An Internet Application for Lab-Group Booking Using Open Source Software

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Abstract: This paper presents an internet application that helps students to book laboratories groups. The application is based on a relational database. The aim of this application is to automate the booking procedure, to provide speed, flexibility and efficiency for users. The application has been developed only using open source software. MySQL has been preferred as a relational database system for the database design. Scripting language PHP was used to develop the application and to connect the application with the database. This e-application has been applied with success in the Department of Information Management of Technological Institute of Kavala, Greece.

Key-Words: Internet Application, Group Booking, Open Source Software, MySQL, PHP.

1   Introduction

Nowadays, there are a lot of internet applications mainly in the commerce and the rendering of services. Most of them are based on commercial software, which obey certain limitations. Open Source Software and software free tools which can be downloaded from the internet, can be alternatively used with no significant cost. Open Source Software can also be modified to fit the developer needs by changing the source code since the source code is also provided free. This work describes an Internet application developed only by using open source software.

The purpose of developing the application named "Lab-Group Booking" is to make the procedure of booking laboratories groups easier for the students of Technological Institute of Kavala, Greece. This e-application improves the rendering of administrative services of the department because of the internet's advantages. The access is possible from anywhere an internet connection is available. This, make the procedure easier for the students since they are not obliged to remain many hours to the department waiting for service. It is also make easier the management procedure for the teachers and the secretariat of the department since the application provides them with several reports. Moreover, the use of the application decreases the possibility of making mistakes, since many controls are applied automatically.

The Lab-Group Booking application has been developed from open source software tools like HTML, PHP, MySQL and Apache. HTML is the language for the internet user interface design. PHP (www.php.net) is a scripting language especially designed for developing Web applications [3]. PHP is an open source product and its main purpose is to help web applications programmers to develop potential web pages. Besides, PHP has a large library to operate data from a database operating system like MySQL. MySQL (www.mysql.com) is a very fast and powerful database operating system [2]. The Apache server is an open source web server, which shelter the application's web pages and it is installed under Unix operating system [1].

2   User Interface and Functionalism

This section describes the user interface, with emphasis on the features provided by Lab-Group Booking application. Two groups of users have access to it. The first group is the administrators of the application. The second group is composed by the students of the department. Each group has different functionalities. The administrators inform the database, alter the records and handle the bookings, and the students use the interface witch gives them the capability to book laboratories groups through internet.

The basic function that the application provides to the students is the lab- groups booking procedure.

As basic interface the prototype of the weekly program is selected. It has the advantage to be familiar to the students and there is no need to get used to something else. After the login script which verifies a valid user by using password, the logged in user guided to a web page where he must check the laboratory groups he want to book. The web page is illustrated in Figure 1.
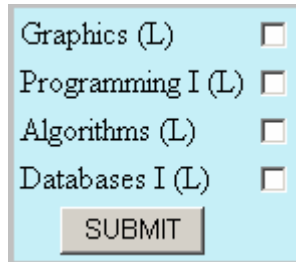

Figure 1: A part of the interface where user check his lessons

The user selects the laboratory lessons by checking the check-boxes and then clicks the submit button. Then, he guided to the main interface, illustrated in Figure 2. The main interface presents only the laboratories groups for checked lessons, the sum of students for every group and the maximum number of students that can book the particular group. The user can book a lesson group by submitting the button named "BOOK". The database gets informed automatically and the web page appears again where the user is no capable to book other group of the same lesson. If he wants to change the booked group, he must delete first his previous booking by submitting the button "DELETE". When the user finishes with his lessons, he prints his personal schedule and logout the application.

Figure 2: A part of the main interface where the user books the groups

Administrators can operate the database inside the web pages of the application. The functions that they can apply are:

- alter the schedule
- control the conditions
- output the bookings of every group
- output statistics

The alteration in the schedule is necessary to insert new groups or alter the existed groups. The conditions control protects the administrators from making errors like blocking a room at the same time for two groups. The output about the bookings of every group gives to those who are in charge of the laboratories groups, lists of the students that have booked the particular group. The output statistics give to the administrators' information which helps them to develop the department's resources, for

example the frequency and the fullness of rooms' usage of the department.

MySQL and Database Architecture

MySQL uses the Structured Query Language standard giving a great deal of control over a relational database system. However, unlike most relational database systems, MySQL is freely available and because it operates on Unix systems, it integrates very well scripting languages such as PHP [6].

The architecture of the e_registration database evolved as a functionality of the database was growing. The resulting database structure is illustrated in Figure 3. In total there are eleven separate tables. There are three main tables

Schedule, Lessons and Participations linked to other tables by using a different record number.

Although it appears complicated, this architecture greatly simplifies the data insertion process into database, and also reporting sorted result out of the database.

