A Web-based Application for School Class Scheduling

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Abstract— Nowadays, school teachers must schedule class every semester. They have to spend a lot of efforts to schedule classes on paper, and spend a lot of time to work collaboratively to finish it. In a big school, class scheduling is a big problem to do so because there are many teachers, students, classrooms and the subjects. Sometimes, the class schedule does not look proper that cause from the limitation of time and they do not have a proper supporting tool. As the internet is more widespread nowadays, we develop a web-based application to solve the class scheduling problem. This web-based application is designed with user friendliness in mind. The application will allow the school's authorized members to simultaneously create, edit, and publish the school's class schedules. The teachers and students can download their schedules with a theme they like. Our experiment with 20 teachers from Benjamarachanusorn School identifies satisfaction of usage.

Index Terms—class scheduling, web technology, AJAX

I. INTRODUCTION

All Thai schools must schedule classes every semester. Most of them use pens and paper for scheduling. In addition, there are many requirements from many departments and school's policies, such as Mathematics must study in the morning, and a teacher must not teach 4 classes consecutively, etc. These requirements involve many people in the school, and can grow the complexity of the class scheduling.

Even though there are many requirements for class scheduling, the scheduling process is not that complex. There are many efforts to solve the problems with cutting-edge and complex algorithms. The responsible teachers only need a tool to work collaboratively. The tool should allow many department representatives to edit the scheduling data simultaneously, with resource collision checking in real time. Therefore, all representatives can see the same scheduling data at the same time. Furthermore, the school usually initialize the class scheduling process with last year's schedules. This can realize via current web and database technology.

Therefore, we develop a web-based application for school class scheduling with PHP, HTML, CSS, AJAX, JavaScript, and MySQL. The school teachers can create their scheduling and fill in the scheduling data anywhere with the web technology. AJAX allows all teachers from the same school to see the latest scheduling in real time. The database technology allows copying the data of the entire previous semester to the latest one. Therefore, the responsible teacher can initialize the new semester class scheduling faster.

II. RELATED WORKS

One of the most popular class scheduling program in Thailand is called TR Win[1]. This program is a windows-based application. There are approximately 1,200 schools in Thailand using this program since 1998. The program costs 8,000 baht per school. TR Win can manage many scheduling requirements in Thai schools, such as multiple users can input the scheduling data at the same time with collision checking. However, it requires all department representatives to present at one place to connect their computer together with a hub. Then, all representatives can schedule classes simultaneously. In addition, it requires the administrator user to setup all related information beforehand, such as all subjects, students, teachers, departments, and user level with authorities.

Rather than TR Win, there are many class scheduling spreadsheet available on the internet [2-4]. These spreadsheets employ macro scripting and formula linking among multiple cells and sheets. Therefore, multiple users cannot collaborate simultaneously on these spreadsheets.

On the other hand, many researches concentrate on complex algorithms to solve scheduling problems [5-7]. Many algorithms have been proposed, for example a genetic algorithm and A* algorithm. However, in spite of their complexity, these algorithms have never been reported their usage in an actual school.

However, the schools do not require such complex algorithms. They only need a tool that can facilitate multiple users from multiple departments updating the same data without collisions. This can be realized with current web and database technology. Therefore, we develop this system and concentrate on actual situation users confronting.

III. METHODOLOGY

We have developed a web-based application for School Class Scheduling with PHP, MySQL, HTML,

CSS and AJAX. The application and its database are installed in our university private cloud. The core features are creating a class schedule with resources, including student groups, teachers, and classrooms, and then checking if there is a resource collision. In addition, our web-based application concentrate on user friendliness. Therefore, it equips with easy data entering method such as collecting resource names on entering, and drag-and-drop motion to modify classes on a schedule. So, the users need not to pre-define all resources beforehand. They can create a schedule and fill required resources in each period. The application will decide if the resources are new to the database, then it will record those new resources to the database automatically.

Furthermore, the general user, such as students and teachers, can view their schedules on time tables and select a theme for the time tables, then download them as a picture file. So, they can view their schedules with any computers on any platforms.

Figure 1 shows ER Diagram of the system's database. There are seven entities, including users, school year, periods, subjects, rooms, students, and teachers. At this time, one school can have only one user account, but many people can log in with the same user account at the same time. In our next version, there will be multiple users per school.

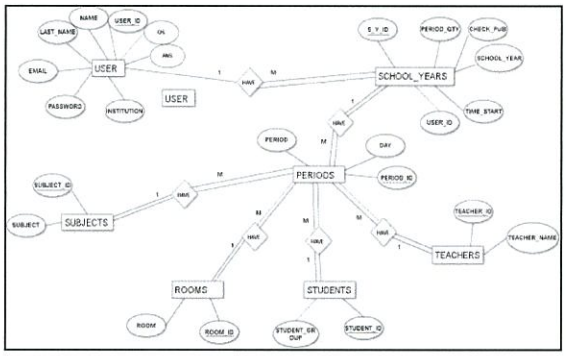

Fig. 1. ER Diagram.

After we develop and test the system, we setup a beta-testing session with 20 teachers from Benjamarachanusorn School, Nonthaburi. The experimental results are in the next section.

IV. Experimental Results

After developing the application, we test our application. The user interfaces are as the followings. Figure 2 shows the main page of our application. The general users, such as students and teachers, can choose their school name from the list at the bottom of the page, or can search for the school name at the search box on the right. After they choose the owner of the time table, such as a teacher name or a student group, they are directed to the time table page. At this page, they can choose a theme to apply to the time table for decoration. Figure 3 shows the theme page.

