



## DESIGN AND DEVELOPING ONLINE IRAQI BUS RESERVATION SYSTEM BY USING UNIFIED MODELING LANGUAGE

Asaad Abdul-Kareem Al-Hijaj<sup>1</sup>, Ayad Mohammed Jabbar<sup>2</sup>, Hayder Naser Kh<sup>3</sup>

Basra University, Iraq<sup>1</sup>

Shatt Al-Arab University College, Basra, Iraq<sup>2,3</sup>

### ABSTRACT

*The Online Iraqi Bus Reservation System (OIBRS) is a web-based system. It allows customer to check the ticket availability and search for the most possible prices. Our system is available in online twenty four hour and seven days per a week. The most advantages of this system are allowing the customers to search and choose his/her seat position and ticket payment procedure. In this research, we gather the information to define the requirements of the new application. In addition to design and develop OIBRS the Unified Modeling Language (UML) used to model the software and Entity Relationship Diagram (ERD). Both have been established to describe a plan which executes the requirements. The scope of this paper covers customer services to book bus ticket and company daily management work. Furthermore, this work use C# as programming language and Microsoft SQL server 2008 for Data Base implementation. In order to evaluate the Usability of the system, we used Computer System Usability Questionnaires (CSUQ) as application to achievement of this task.*

**Keywords:** Web Technology, Online Reservation System, Booking Bus Application. Web application development. Software Engineering Unified Modeling Language.

### 1. INTRODUCTION

Nowadays the internet becomes one of the most important sectors around the world. The internet has changed the way that people look at the life. Using the internet makes the reservation systems the easiest way to do this task. The internet booking to travel throw airplane or bus is now in the reach of our hand at home [1]. The online booking gives us extra details about the company and lets the customers check the availability of the bus ticket before they buy it. Besides that, customer suffering will rid off by easy way to save time and money[2]. The problems with manual system when users have to stand up in a long queue to buy bus ticket or asking for some information. In Iraq, The State Company For Travelers And Delegates Transportation company in the Ministry of Transportation is still using the manual system. The problems with manual booking items appear when the system lay off at the same time in par-

ticular day with different user, the redundancy of data which cannot be automatically updated, the paper works can be easy lost, the storage space and costs[3]. In fact, the disadvantages of having no electronically system not only effect the public transporter sector but they will certainly affected Health care, Telecommunications, Educations water and electricity, etc. It will delay our county from the rest of the world. "Our experience points are very important for Iraq today: Difficulties and suffering of the current Iraqi constituencies systems will affect new Iraq.

By survey sample of travelers at Garage Baghdad bus station in Basra city / Iraq the result shows an average 97 % of passengers are not happy with transportations system. Also by survey the registration operation in the Iraqi garage stations the majority of drivers suffer when they register for a new root. In the other



hand the customer can deal easy with our friendly website application[4].

Furthermore the website application will help the company employees in daily work by making their work more arranged and more connected to the other company branches. In fact, there are many similar systems in the different countries, but they do not exist in Iraq.

## 2. FRAMEWORK

Our Framework contains a lot of features, which are well-organized in five modules shown in the diagram below. We will discuss each of the modules in turn.

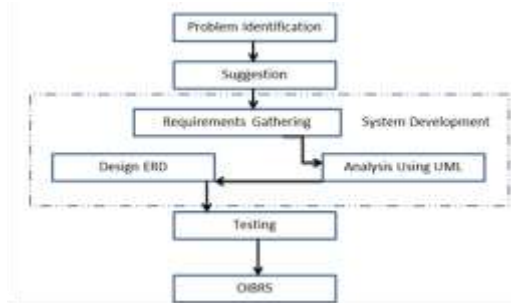


Figure 1: Framework for Online Iraqi Bus Reservation System process

## 3. THE PROBLEM IDENTIFICATION

The problem identification is the first phrase of our research framework. It focused on how to understand the objectives and the problem as well as how to create our OIBRS applications using the C# language and MS SQL server 2008. The outcome for this phrase is the project awareness of problem which gives the clear and full view about the detail problem, especially in a manual system.

