Developing and Implementing Web-based Online University Facilities Reservation System

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Abstract

To solve the imbalanced use of the university facilities such as Halls, Theaters, and Swimming pools and Sports Venues and as a part of the role of the university in the community services, the online facilities reservation system for Imam Abdulrahman Bin Faisal University (IAU) is designed and implemented through incorporating the existing online reservation systems experience. Based on the general requirement analysis, the basic function of the of the proposed IAU online reservation system are user's registration and login, halls, stadiums, theaters, swimming pools reservation and database construction. The proposed work was designed and implemented using the Unified Modeling Language (UML), MySQL and visual basic (VB) programming language. The proposed IAU online reservation system will solve the current lack of IAU facilities management system and give the ability to the people to reserve the university facilities as a part of the role of the university in the community services.

Keywords: Information System; Reservation System and Unified Modeling Language.

INTRODUCTION

Community services have grown in the recent period by the government and private institutions because of the awareness of the importance of community services in the development of society [1, 2], distinctive community services provided without charge are now available, the services provided are not only the financial services, but also there are other community services which are important for progress and prosperity of society, by making individuals active and constructive members of this society [1, 3].

Given the importance of these community services, the universities seek to provide many social services to the community around them [2-8], such as: the establishment of free accredited courses for students and the holding of meetings and arrangement of secondary schools students tests (General Aptitude Test (GAT), Qiyas Tests ... etc) and many others services. In order to spread the community service culture, the university is proposed to provide this services which allows all employees of the IAU and visitors to reserve the university facilities, such as: university halls, university courts, university swimming pools and university theaters. Through this proposed system the user can make the reservation, cancel the booking, follow up the booking and manage the account, based on the fact that all the university facilities are managed, monitored and maintained continuously.

Nowadays, Artificial Intelligence (AI) algorithms have been used widely for solving several difficult problems, such as image segmentation [9-17], medical image analysis [18-22], nurse rostering problem [23], Healthcare Monitoring [24, 25], patterns recognition and information retrieval [26-37], Learning Management System [38] and river flow forecasting [39-41]. Many researchers designed and implemented booking and scheduling web system using AI algorithms and web technology for covering real booking and reservations problems [42-45].

The main motivation of this work is that there is no online reservation system for all IAU facilities, through the proposed system; the customer can reserve the IAU facility from any place and at any time according to facilities schedule, this will increase the utilization of university facilities by the community members. Thus, an online facilities reservation system for IAU is necessary. The facilities reservation system should provide user friendly interface and complete functions.

The rest of this paper is organized as follows: Section 2 explains analysis of the proposed system. Section 3 shows the interface design. Section 4 discussed the obtained results. Section 5 concludes the paper.

SYSTEMS ANALYSIS

The IAU system should be able to satisfy the requirement in providing the suitable functionality to the user, where user should be able to know the availability schedule of different IAU facilities, user should be able to reserve a facility needed online anywhere and anytime, and user should be able to check his/her reservation schedule online. The first step is analyzing the requirement of the proposed system for IAU reservation system; the second step is developing the design strategy. The design of the interface specifies how the users will be moved through the proposed IAU system. The database construction defines what data developed and stored. The Unified Modeling Language (UML) will be used to describe the main structure of the proposed system by presenting the use case diagram and class diagram.
Use Case Diagram

Use case diagram has become an important practice for capturing the functional requirements [46-51]. A set of possible sequences of interactions between the system and users in a particular environment will be involved in the use case diagram for accomplishing particular goal [46]. The use case diagram has used in the proposed IAU system in order to show the system components that are classified to the administrator of the IAU system and the user, both of the administrator and user have their own operation. Figure 1 represents the use case diagram of the proposed IAU reservation system.

Figure 1: The use case diagram of the proposed IAU reservation system.
As noted in Figure 1, the use case diagram deals with the issues related to the authentication of the system administrator or users (customers), creation of a profile for each user that reflects his interest in different kinds of reservation such as halls, stadiums, theaters, and swimming pools reservation. Additionally, the customer can continue reservation information, view or update his account details. The administrator can manage the facilities by adding and deleting any facility, view the reservations schedule and confirm the reservation from the user.

**Sequence diagram**

The sequence diagram shows the classes and objects that will be involved in the scenario, the sequence of messages exchanged between the objects were needed to perform the scenario functionality [48]. Figure 2 shows the sequence diagram of the proposed IAU reservation system.

![Sequence Diagram](image)

**Figure 2**: The sequences diagram of the proposed IAU reservation system.

**Class diagram**

In the object-oriented analysis and design, class diagram is one of the most required and important entity [47-49, 52]. Class diagram is used to describe the objects types that will be involved in the system and shows the static relationships between the system internal classes. Moreover, class diagram used to describe the attributes, class operations and to apply constraints on the manner of the objects connections.

