Online Appointment Management System

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Abstract - *Booking an appointment online has grown in popularity over the past few years. Many different types of businesses use some type of Web-based online appointment management system to help make the appointments setting process more streamlined. An online appointment management system allows students to register and book appointments with their advisers. This paper gives details of the development process of an online appointment Web-based management system to be used within a higher education Institution. We have conducted some experimentation to show the effectiveness of our system.*

Keywords: Web 2.0, Web Technology, Appointment management system, Web based application.

1 Introduction

Web applications have helped in streamlining many of the tasks we perform on a daily basis, and have made our lives easier. These applications are widely used to assist us in overcoming problems with student learning and scheduling appointments. In the past, these appointment processes were done manually and, because of this, there were many instances of overbooking or forgetting to cancel an appointment which could free up the space to schedule another in its place. To eliminate human error due to setting appointments manually, a web application will be developed to make the scheduling process easier. Also, given the busy lives that many of us lead today, an online appointments management system within a university makes perfect sense as it frees up valuable time, not only for students, but also for lecturers and university staff members.

The purpose of this paper is to develop and evaluate an online lecturer appointment system for students' projects, where all processes of appointments are verified. Most aspects of appointment management, such as reservations, confirmations and cancellations, are controlled automatically. Our online appointment management system for students' projects should be able to facilitate the task of booking an appointment with lecturers.

Nations defines web application as any application which can use a web browser as a client. The application can be simple such as a message panel or a visitor sign-in book on a website, or complex like a word processor or a spreadsheet [5].

In the proposed paper, a new web application will be developed. It will be programmed by ASP.NET with code behind visual basic [9]. An online appointment management system will allow students and lecturers to interact with each other in real time. This web application allows students and lecturers to administer the appointment and registration process in an easy and efficient way. The application will also be set up on a multi-platform network which will allow those still using Windows XP or Windows Vista to be able to print reports generated by new systems [7]. Since not all computers within the college have Windows 7, this will aid in terms of compatibility issues [4].

The instructors, students and lecturers who are using the system will receive information in real-time. With some applications, the system needs to run overnight in order to display any changes. With our system, however, once the information is entered and has gone through the verification processes, the end users will be able to view it automatically. This means that if the day and time of an appointment are changed, once that information is put into the system, it will be available for all users to see. As such, once lecturers update their calendars, since everything is done in real time, students will be able to schedule appointments immediately with no waiting time involved.

To eliminate the mistakes caused by human error, it is felt that this new system should be used instead of a manual one which involves having a person schedule and cancel appointments. The current way that the scheduling process works is as follows:

- A student goes to the office to request an appointment.
- A staff member takes down the information on a Scheduling Form. A copy of this form is placed in the lecturer's mailbox.
- The information is then entered into the lecturer's calendar whenever the staff gets around to do it. This means that even though a student may have requested the earliest appointment, it may not be entered into the system until the staff member gets around doing it. There is the potential for another staff member filling the slot with a different student's request, thus causing the first student's

appointment to be rescheduled at a time that is inconvenient.
- If rescheduling is necessary for the first student, the staff member must contact the student, explain the mishap and try to reschedule. This process takes up valuable time that could be used to make the student, the staff member, and the lecturer more productive.

The paper is organized as follows: section 2 presents the related works, section 3 considers Requirements and Design, section 4 also discusses the implementation and testing, and section 5 presents the system evaluation.

2 Related Works

2.1 Web Application

Lately there have been many different trends in web application development. Web application development is a fast and ever growing field. Jazayeri said "Web applications have a user interface based on the browser that interacts with the user and can manage large amounts of data" [2]. They are popular because a new version of the application can be released without the necessity of installing the new version on the client computers. This is very different from desktop applications where either a new version has to be installed, or there must be the installation of a patch [2].

Web applications of an online appointment management system within a college or a university setting is an area of rapid growth because it is a more efficient way of handling administrative issues [3].

Online appointments management systems have been around for a few years. They are used extensively in hospitals and healthcare settings in order to keep track of patient records as well as for scheduling appointments. Although this system will be developed for an educational institution, it is helpful to obtain ideas on how other areas of business have used such systems. UCLA developed a web-based data management system that is used in hospitals across the country, and although the system does have its limitations, it is still performing quite well [8].

Lu and Ab Hamid (2007) have developed an appointment management system called WBAMS which uses Web Modelling Language (WEBML) and -.Net four-tier architecture. According to them, their system will allow appointment scheduling to be more efficient and effective.