## 4. SUGGESTION

The second phrase aims to understand all the requirements, high level design and the general

task to develop the prototype. It is focuses to reach the required levels of quality in the analysis. The outcome of this step is gathering the requirements, design the ERD for database and analysis the system using (UML) as well as to develop web based application.

## 5. SYSTEM DEVELOPMENT

In the development stage, we start with requirement then we defined the system components and we determined the relationship between them. The database has been design depended on relational entities, Normalization and implemented in MS SQL 2008. Then, we used system analysis in order to develop a web based application. Microsoft Visual Studio 2005 is the development tools and C# is programming language for this prototype. The step for system developments of this system as following:

### 5.1 REQUIREMENTS GATHERING:

The task started with requirement collecting to develop bus reservation prototype Table 1 and 2 shows the result below which is the functional requirements and non-functional requirement of the system[7]. In the priority column, the following short hands are used:

- M – mandatory requirements (something the system must do)
- D – desirable requirements (something the system preferably should do)
- O– optional requirements (something the system may do)

Table 1: OIBRS functional requirements

No.	Requirement Description	Priority
<b>Register Member</b>		
1.	Customer must register before Log in the system.	M
2.	Customer must fill all fields in the registration form , otherwise the system will show an error message .	D
<b>Log in</b>		



3.	Administrator can log in to enter the system	M
4.	Customer can log in the system to make his/her booking.	M
5.	The user must enter the valid user name and password, otherwise the system will show an error message.	D
<b>Search Destination</b>		
6.	Administrator can search a Destination, date, number of passengers and select the trip type (one way or return).	M
7.	Customer can search a Destination, date, number of passengers and select the trip type (one way or return).	M
8.	The User must fill all the searching field before press search button , otherwise the system will show an error message .	D
<b>Booking Ticket</b>		
9.	Administrator and Customer can select the coach.	M
10.	Administrator and Customer can select a bus seat.	M
11.	Administrator and customer can confirm booking.	M
<b>Print Receipt</b>		
12.	Customer can print his / her Receipt	O
<b>Manage System</b>		
13.	Manager can create a new coach (include all coach details).	M
14.	Manager can Edit the coach (include all coach details).	M
15.	Manager can Delete the coach (include all coach details).	M
16.	Manager can update customer profile if he/she has any wrong in it.	M

Table 2: OIBRS Non-functional requirements

No.	Requirement Description	Priority
<b>Reliability issues</b>		
17.	If the system should crash no more than once per 24 hours.	M
18.	If the system has been crashed, it should not be more than 20 Minutes	M
19.	If the systems has been crashed, it should behave perfectly normal when reloaded again	M
<b>Usability issues</b>		
20.	That means we should make sure that the system stay working smoothly without any interruption	M
<b>Security issues</b>		
21.	Only Administrator will be able to enter the system to make maintenance.	M
<b>Performance</b>		




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22.	The system must have a high speed of manipulation data and reply to the user request	M
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## 5.2 SOFTWARE ADVANCED ANALYSIS TECHNIQUES:

In our research we highlight the use of (UML) to design the web-based application. We design both sequence diagrams which is used to show the dynamic behavior of application design and class diagrams which it is application statically structure [8]. The sequence diagram present interactions between the objects that arranged in a time sequence.

### A CLASS DIAGRAMS

The class diagram is used to show graphically the visual model as a static view which presents the collection of static elements of this field[9]. The class diagrams are probably the most important and best understood among all UML models [10]. The main constituents of this static view are classes and their relationships. Relationships among classes include associations and generalizations. The class diagram of OIBRS as shown below in Figure2 represent the set of customers who used the system and the association between booking, bus, seat, and etc.