Since table Schedule is one of the main tables, it holds all the appropriate information in relation to the timetable of the department's lessons. In almost each field of the table is stored the proper entry associated to another table of the database like

id_lesson linked to table Lessons, id_day linked to table Days, id_hour linked to the table Hours and id_room linked to table Rooms. The primary key of the table is an auto_increament integer field named id_schedule. Field name declarations is an integer indicates the number of the students that has been booked for the specific laboratory group. Groups is the field that holds the consecutive number of the available groups for each lesson. The next field named students is an integer that holds the maximum capacity laboratory group.
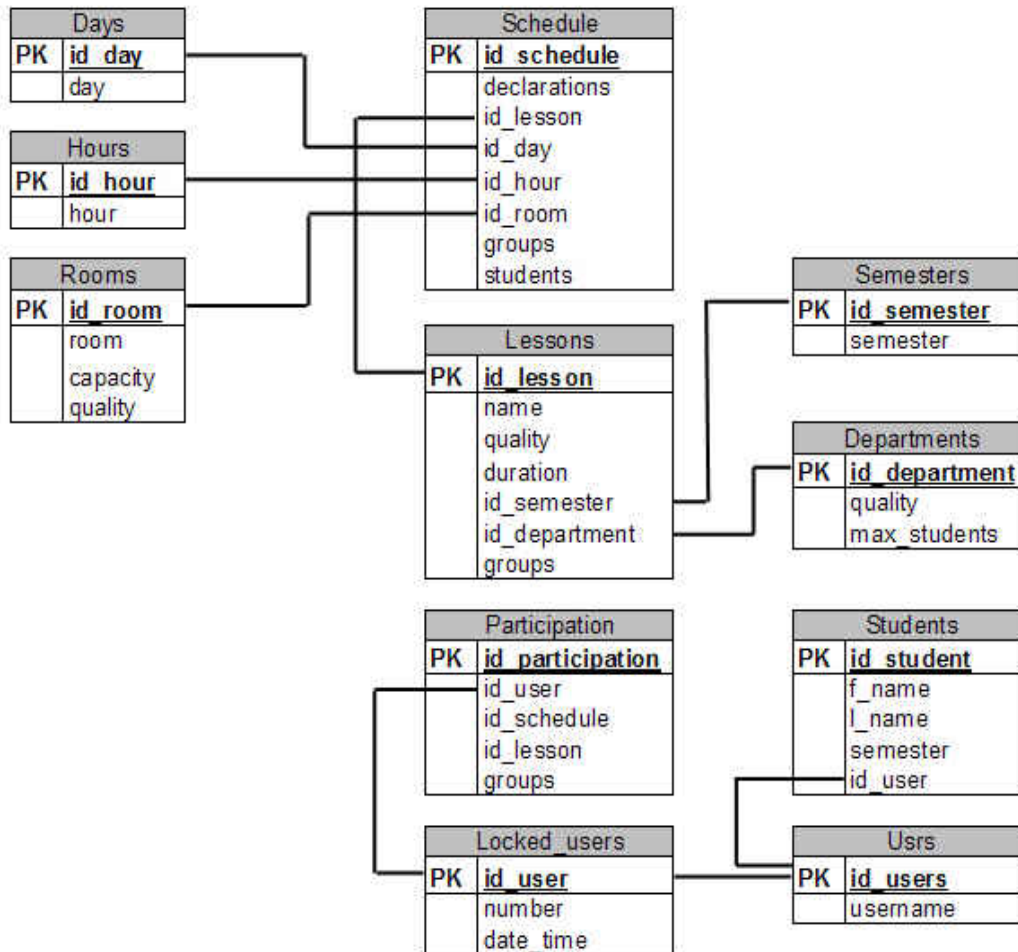
Figure 3: Database Structure

Table Days holds the names of five days of a week, Monday to Friday along with their ids. Table hours contains all the academic hours that lectures and laboratories takes place in the department. All the available lecture rooms, theatres and laboratories along with their capacity are stored to table Rooms.

Table Lessons provides all of the requisites information for all the modules comprising the educational program of the department like the name of each module, the duration and the number of available groups in case of a laboratory is

concerned. Field name quality indicates either the particular module is theory or laboratory or even practical exercises (tutorial). There are two more integer fields named id_semester shows the semester each lesson belongs and id_department indicates the type of lesson. The primary key of the table is the integer field name id_lesson.

Eight semesters is the duration of the degree for the department. The names of those semesters with their ids are placed in table Semesters. The types of lessons along with the maximum number of participant students are booked into table

Departments. Table Participations holds all participations have been booked for every laboratory, for each student. Each record of the table is formed by five records. Id_participation is an auto_increament integer and primary key of the table. Id_user is a field that stored a unique number which refers to the username of the student uses the application and is linked to table Locked_users. Field name id_schedule carries another unique integer number indicates an entry in table Schedule. Integer field id_lesson hints at the name of the lesson booked. Groups field implies which group has been chosen.

The table Usrs relates the is_user which is the primary key with the username of the student user. All the information needed for the students as fore name (f_name), last name (l_name), current semester (semester) situated in table Students. Together with the id of the user (id_user) and an auto_increment field called id_student which is the primary key of the table.

Table Locked_users has three fields, id_user which is an integer field and the primary key of the table. Field named number is an integer number that is randomly assigned from the application. Date_time field holds a time stamp of each logged in user in the e_registration application at the time each user has logged in.

Conclusions

The Lab-Group Booking application is being used by the Department of Information Management of the Technological Educational Institute of Kavala, Greece and it has made the process of booking laboratories groups from the department's students proper simple. The specific application is an inner application and is been made to cover the department's necessities. The students are used in using the specific technology and they can easily have access on it from intranet or internet. For all these reasons the Lab-Group Booking application has been established as a very successful and useful internet application.

Acknowledgement

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