and goals review. Many recent technologies have been utilised to address many aspects, like accuracy and time-saving to decrease the search space and computational complexity (Alshaykha et al., 2021; Rahem et al., 2016).

Android Architecture

The mobile phone structure that uses the Android system comprises a collective of software constituents segregated into 5 segments and 4 primary tiers (Ntantogian et al., 2014), as indicated in Figure 1.

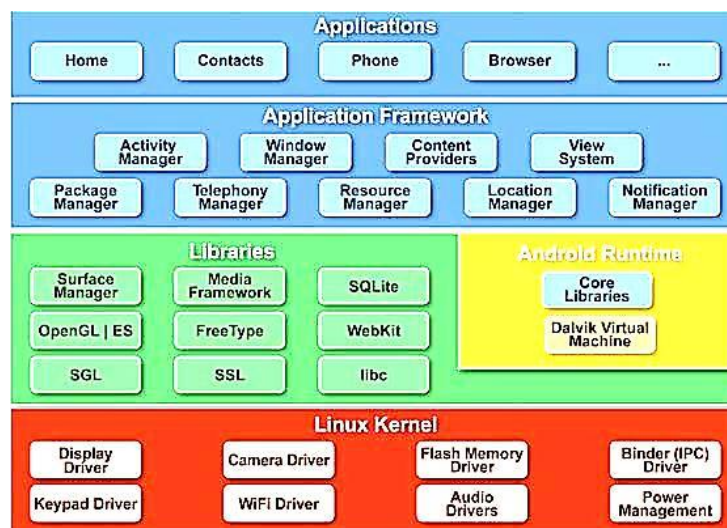


Figure 1 Mobile Android Architecture

In Figure 1, it can be observed that there is a Linux Kernel situated at the bottom-most layer, SSL is the library in charge of Cybersecurity (Ntantogian et al., 2014; Yii et al., 2020).

- **Android Runtime**

As indicated in Figure 1, the Android Runtime is found in the third part of the Android structure, and constitutes two components; the Dalvik Virtual Machine and the Core Libraries. The DALVIK VM (Virtual DALVIC), a form of virtual Java device particularly created to improve Android, is a crucial component.

This machine uses the basic features of Linux such as memory management and multi-threading, which is essential in Java. This machine employs fundamental Linux characteristics such as management and multi-threading, which are critical in Java memory administration. By employing a programming language known as Java, the Android system also includes a collection of fundamental libraries that allow Android developers to create Android applications (Ham et al., 2014).

- **Application**

All Android apps are found in the upper layer, and the intended application is written and to solely be installed on this layer. Exemplars include books, browsers, games, and so on (Jin et al., 2015).

Android Application Components

Being fully integrated with the Android Manifest.xml application file, the application components are the foundation of an Android app. The operating system and Android applications are connected by the broadcast receiver. The providers of content are those who deal with database and data management problems (Amalfitano et al., 2012).

- **Activities**

An activity can take the form of a single-screen activity with an interface for a user. A record of new e-mail messages is one of the activities in an e-mail program. Creating messages and reading emails are other types of activities. In instances when a certain app is exhibiting numerous activities, then one of the activities exhibited must be chosen when the application is run. This activity is carried out as a subset of the following activity:

The main public activity layer broadens the scope of the activity.

- **Services**

It is a background component that performs legacy activities. Services are applied as a subset of the Services as follows.

The public service layer extends the service as:

- **Broadcast Reception**

Broadcasting reception is performed as a sub-channel to receive the broadcast. The public class receiver extends the downstream and receiver range (Liu et al., 2011).

- **Content Providers**

A subset of the initial content providers is used, and a common set of APIs should be created to enable other apps to conduct proceedings. The public layer contains a provision that expands the content provider. The following will be explicated in detail (Gordon et al., 2015). There are additional components that will be used to build components previously listed and these components are:

- **Plug-ins**

The parts represent behavior or part of the UI activity. The user interface elements in the on-screen user interface include buttons, menu templates, and others A hierarchical view layout controls the shape of the screen and the appearance of views (sun et al., 2014).