### B SEQUENCE DIAGRAM

A sequence diagram is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart [11]. The interaction process involves in this project are system user. The booking ticket and the manage system sequence diagram for use case are shown in Figure 3,4 below

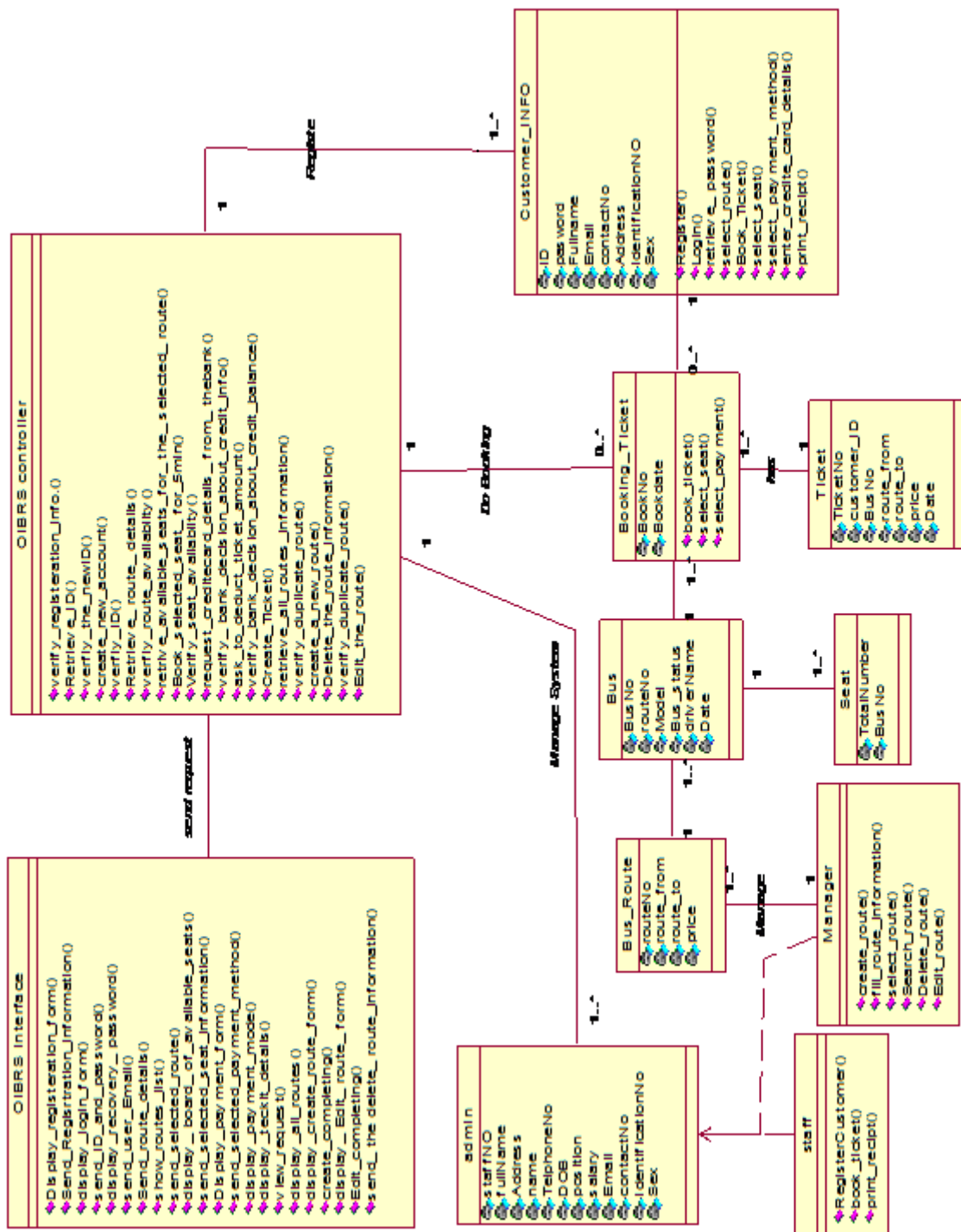
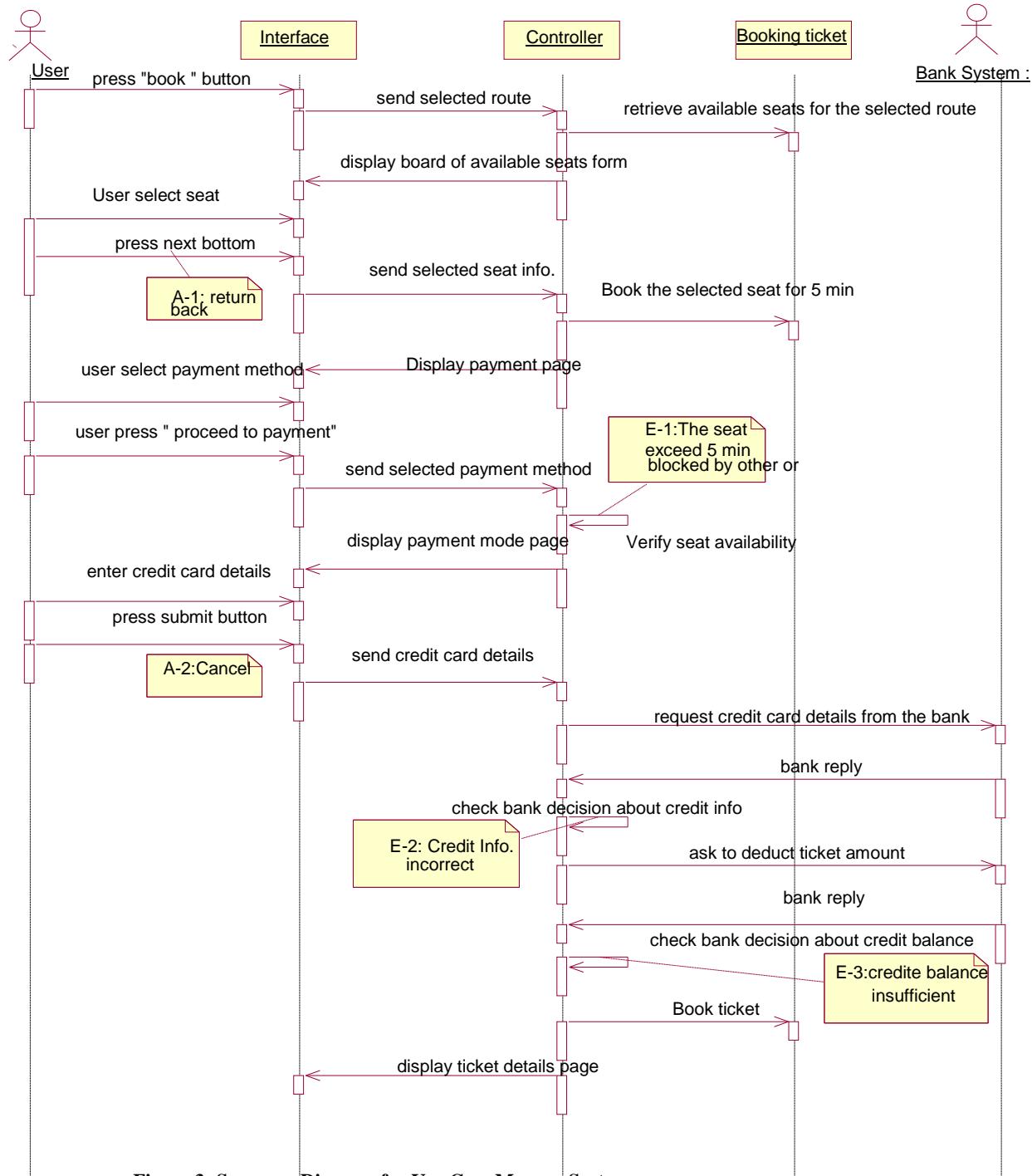