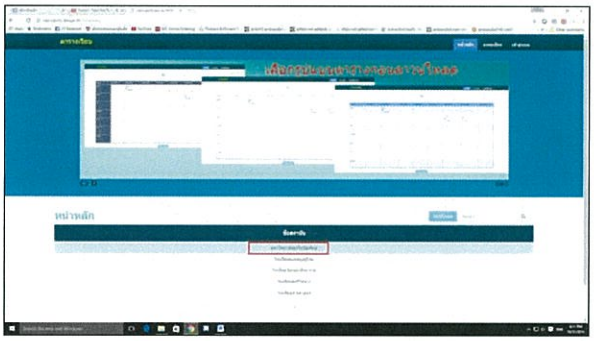

Fig. 2. The Application's Main Page.

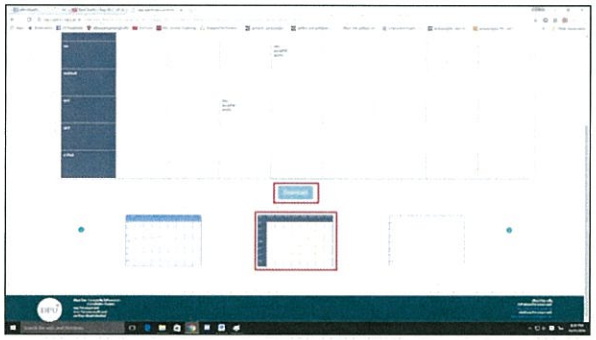

Fig. 3. The Theme Page.

For a registered user, after authentication, he can create a semester's schedule. There are two methods, including creating a blank semester, and copying schedule data from any previous semester. For the first method, the user must provide the schedule start time, the period length, and the number of period in each day. The application will create all time tables in the semester according to those settings. For the second method, the user must specify the source semester and the destination semester for schedule copying, then he can modify the schedule data from the existing schedule. Figure 4 shows pop-up windows to create a semester's schedule for both methods.

Fig. 4. Semester's Schedule Creation.

After that, the user can create a time table for a teacher. Figure 5 shows a time table for a teacher at the back. When the user clicks on a time table cell, which represents a period, there is a pop-up window allowing the user to enter the clicked period resources, including the subject, the student group, and the classroom for that period.

There are two buttons above the time table, 'switch' button and 'copy' button. If the user wants to move a period, he can click on the 'switch' button, then drags the period to another cell. The application will switch the source period with the destination period. On the other hand, if the user clicks on the 'copy' button, and then drags a period to another cell. The source period's data will be copied to the destination cell automatically. The user can copy a cell to any number of cells in the time table. This process can make time table filling much faster in case of a subject occurring every day.

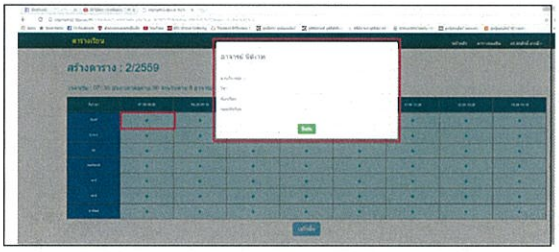

Fig. 5. A Teacher's Scheduling Page and a Data Entering Pop-up.

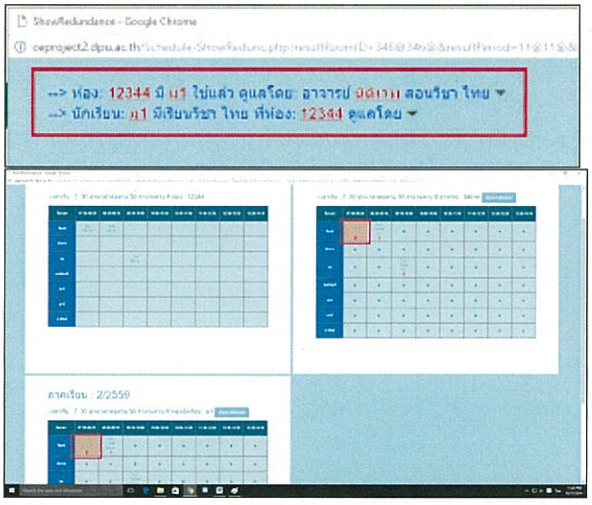

Fig. 6. Collision Pop-up.

After the user enters a period data, if there is a resource collision causing by that period to any other periods in any resource's time table in the database, a pop-up window is displayed. Figure 6 shows a pop-up window. The pop-up notifies the cause of the collision. The user can click on the little down arrow on the right to see the time table of all involving resources to that period, including the classroom, the teacher, and the student group with red highlight to identify the collision cause. Then he can correct the collision.

If there are multiple users working on the same time table at the same time, the application employs AJAX technology to display multiple updated data in real time. Therefore, a user can see other user's data simultaneously.

We conducted an experiment with 20 teachers from Benjamarachanusorn School, Nonthaburi as shown in Figure 7. We setup a 2-hour beta-testing session. The teachers brought their own computers connected with the school's internet to test our application. We created an account, which all 20 teachers used at the same time. Then, we create a time table for an actual teacher, and let all teachers to fill in the classes for this particular teacher.

Fig. 7. Our beta-testing session.

After the session, the users gave us very valuable feedbacks. They are very satisfied with our application. They said the application worked very fast, easy to use, and have attractive user interface design. They are very excited to use it in the near future. They also suggest us to add multi-level users to prevent a user's deleting or modifying other user's data. Also, the application should have chatroom feature, so they can collaboratively schedule at home. Therefore, we will add multi-level users, and chatroom to the next version.

V. Conclusions

We developed a web-based application for School Class Scheduling to help school teachers schedule their class efficiently. The application is developed with PHP, MySQL, HTML, CSS and AJAX. From an experiment session with 20 school teachers, the teachers satisfy with our application. However, some

features, including multi-level users and chatroom, will be added to our next version.

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