E-Booking (Online Booking)

When a person thinks of traveling to any country, an airline ticket needs to be booked and details of the trip and the method of payment be known to pay. The computerized reservation system is a computerized system utilized for travel information archiving, querying, and booking that was first employed by airlines and was eventually expanded for use by travel agents (Srivastava et al., 2021). Airlines can electronically book to dedicated worldwide distribution organizations, which allow clients to book online. Instead of keeping data safely within our computer system, an e-ticket is a booking mechanism that removes the necessity of tickets in paper form. To conclude the airport journey, a person needs only to present an e-ticket confirmation receipt together with the passport.

By booking online, the traveling distance problem between the place of residence and the place of booking or lack of available seats to delay the booking can be overcome. All a person has to do is to go to the website and fill out the booking information, which will include the location of the trip, the date of leaving, the number of individuals returning, and the ticket reservation category (for example 1st class, businessmen, or tourist class) (Yii et al., 2020).

When this information is saved, a page will open where the kind of payment can be selected (for example Visa or Credit Card) that will be submitted to the bank's website for the transaction. Hence, no ticket can be misplaced or overlooked once it is saved. E-booking also possessed the ability to alter travel information quickly and whenever, with no need to submit a printed ticket or visit a booking office.

Customer cost: Part of the service is provided free of charge to customers, and for those who wish to receive additional advanced services and are paid to them. Some electronic booking systems are of interest to suppliers to add information and this cost is not standardized. This varies depending on the number of travel agencies. The higher the number of travel agencies, the higher the price the company offers to publish its content, so it evaluates itself according to the value a person provides rather than the price, but there is still an existing price for the system only.

Unemployment

The unemployment issue is connected to issues pertaining to psychology, socio-economic, safety, and politics. This is because it impacts negatively on the creation of power, vitality, talent, and expertise of the youth, who are deemed as the genesis of work and productivity. Consequently, the interruption in the energy physically as a result of the void, particularly amongst the young people, causes a boomerang effect, which annihilates the energy of the youth generation mentally, generating a slew of issues. Unemployment is a worldwide phenomenon, yet its magnitude differs according to country basis (Jodah & Hammood, 2021). The level of compassion that an individual gets from his community, as well as the number of unemployed people in any community, are crucial indicators of the population's mental wellbeing. The job market is full of opportunities for computer science professionals and every day new conflicts in the IT world increase these opportunities. However, it is intriguing why even though this opportunity is available, still many professionals are dissatisfied with the opportunities offered to them as what they deemed that they deserve best.

The main cause of unemployment in Iraq is the sole dependence of the Iraqi economy on one resource, which is oil and this resource is characterized by several attributes, including the instability of oil prices for economic reasons, political and natural reasons. The shortage in either one of these reasons is because of its lack of effectiveness or because of low economic importance. Unemployment has been exacerbated in Iraq in an extensive scope, ranging between 30 - 50%. Moreover, even the methods that were taken to address it was only considered ineffective and minuscule. Furthermore, the outputs of

education were seen as a means of reaching the dissemination of higher degrees. Subsequently, this has led to the prospects of thinking about emigration in the face of globalization, and the revolution of 'Informatics/Information' in which the world is considered as a single global village.

Hence, there arises a question of whether: Is the revolution of modern technology a reason for the increase in unemployment? That perhaps the application of computerized technology and numerous contemporary gadgets and technological innovations has decreased the amount of personnel in several sectors that have adopted technological advancements. Yet, simultaneously, certain areas were unaffected. Conversely, contemporary technology has spawned sectors that demand a surge in the prevalence of jobs and have generated numerous prospects for youths.

Related Work

Use the Internet in order to create brands in online channels to compete between companies. This researcher's work advocated that traditional marketers should rethink brand strategies and investments if they target to stay relevant to customers who are blocking new media. The authors (Mouakket, S., & Al-hawari, M.A., 2012) understand how customers behave towards this technology. It deals with the role of quality of e-service, usefulness, and self-standards in motivating loyalty towards online reservations. It proposes that other studies should consider different optional factors to deepen knowledge of customer loyalty, broaden the theoretical framework, and add additional variables.