Figure 2: Classes Diagram for OIBRS



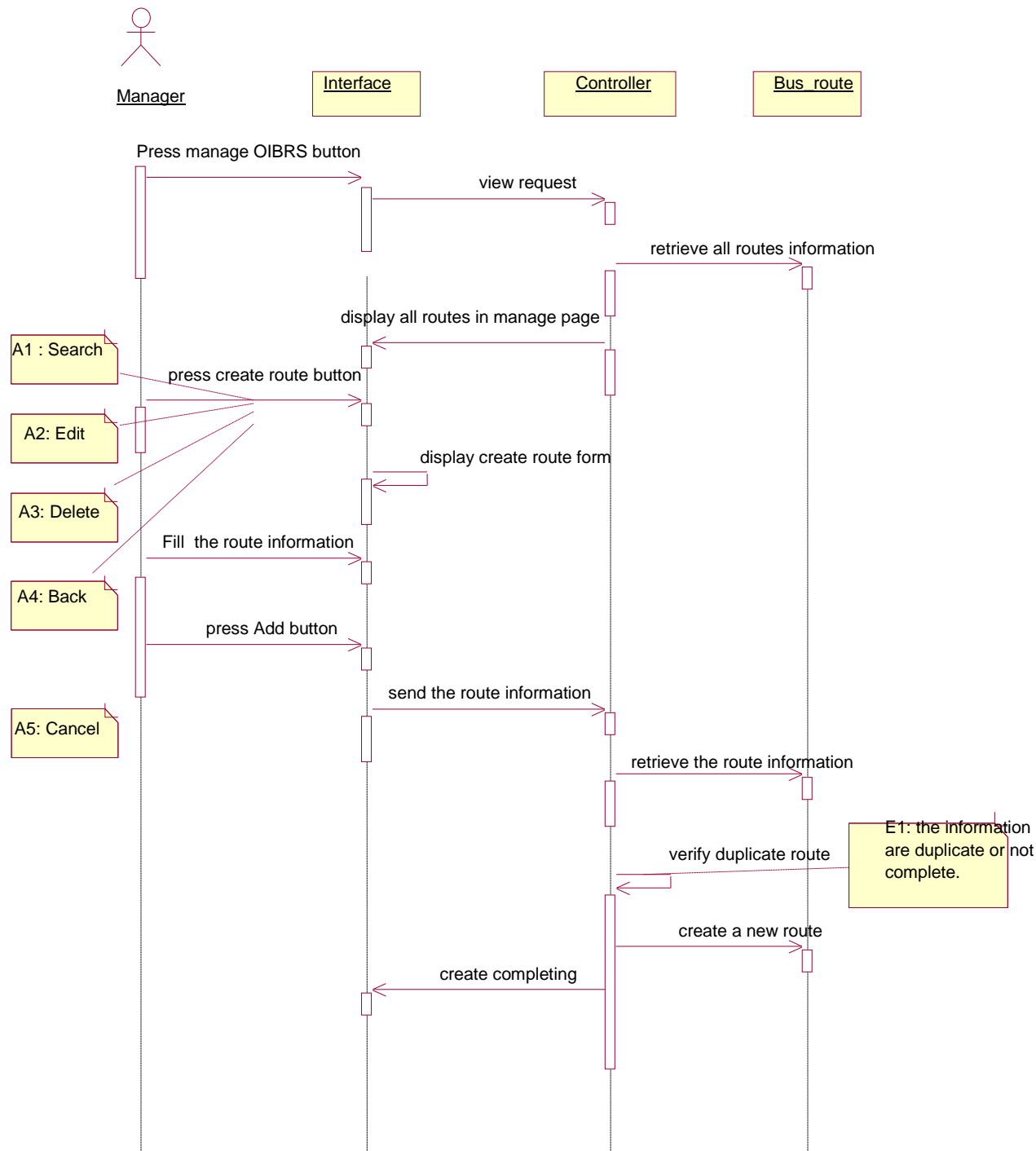


Figure 4: Protocol for Booking Bus Ticket



### 5.3 ENTITY RELATIONSHIP DIAGRAM (ERD)

Entity relationship diagram (ERD) is a kind of graph for presenting visually the entity set, attribute and the relationships between entities in a database[5]. ERD is top down approach to database design that begins by identifying the important data called entities and relationships between the data that must be represented in the model. We design ERD if figure 5 of OIBRS by using the technique of normalization. Normalization is formal technique of analyzing base on their primary key. At the end of ERD design we validate and check the model to ensure it is capable to support the required transaction given in the user requirement specification[6].