The authors used six functional requirements to develop their online appointments management system:
- User Access Module - Allows access to the systems as well as online registration.
- User Maintenance Module - Used to manage and maintain the user groups.
- Consultation Module - Allows the lecturer to manage his/her appointments. The lecturer may schedule and cancel appointments as well as block some students from scheduling.
- Appointment Module - This is where the students schedule their appointments.
- Setup Calendar Module - This is used by the administrator to customize calendars.

There are also non-functional requirements that were used:
- Usability - The intuitive interface provided by the system.
- Performance - Deals with the response time of the system.
- Maintainability - The ability to modify a component without affecting other components.

The authors developed different views for the students, lecturers and administrators using the system:
- Student Site View - This consists of an appointment area and a student area.
- Lecturer Site View - Consists of the lecturer and appointment view.
- Administrator Site View - This is the default page users see when they log into the system.

2.2 Web 2.0 Technologies

A website programming language, Web 2.0 was named as a result of a meeting between Tim O'Reilly and Media Live International. O'Reilly said that Web 2.0 had become more interesting than before because it had some new features which increased the functionality of web sites, such as YouTube, Facebook and Bloglines [6].

2.2.1 Web 2.0 Concept

Web 2.0 is a term that refers to a group of new technologies and web applications that led to changes in the behaviour of the global network "Internet". O'Reilly defines Web 2.0 as embracing the business on the Internet as a platform and using its power [6].

Web 2.0 consists of applications based on the World Wide Web which carries a number of features that distinguish it from Web 1.0. For example, it allows users to use applications that rely on the browser. Therefore, these users can obtain their own database on the site, and can also control this database. In addition, Web 2.0 allows users to add values to the applications which are based on the browser [6].

3 Requirements and Design

3.1 Descriptions of Data Requirements

A lot of data requires being stored in a database. This includes the details of each user, and appointments. Data requirements provide a detailed description of the data model which the system must use to accomplish its functional

requirements. In this section, we provide details about the required data, as well as any security issues surrounding access to that data.

- The system needs to keep details of lecturers, students, projects and appointments.
- Information about each lecturer and student is recorded at registration. These are ID, name, user name, password, email and activation.
- Every user has activation and blocking fields.
- Each user name is unique.
- Each user has a privilege stored in field roles that manage the security.
- The availability of the lecturer is stored in lecturer available, while student unavailable stores the student unavailability.
- Each student may register his project with a lecturer. This includes project ID, lecturer ID, student ID, project name and description.
- Each student chooses only one project.
- The acceptance of a student by a lecturer is recorded in the field acceptance in the table student project.
- Information recorded for each appointment includes appointment ID, project ID, lecturer ID, student ID, start time, end time, duration and date.
- Each appointment should contain points which include points ID, appointment ID and point's title.
- Each appointment should also contain results which include results ID, appointment ID and results title.

3.2 System Architecture

The OAMS allowed students to schedule their own appointments, cancel and register. The newly developed online appointment registration system also allowed students to avoid the hassles and mistakes that can occur as a result of using paper registration. Since everything is done in real-time, the registration process will be fair and done on a first come, first registered basis. Allowing students to book their appointment with lecturers online has several benefits.

- The system will be available twenty-four hours/seven days a week allowing for scheduling at a time that best suits the student.
- Students will be able to view the lecturer's availability for appointments and schedule accordingly.
- Lecturers can add results after finishing the appointment.
- All processes are performed in real-time which cuts down drastically on mistakes and errors.

Figure 1: The users' abilities and privileges, and functionality of the web application.