The researchers (Zhao et al., 2014) identified customer satisfaction matters and the re-purchasing matters of goodwill in online tourism, hospitality, and hospitality service. The coupon treatment simulates two dimensions of the operator's coupon validity period and the face value of the voucher. Their research assists online sellers understand customer perceptions when online service failures occur.

According to the findings of Ahmadi et al.,(2017) The prevalence of the health information system is still in its early stages and there is a slowdown in the adoption rate among general, small, and large public hospitals. In order to achieve the strategies that affect the adoption of the health information system in hospital operations, this study proposed a theoretical theory. Moreover, (Basoglu & Polat, 2014) have identified that the problem is the effect of variables through the use of the system. The objective is to detect potential variables that may affect PIO and PO and indirectly affect behaviors in mobile service

acceptance. Furthermore, (Olaniyi & Adegoke, 2010) highlighted the problem of manual airlines bookings in developing countries that are costly and time-consuming. The goal is to enable mobile flight reservations as a way to improve efficiency, lower operational costs, increase revenue production, and deliver quality customer care to air travelers. (Garvey & Sankaranarayanan, 2012). Revealed that the increased economic integration has resulted in increased mobility of people, commodities, capital, and ideas, as well as an increase in commerce and investment, in addition to travel-related issues. Thus, there is a need in providing an intelligent application that is capable of meeting the requirements of mobile users worldwide. (Anderson, & Magruder, 2012) divulged that eateries and restaurants are offered bogus incentives to post a review, yet a diverse range of networks have indicated that restaurants do not manipulate ratings in a perplexing manner. In their research, the researchers had performed a series of experiments that all share a common discovery and had no modification at the thresholds. They presented concrete evidence for the first mechanism, but their definition was insufficient to address the second mechanism.

In a study by (Zhao & Law, 2000), the authors had checked out various airline services on the web. They made a comparison of the airlines to ascertain if there exist any differences.

Individuals with Computational Thinking talents can aid address the economy and decrease unemployment rates (Letchumanan et al., 2021). However, (Mulianawati et al., 2020) proposed mobile application for alumni students. According to past research, no mobile system has been established or built for Iraq's demands that also supports the Iraqi environment. There will be non-existence of certain premium services if the app does not exist and within these premium services exist discount and discount of passenger tracking, where the provision of this app is not free within the new premium services. Therefore, there is an opportunity for the unemployed to be mobile apps developers, mobile apps designers, or mobile apps system analysis.

Methodology

As mobile apps are different from desktop apps and have composite functionality, the following mobile app development lifecycle model is used to demonstrate which method has been launched. The approach flow chart is depicted in Figure 2.

Identification-phase

Initially, ideas are gathered and sorted. As can be seen in Figure 2, the objective of this identification phase is to develop a new concept or enhance a currently found application.

This is a customer-generated idea. If the consumer has the notion, it is investigated and described. Developers can come up with new app ideas. The mobile application concept team consists of the business and IT representatives who debate the viability of launching a project around the filtered list of ideas. Existing apps on any common platform are searched for uniqueness. If a similar app already exists, its popularity and supported features are investigated and compared. The existing application contains inconsistencies (s). If no equivalent app exists on any mobile platform, the concept should be documented. The time necessary to create the application is also defined in this step to complete the initial prerequisite collecting. It is imperative that the design team gets the documented tasks of the mobile application idea team.

Design-phase

The mobile application team's concept emerges as a basic plan for the app at this stage. The ubiquity of the app across various mobile devices is evaluated. Alternatively, the appropriate mobile platform is defined. It should be chosen if the developed software will be released as a gratis or sample edition with limited capabilities, or fully as a paid version. To be offered as prototypes, the functionality of the application is separated into components and prototypes, which are mixtures of components at this phase, the functional needs are defined. The application's software architecture is then built. This is ensued by the prototypes and modules. The storyboard for the user interface interaction is a critical aspect of the design process since it depicts the application's flow. For coding purposes, the documented design work is handed over to the development phase.