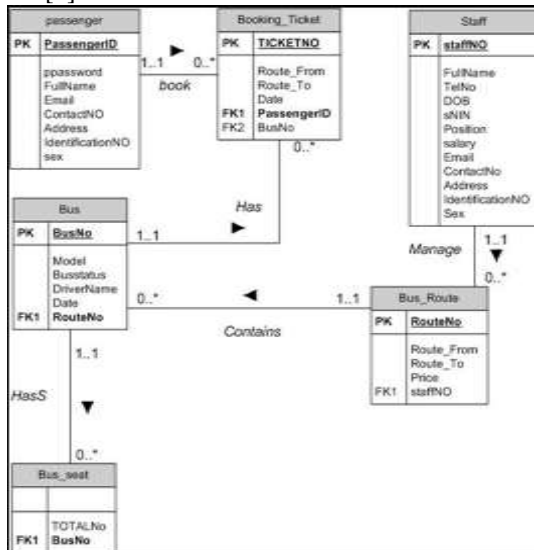


Figure 5: Entity Relationship Diagram (ERD) of OIBRS applications

The last phase in the system development is implementing of the system interfaces. The system interfaces is a web based application has been programming using C#. Our system meets all the func-

tional requirements which have been collected in the requirement gathering step.

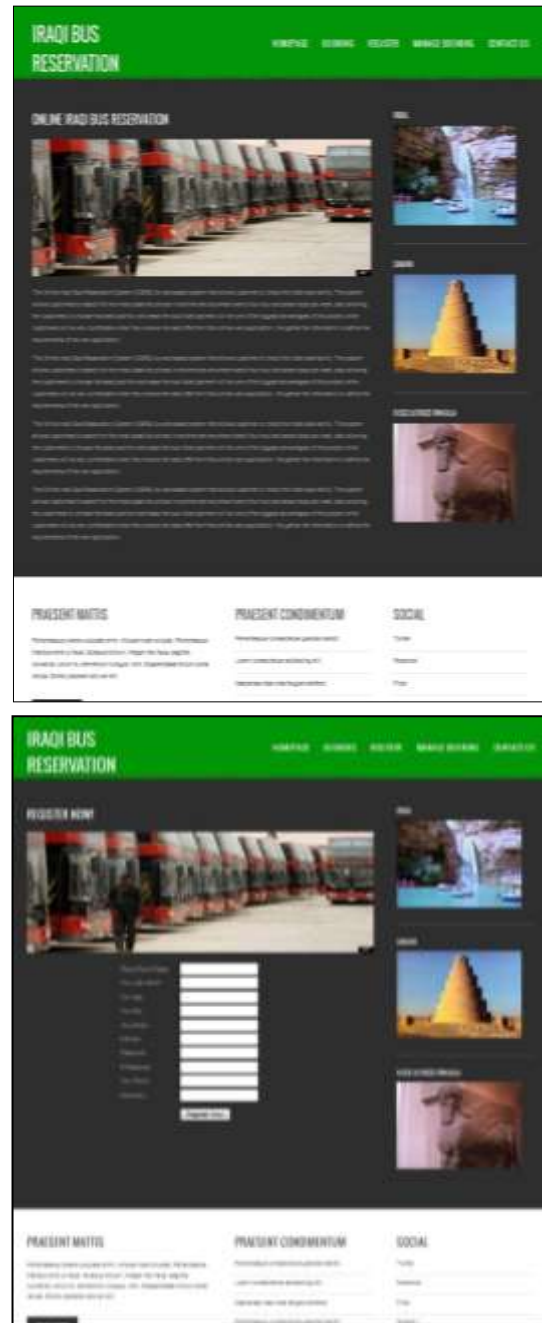


Figure 6: OIBRS Web Based Application



## 5.4 EVALUATION

This part explains the analysis of the evaluation that has been done for this application. After the prototype development is finalized, The System has been tested by the actual users and through Computer System Usability Questionnaire (CSUQ) Web Based Application, which measures usability and system satisfaction[12]. The questionnaire is taking from Lewis (1995) [13]. It contains of 19 questions and 7 degrees of likert scale (1-strongly disagree – 7-strongly agree). The questionnaires address evaluation at both a global overall system level and at a more detailed scenario level .The result of the study was analyzed by using MS Excel 2010 software and the result confirmed that the prototype is satisfying by the users. According to the Figure 7 there is no questions that has disagree as the highest rate, the majority of the rate fall into agree scale .The data analysis result has been showed a positive result in both usability and system satisfaction with how easy it is to use this system. Finally, descriptive mean and Std. Deviation statistics for related questions to our application shows in figure below.