**Entity Relationship (ER) diagram**

Figure 4 represents the Entity Relationship (ER) diagram. ER diagram shows the relationships of the entity sets stored in a database [53]. Here; an entity is a data component. In other words, ER diagram demonstrates the logical structure of the proposed IAU facilities reservation online system database.
Database Testing and Construction

Testing the database is an important process in order to find errors that might affect the system reliability, consistency, performance and security. It also assists to validate the system against the requirements specified by the user [53, 54]. The proposed IAU facilities reservation online system used MySQL server to implement the database. Several tables have been created as following:

Table 1: Booking Database

<table>
<thead>
<tr>
<th>BookingID</th>
<th>FacilityID</th>
<th>BookingDate</th>
<th>BookingDate</th>
<th>BookingDay</th>
<th>BookingTime</th>
<th>BookingStatus</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>13/04/2018</td>
<td>02/01/2001</td>
<td>8:00</td>
<td>09:00</td>
<td></td>
<td>203344</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>29/03/2018</td>
<td>08/01/2001</td>
<td>11:00</td>
<td>01:00</td>
<td></td>
<td>203344</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>03/04/2018</td>
<td>03/01/2001</td>
<td>19:30</td>
<td>08:30</td>
<td></td>
<td>203344</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>14/03/2018</td>
<td>16/03/2018</td>
<td>9:00</td>
<td>11:00</td>
<td></td>
<td>203344</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>03/04/2018</td>
<td>05/04/2018</td>
<td>9:00</td>
<td>11:00</td>
<td></td>
<td>203344</td>
</tr>
</tbody>
</table>

Table 2: Facilities Database

<table>
<thead>
<tr>
<th>FacilityID</th>
<th>FacilityCategory</th>
<th>FacilityType</th>
<th>BuildingName</th>
<th>FacilityDetail</th>
<th>FacilityImg</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>مصغ موزو .</td>
<td>منطقه</td>
<td>600</td>
<td>مصغ</td>
<td>FacilityPic/T.png</td>
</tr>
<tr>
<td>2</td>
<td>مصغ موزو .</td>
<td>منطقه</td>
<td>55</td>
<td>مصغ</td>
<td>FacilityPic/2.png</td>
</tr>
<tr>
<td>3</td>
<td>مصغ موزو .</td>
<td>منطقه</td>
<td>100</td>
<td>مصغ</td>
<td>FacilityPic/3.png</td>
</tr>
<tr>
<td>4</td>
<td>مصغ موزو .</td>
<td>منطقه</td>
<td>450</td>
<td>مصغ</td>
<td>FacilityPic/4.png</td>
</tr>
<tr>
<td>5</td>
<td>مصغ موزو .</td>
<td>منطقه</td>
<td>564</td>
<td>مصغ</td>
<td>FacilityPic/5.png</td>
</tr>
<tr>
<td>6</td>
<td>مصغ موزو .</td>
<td>منطقه</td>
<td>45</td>
<td>مصغ</td>
<td>FacilityPic/6.png</td>
</tr>
<tr>
<td>7</td>
<td>مصغ موزو .</td>
<td>منطقه</td>
<td>100</td>
<td>مصغ</td>
<td>FacilityPic/7.png</td>
</tr>
</tbody>
</table>

Figure 4: The ER diagram of the proposed IAU reservation system.
INTERFACE DESIGN

From the administrator perspective, the usability issues of the proposed system will be discussed in this section. As the software becomes more flexible, allowing a wide variety of reservations types to be used, the user task of specifying the complete set of rules for the reservation becomes more difficult. In the IAU facilities reservation online system, the user has to register into the proposed system for performing reservation activities (see figure 5). In the proposed site, the user starts with the welcome page, then the user proceeds to the login process if he/she has an account as shown in figure 6, if not the user has to proceed to the user registration process and fill the registration information. In addition, Figure 7 shows “manage reservation” interface.
RESULTS DISCUSSION

This section presents the usability of the proposed system, where the proposed system has been tested by running the system on the Google chrome, Mozilla Firefox (most suitable) and Internet Explorer with the local host server. Twenty students have been involved to evaluate the proposed system prototype from College of Applied Studies and Community Service at IAU. Every student was given a brief description about how to use the proposed system, test the system and give the answer based on the prepared survey questionnaire. The survey contains of 10 questions measured by 5 Likert Scale in order to prove the usability and measure the user satisfaction of the proposed system. The obtained results from the questionnaire indicates that a high percentage of the student agree that the proposed system is helpful, usable and achieved the key target of the project. Table 4: collected data results from the twenty students.

| Table 4: Collected data results from the 20 students. |
|-----------------|---|---|---|---|---|---|---|---|---|
| Q1  | Q2  | Q3  | Q4  | Q5  | Q6  | Q7  | Q8  | Q9  | Q10 |
| Strongly disagree |     |     |     |     |     |     |     |     |     |
| Disagree |     |     |     |     |     |     |     |     |     |
| Neutral | 5   | 4   | 6   | 3   | 3   | 2   | 1   |     |     |
| Agree   | 5   | 8   | 6   | 6   | 10  | 9   | 15  | 13  | 14  |
| Strongly agree | 10  | 8   | 8   | 11  | 10  | 11  | 5   | 4   | 4   |

CONCLUSION

The IAU facilities reservation online system has designed and developed in this work. The proposed system solved the imbalanced use of the university facilities such as Halls, Theaters, Swimming pools and Stadiums, where the IAU reservation facilities system proposed to be used by the community as a part of the role of the university in the community services without any financial profit to the university. The proposed IAU facilities reservation system was designed and implemented using the Unified Modeling Language (UML), MySQL and visual basic (VB) programming language. The proposed system successfully solves the current lack of IAU facilities management and gives the ability for the community to reserve the university facilities without any financial profit. The proposed system can be also extended to other facilities of IAU or other universities or companies; this will improve the use of their facilities and resources.

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