Development-phase

The Development Phase is where the app is coded. It is feasible to code modules for a similar prototype in parallel. The procedure for development may be separated into two phases: functional coding and user interface coding. The code for the fundamental functions is written initially. Components of the identical model can be developed independently. These modules can then be combined. In the second stage, the user interface is intended to be compatible with various feasible mobile-platform OS; having a distinct look and feel for the same app on multiple platforms is not recommended. The design should employ the smallest set of mobile OS interface components. Finally, the development phase documentation is sent to the prototype phase which is the planning stage. The second model is then tested, merged with the first, and submitted to the customer. The process is continued until the eventual model is ready. The customer is

provided the final prototype for input. The prototyping work is recorded and tested during the Testing Phase as indicated in Figure 2.

Testing-phase

In any development process model, testing is essential. Using an emulator/simulator, the prototypes are initially evaluated. Android OS development, for example, must be tested across a variety of OS versions, phone types, and screen magnitude. As a result, the documentation for the test statuses is sent to the customer.

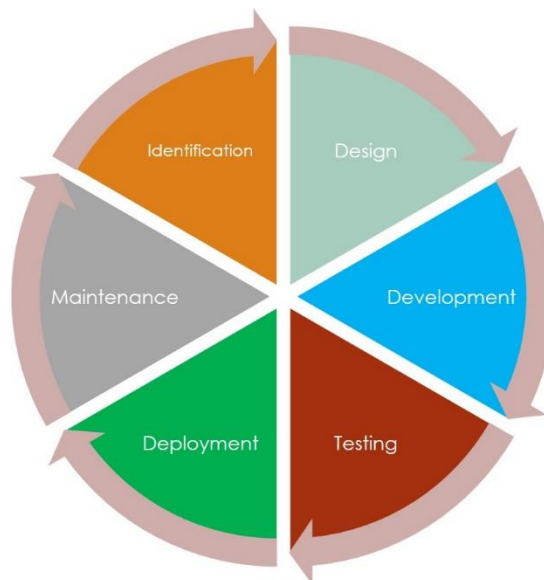


Figure 2 Methodology flow chart

Deployment-phase

The final phase of development is the Deployment Phase as illustrated in Figure 2. The app is ready for release after testing and final client feedback. The app is then posted to the proper app store/market. Before deploying the app, review the instructions below.

1. On the website of the application developer, register as a developer and contribute to the annual subscription payment if it is required.
2. Before installing an app, review the application store's rules and regulations.
3. To improve the program, remove whole comments as well as log files.
4. The app must have appropriate images for the background and icons, and the mobile device must support the necessary file format.

Maintenance - phase

The final phase in this approach is the 'Maintenance Phase' as illustrated in Figure 2, which is a continuous effort. Users provide feedback, and the needed modifications are implemented as problem repairs or enhancements. Regular updates should include security fixes, performance enhancements, new functionality, and new user interfaces. The maintenance phase also includes marketing the app through the promotion of its unique features. If any app needs a backend server, it must be maintained together with the operating system. The users will respond to the next platform involving analysis after the user has arranged numerous quality indicators with a certain range. Here, the feedback and results of the profits will undergo an analysis before being sent to the next platform, which is the output. Information on the evaluation findings in terms of average flight, excellent hosts, and an exceptional flight will be made available to the user.

Results and Discussion

The oversupply of computer graduates makes unemployment a challenge for any government initiatives aimed at resolving the problem, Unemployment refers to the share of the labor force that is without work but available for and seeking employment. Unemployment refers to the share of the labor force that is without work but available for and seeking employment, 0.98% increase from 2019, 0.11% decline from 2018, 0.15% decline from 2017 and a 2.2% increase from 2016 as listed in figure 3.