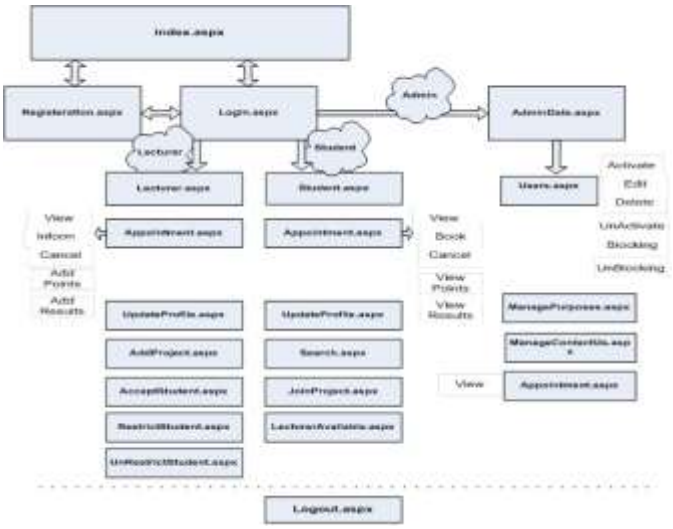

Figure1 Diagram of the research

The creation of database tables is based on the ERD. Each entity converts to a table in the relational database. Figure 2 demonstrates the database relationship for our online appointment management system. The diagram will show that each entity is converted into a relational table. In addition, the attributes are also converted to fields of table.

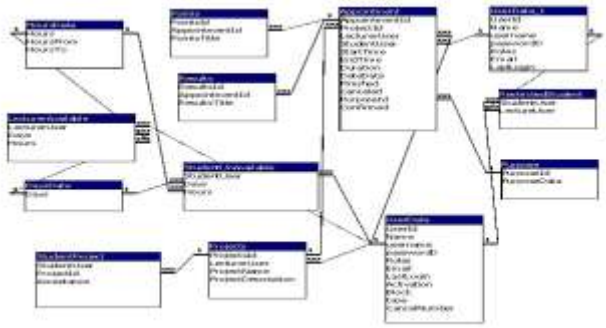

Figure2 Database Relationship Diagram

4 Implementation and Testing

In this section, the implemented pages as can be seen during the browsing on the online appointments management system are displayed

4.1 Implementation in General

The implementation and development of an online system to manage appointments between lecturers and students is the main goal of this research. The content of this system should adapt to the users' requirements. For instance, reservations, confirmations and cancellations have to be implemented in this system.

In this system, students can register in and join a project which has been added by a lecturer. They can also reserve appointments with lecturers. In addition, they can manage

these appointments. For example, they can cancel or change these appointments.

On the other hand, lecturers can sign up and add new projects for students. They can also view their available time and accept students' appointments. Moreover, they can write results at the end of each appointment. If any student cancels an appointment more than five times, lecturers can prevent this student from making another appointment.

4.2 Description of Implemented Pages

In this part, the main pages in the website will be described.

4.2.1 Registration Page

In order to let students book appointments with lecturers, they have to complete the registration forms which include:

- Personal and contact information: Name and Email.
- Login information: User name and Password.
- Available time: Available time for lecturers and lecture schedule for the student.

Lecturers can add projects for students by adding the project name and description. In addition, students can select a lecturer's name, and then choose a project from a list of projects which can be added by the lecturer.

After a student joins a project, the lecturer has to accept that student's decision in order to allow the student to book an appointment with them.

4.2.2 Booking Page

Students can reserve appointments with their lecturers after viewing the lecturer's availability. They can choose the date and time of each appointment. In addition, they can add this appointment to the Google calendar by entering the user name and password as provided in Figure 3. However, the lecturer can restrict students from booking any appointment with them for any reason.

Figure3 Booking Page

4.3 System Testing

The implemented system has been tested as follows:

- Navigation between pages was tested.
- Registration for lecturer and student was tested.
- All of the users have to be activated by the administrator to allow them to access the online appointment management system.
- Add project by lecturer, join project by student and accept student's project by lecturer were tested.
- Reservation, cancellation and confirmation were checked.
- Appointments enter to Google calendar worked very well.
- Sending an email when the student reserves or cancels an appointment was tested.
- Sending an email when the lecturer confirmed and cancelled an appointment was tested.
- The email reminder worked well.
- The ability of the lecturers to add points for appointments before confirmation and add results after finished worked well.
- Student can view points and results of appointments.
- Restrict/unrestrict student by lecturer was tested.
- User blocking and activation worked well.
- Managing purpose and managing contact us worked well.

5 System Evaluation

Evaluation took place after the system had been used for several weeks. A field study was carried out to observe the system's features and users' usage. Furthermore, the online appointment management system has been compared with another static appointment system.

5.1 System Testing

Some students were asked individually to use the online appointment management system and fill in the questionnaire in order to obtain feedback and to assess the whole system.

Each student was asked to read the following scenario and fill in the questionnaire:
"Assume that you have to reserve an appointment with a lecturer. You are visiting our online appointment management system. Please execute the following tasks:

- Register.
- Login to the website.
- Navigate throughout the website.
- Add your project.
- Reserve an appointment with a lecturer.
- Cancel this appointment.
- Check your email.
- Logout."

