E-Appointment Scheduling (EAS)

Noraziah Ahmad, Roslina Mohd Sidek, and Mohd Affendy Omardin

Abstract—E-Appointment Scheduling (EAS) has been developed to handle appointment for UMP students, lecturers in Faculty of Computer Systems & Software Engineering (FCSSE) and Student Medical Center. The schedules are based on the timetable and university activities. Constraints Logic Programming (CLP) has been implemented to solve the scheduling problems by giving recommendation to the users in part of determining any available slots from the lecturers and doctors' timetable. By using this system, we can avoid wasting time and cost because this application will set an appointment by auto-generated. In addition, this system can be an alternative to the lecturers and doctors to make decisions whether to approve or reject the appointments.

Keywords—EAS, Constraint Logic Programming, PHP, Apache.

I. INTRODUCTION

NOWADAYS, Information Communication Technology (ICT) impacts the human life. In realistic world, the need for the system arises as a result of problem faced by users in the current manual. ICT has started changing the modern way of life, e. g., an online appointments system is helping to reduce National Health Services (NHS) waiting times [1]. A hospital referral from a Government Policy (GP) is usually followed by a long wait, but under new government regulations this could become a thing of the past as part of the NHS Plan, all NHS trusts must have an online booking system in place by 2005 [2]. Although automated messages have been shown to improve appointment attendance, these studies have not focused on the messages themselves. Improving the design of appointment messages may further increase the potential of automated systems for improving appointment adherence [3].

E-Appointment Scheduling (EAS) has been developed to handle appointment for UMP students, lecturers in Faculty of Computer Systems & Software Engineering (FCSSE) and Student Medical Center. It is an online application for FCSSE's student whenever applying to make appointment with lecturers or doctor. All applications have to be sent to the lecturers or doctor for approval. This system will give more interactive for student to make an appointment through an online system. By deploying this system, we can avoid

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wasting time and cost because this application will set an appointment by auto-generated. Therefore, this system is hopefully to solve problem for scheduling. E-Appointment Scheduling performs the related task associated with students or lecturers and doctor such as:

a- Student needs to see lecturers or doctor first before make the appointment.

b- Student needs to fill the form before meet with the doctor.

c- Consume more time to key in data into current system.

d- Increase error while entering data into current system.

e- The scheduling not effective for doctor and lecturers.

The system has been developed by using PHP tool in Microsoft Windows OS. There are lot of advantages of using PHP includes easy learning curve, database integration, extensibility, object oriented programming, scalability and rich features. It has been compiled with functions to interact with MySQL database system. The system is debugged in the local host server using Apache Server as the platform.

II. RELATED WORK

A. UMP Appointment

The current appointment in UMP is used by students, lecturers and doctor to carry out appointment. In this report explain the important of appointment at UMP meeting and how the system organizes the appointment. This system developed for e-meeting with C# and use for meeting management [4].

B. Concept of Scheduling

Scheduling is a problem that is grounded in many different levels of computer science and computer hardware engineering. Various scheduling and sequencing problems have been addressed since the 1950's by researchers in computer science, operations research and discrete mathematics [5], [6]. In a business-computing context, scheduling implies the automatic execution of background tasks at pre-set points in time. Three types of scheduling distinguished are native, basic and advanced scheduling [7].

C. Constraint Logic Programming

Constraint Logic Programming (CLP) is a merger of two declarative paradigms: constraint solving and logic programming [3], [8]. Although a relatively new field, CLP has progressed in several quite different directions. In particular, the early fundamental concepts have been adapted to better serve in different areas of applications.

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D. Techniques Uses in EAS

EAS has been developed by deploying Constraint Logic Programming. In this technique, using logic programming can write as logic programs that suitable with scheduling has been developed in this system. It solves some problems that are more natural or simple to write as logic programs, while some are more natural to write as constraint programs.

The constraint programming approach is to search for a state of the schedule in which a large number of constraints are satisfied at the same time. A problem is typically stated as a state of the schedule containing a number of unknown variables. The constraint program searches for values for all the variables. Constraints for lecturers and doctor for are defining as below:

a) 5 constraints for lecturers based on higher priority:
  i.   Emergency leave
  ii. Meeting
  iii. Fix time table
  iv. Appointment with student
  v.   Fix time office hour
b) 5 constraints for doctor based on higher priority:
  i.   Emergency call
  ii. Emergency leave
  iii. Outside work
  iv. Appointment with student
  v.   Fix time office hour