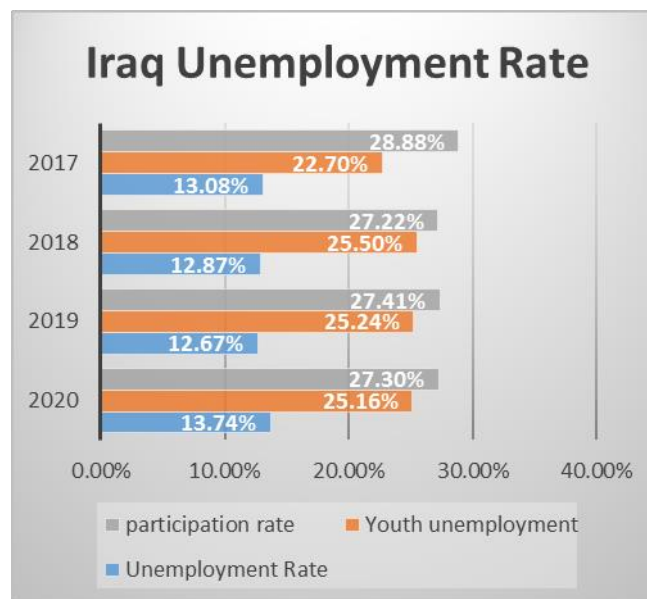


Figure 3 Iraq unemployment facts

Where the recruitment rate does not exceed 4-6% under ideal conditions. The annual generation of 12000 alumni has been a topic of discussion. However, the approximate total of alumni exceeding 500,000, has exacerbated the problem. In the same context, the recruitment rate in the private sector, such as companies, organizations, and others are still meager as numerous factors are affecting it. Consequently, one of the solutions is to encourage computer alumni to penetrate the industrial market as developers. Particularly they should be in the form of a group of developers not exceeding 3 to 4 developers, to develop as well as deploy mobile apps. Additionally, it will be a considerably good source of income on the one hand and help fill the need for Iraq market apps on the other hand. In order to enrich and increase the content of mobile apps and enlarge the level of professionalism in terms of the developers' market requirements, the level of requirements should be raised.

The Application Interfaces

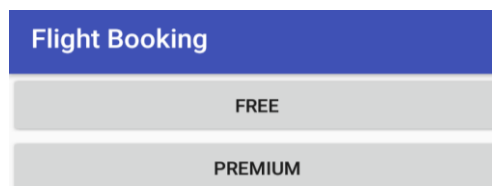


Figure 4 Main Interface

Main Interface The first activity in the system is the main activity that controls the flow of the users using the app. If the user has not registered before and does not wish to register, he/she can use the free option by pressing the “Free” button, and they will then be directed to the flight's activity directly. In case the user desires to use the premium option, pressing the “Premium” button will direct him/her to the login activity as illustrated in Figure 4 for the ‘Free’ or ‘Premium’ options.

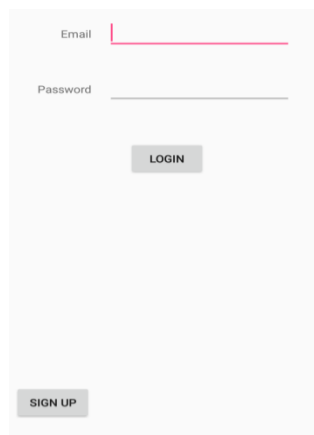
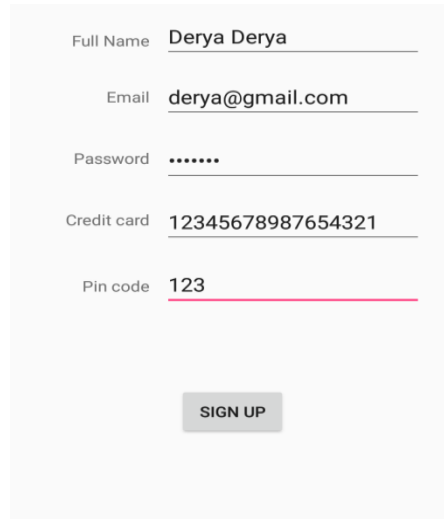


Figure 5 Sign Up

Sign Up

If the user is already registered, they have to fill in the login information to get directed to the dashboard, or else he/she will have to register by pressing on the “Sign up” button, which will then direct him/her to the registration slot as illustrated in Figure 5.