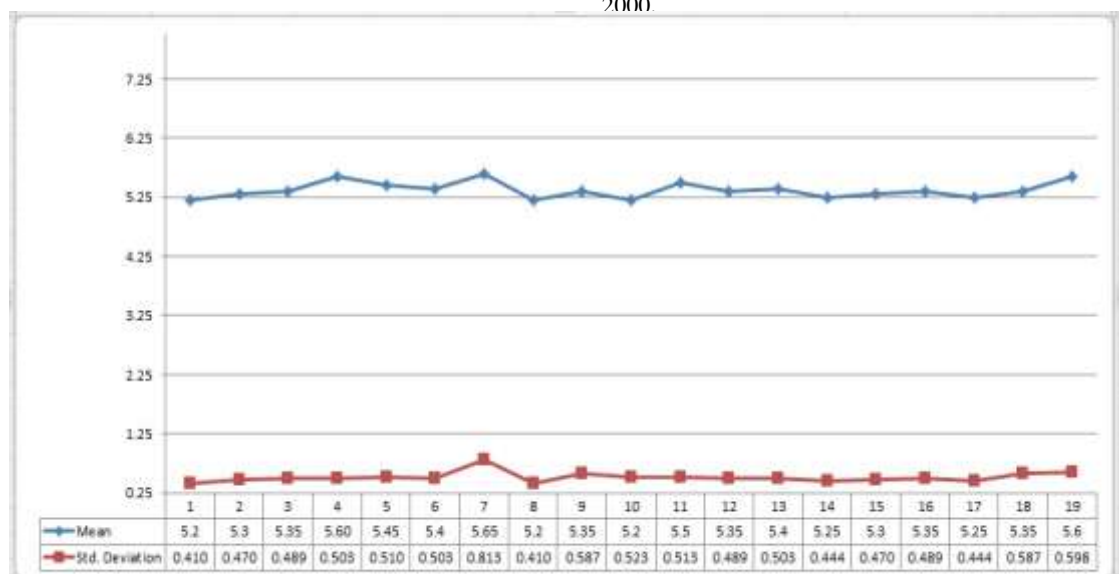


Figure 7: Descriptive Mean Statistics and Std. Deviations

## 6 CONCLUSION AND FUTURE WORK

The Online Iraqi Bus Reservation System is company online web-based system which enable users to check ticket online other than queue up to buy it ,and provide service at any time or any-place for the customer. This is the first system for

Iraqi company which can be the key and the guide for the other companies to develop its own application. The development has been divided into four sections; the first step is identifying the problem of Iraqi Transportation Company. Secondly, it focused on how to aggregate the requirements, analysis the system and design the database ERD .Next the development of our application has been done based on the requirements captured in required analysis phases and proposed design model. Moreover the system usability one of the important thing we had been focus on it in the system evaluate by using Computer System Usability Questionnaire which show the system is satisfied in term of usability . The user gets an interface with easy way to access for all pages with one click to book and simple registration. The system is reliable in the security side and detection of the errors which will be more trusted by the company and the user as well.

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