5.1.1 Results from Questionnaire

A survey was carried out among 28 students. Most of them were studying for a Master's degree, while 43% were

studying for a Bachelor degree as shown in Figure 4. Table 1 also shows the demographic information about the participants.

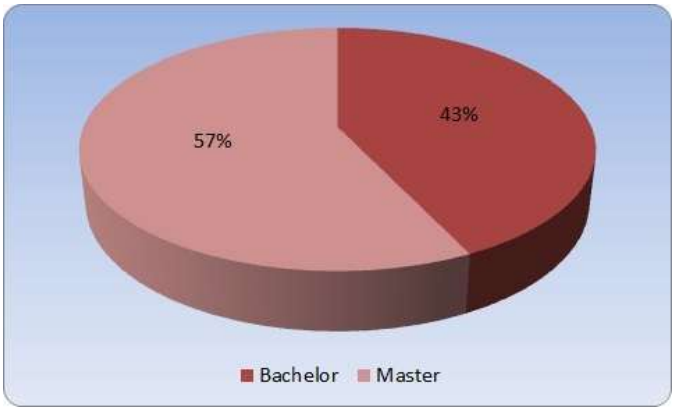

Figure4 Percentage of Participants' Courses

	19 - 20	21 - 22	23 - 24	25 - 26	27 - 28	Total
Female	1	3	7	3	1	15
Male	5	1	4	1	2	13
Total	6	4	11	4	3	28

Table1 Participants' Demographic Information

The second and third questions in the questionnaire were about features which have been built into the system. All of the participants said that they could join projects with lecturers as shown in Figure 5.

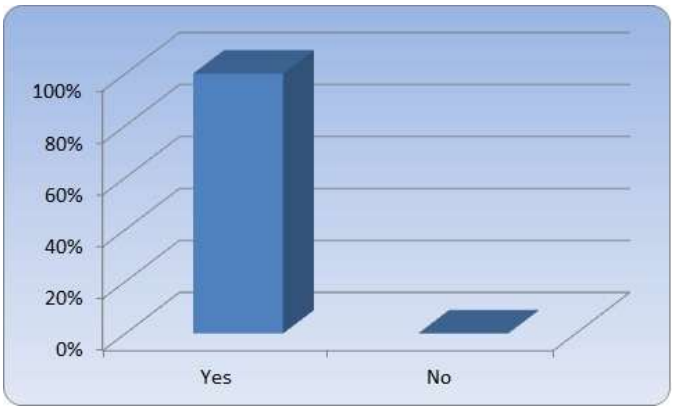

Figure5 I can join a project created by a lecturer

In addition, the participants were asked if the e-mail reminders related to scheduled appointments were one of the most important features in this system. 43% of them strongly agreed while around 39% agreed as indicated in Figure 6.

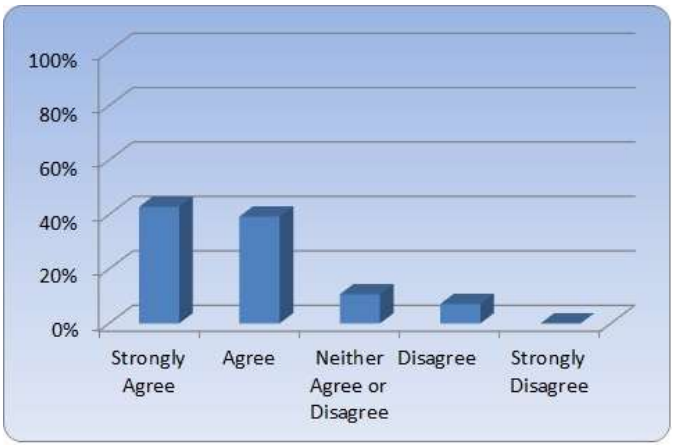

Figure6 E-mail reminders of scheduled appointments are one of the most important features of this system

6 Conclusion

We felt that the development of an online appointment management system was necessary because of the antiquated way in which many schools register and schedule student appointments. In order to keep up with growing technology, we must seek ways to make certain processes less time consuming, more error free and more user friendly. We have built the system using ASP.NET 2008. A field study has been carried out to observe the features of our system and stakeholders' usage. Furthermore, our online appointment management system has been compared with another static appointments system.

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