The image shows a registration form with the following fields and values:

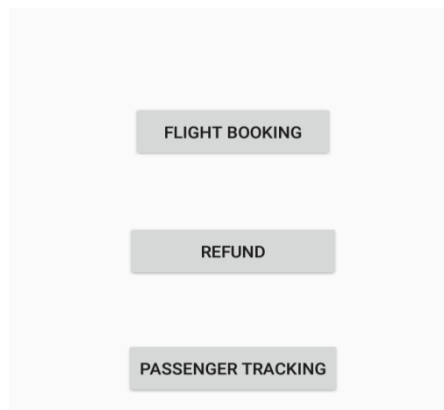
Full Name	Derya Derya
Email	derya@gmail.com
Password
Credit card	12345678987654321
Pin code	123

Below the fields is a button labeled "SIGN UP".

Figure 6 Sign Up Information Needed

Sign Up Information Needed

The user enters their required information; Full name, Email, password, credit card number, and credit card’s pin code as illustrated in Figure 6 The credit card’s information is required for payment of registration fees, and they will not be saved in the database for security reasons. The premium option gives the user the advantages of obtaining an 80% refund of the total fees if he/she cancels the flight, and given free flight after 3 flights for the same person using the same airline and for others to track the passenger as shown in Figure 7.



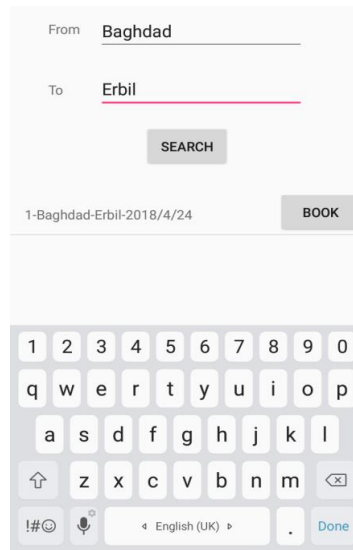
The image shows a menu with three options:

- FLIGHT BOOKING
- REFUND
- PASSENGER TRACKING

Figure 7 The Main Interface Functionality

The Main Interface Functionality

The flight booking button leads the user to the activity of the available flight, as shown in Figure 7.

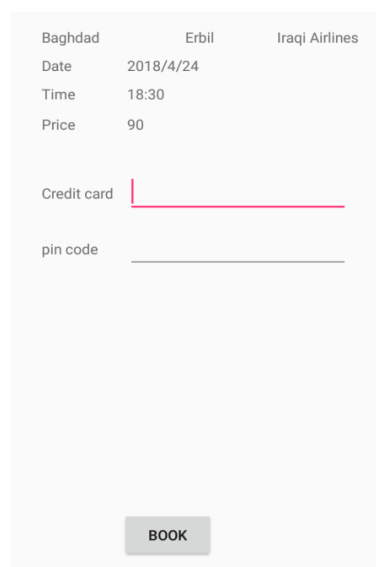


The screenshot shows a mobile application interface for flight search. At the top, there are two input fields: 'From' with the value 'Baghdad' and 'To' with the value 'Erbil'. Below these fields is a grey 'SEARCH' button. Underneath the search button, there is a list item displaying '1-Baghdad-Erbil-2018/4/24' and a grey 'BOOK' button. A standard QWERTY keyboard is visible at the bottom of the screen, indicating that the user is in the process of entering text.

Figure 8 Securing a Flight

Securing a Flight

The user enters the place of flight take-off and the place of landing, then all available flights will be listed in a 'list view'. The row in the list view contains a view in text format showing the information of the flight, and a button to lead the user to the activity of booking Figure 8.



The screenshot displays the payment process interface. It features a table with flight details:

Baghdad	Erbil	Iraqi Airlines
Date	2018/4/24	
Time	18:30	
Price	90	

Below the table, there are two input fields: 'Credit card' and 'pin code'. At the bottom of the screen, there is a grey 'BOOK' button.

Figure 9 Payment Process Interface

Payment Process Interface

Once the user selects the desired flight, he/she will get the information of the flight and edit the Text views to allow the user to enter the credit card number and pin code to confirm the booking as illustrated in Figure 9.

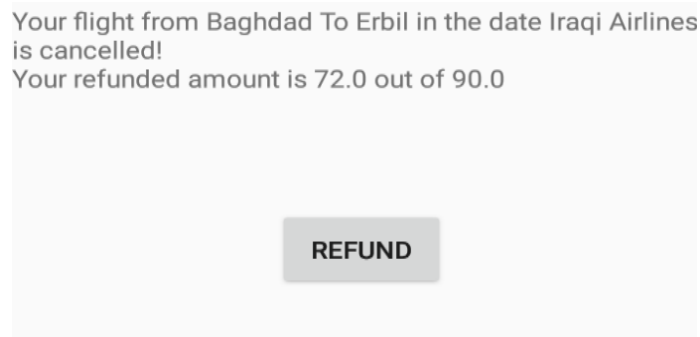
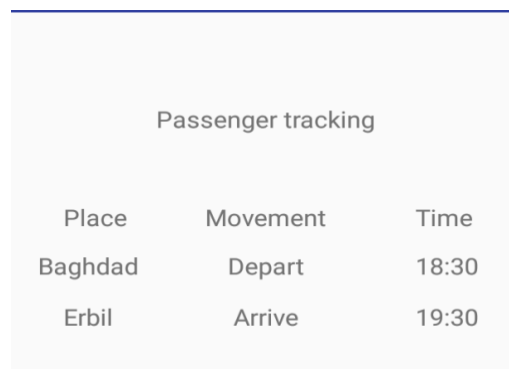


Figure 10 Refund

Refund

The refund activity as indicated in Figure 10, shows that the user has been refunded his/her booking fee, where the service refunds 80% of the total fees of booking to the registered user.

A screenshot of a web interface showing a passenger tracking table. The table has a title "Passenger tracking" and three columns: "Place", "Movement", and "Time". The data rows are: Baghdad Depart 18:30, and Erbil Arrive 19:30.

Passenger tracking		
Place	Movement	Time
Baghdad	Depart	18:30
Erbil	Arrive	19:30

Figure 11 Passenger Tracking

Passenger Tracking

The passenger tracking property, allows others to track the passenger from the time the user boarded the plane until the check-in at the place of destination (Figure 11)

Application Activities Flow

The following Figure 12 shows the flow of activities of the application.

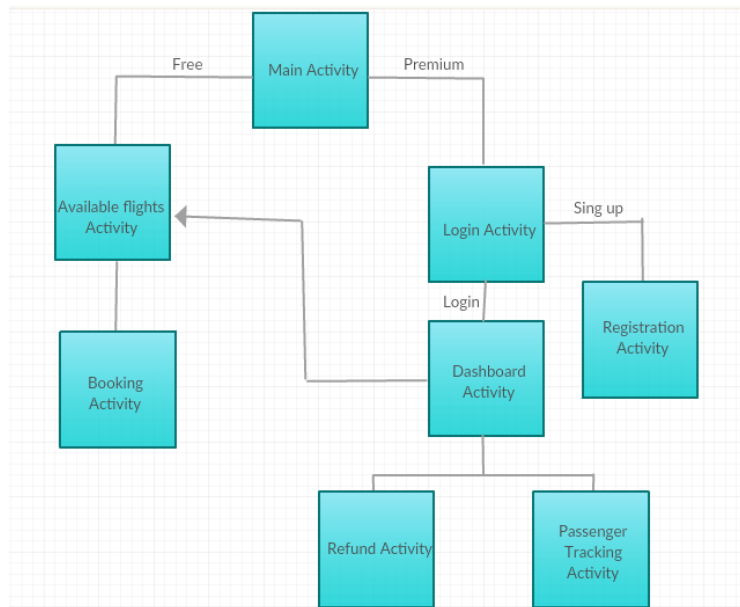


Figure 12 Architectural Concept: Application Activities Flow

The database contains 4 tables; users table, available flights table, booked flights table, and tracking table. The relational database diagram is shown in the following Figure 13.

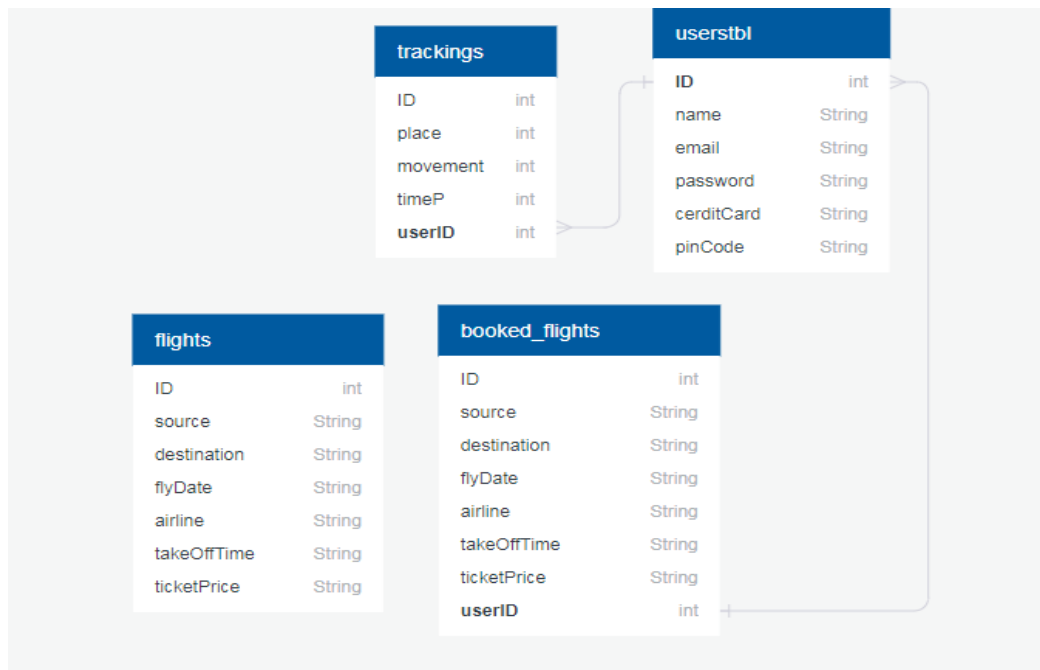


Figure 13 DB Hierarchy

DB Hierarchy

The user's table (usertbl) contains the ID column as the primary key, and name, email, password, credit card number, and pin code (Figure 13). The user's table is linked to the

tables (booked flights) and (trackings) by its key. However, the foreign key in (booked flights) and (trackings) tables is the user ID. The flight's table (flights) contains source as the place of departure, destination as the target or the place of arrival, fly date, airline, take-off time, and ticket price. The booked flights table (booked flights) contains the same columns of flights information except for the user ID, as the ID of the user is stored in the table when they book a specific flight (Figure 13).

Conclusion and Future Work

During this research, the focus was on a very important segment of the unemployed Computer Science Alumni issue, and as a solution to overcome the rate of unemployment amongst these Computer Science Alumni in Iraq, this research proposes the CS graduates to utilize the prospects of being application designers of online flight ticket bookings using mobile applications. With the application of an online flight ticket booking through a mobile application that is dedicated to the Iraq situation, this application is seen to have achieved its goal. This proposal offers programmers and CS graduates in Iraq a promising comfortable livelihood by achieving good income through the revenue generated via the use of this mobile application. It is observed that there is a need in the Iraqi market for mobile applications, The functionality, usability, user-friendliness, responsiveness, the ability to meet user demands, availability, and convenience of the mobile application are considered a priority. This current research views that the advantages of this application need to be developed continuously in future work. We will develop and add additional features in the forthcoming work. The system is part of the application support. The future work is associated with changing the database that is linked to Multi-API flight search, Hotels bookings, Cars rentals, and particular airlines and destination offers.

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