III. METHODOLOGY

Methodology in this system development is a standard process followed in an organization to conduct all the steps necessary analyze, design, implement, and maintain information system [9]. The development of the project usually follows a life cycle. To develope an EAS, System Development Life Cycle (SDLC) has been selected as the guide to develop the project. SDLC is an overall process of developing information systems through a multi step process from investigation of initial requirement through analysis, design, implementation and maintenance. The six major phase that use are project identification, planning, analysis, design, development and implementation. Fig. 1 shows the SDLC phases.
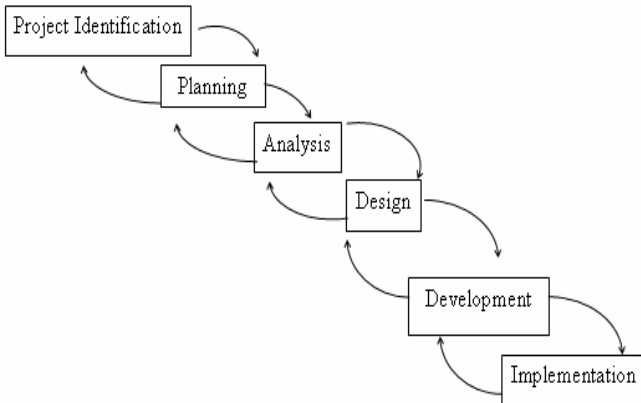

Fig. 1 System Development Life Cycle (SDLC)

Proper design of EAS has done in order to provide better and clear understanding about the process flow of the system. Unified Modeling Language (UML) is a tools developed to helps understanding the system. *Use Case* is one of the steps to show what the user can do it in this system. For this system have two Use Cases that are create for every interaction between users. The use cases below are design to applicant, lecturer and doctor. For use cases between applicant and lecturer, it appears what applicant and lecturer can do it. The applicant can login, fill application form and receive approval application, view applicant info and check schedule. Lecturer can receive the application form, make approval application, and view applicant info, check schedule, edit schedule info and setup schedule. Fig. 2 shows uses case for interaction between applicant and lecturer. Meanwhile, the uses case for interaction between applicant and doctor is shown in Fig. 3.
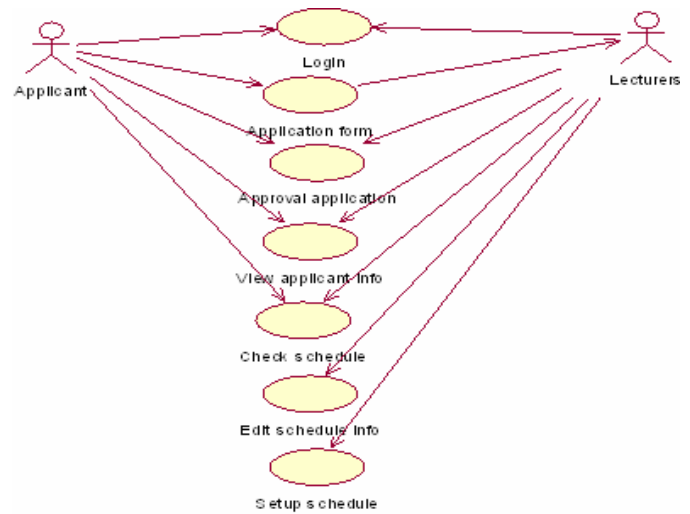

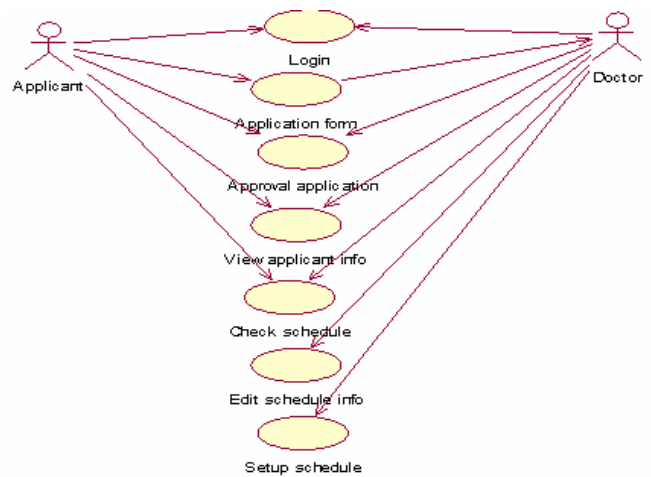Fig. 2 Use Case Specific e-Appointment (Lecturer)

Fig. 3 Use Case e-Appointment Scheduling (Doctor)

In *General Sequence Diagram,* applicants login the system and make appointment either with lecturer or doctor and submit the application form. System generates application for

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approval from lecturers or doctor. Fig. 4 shows the general flow of the e-Appointment scheduling operated.
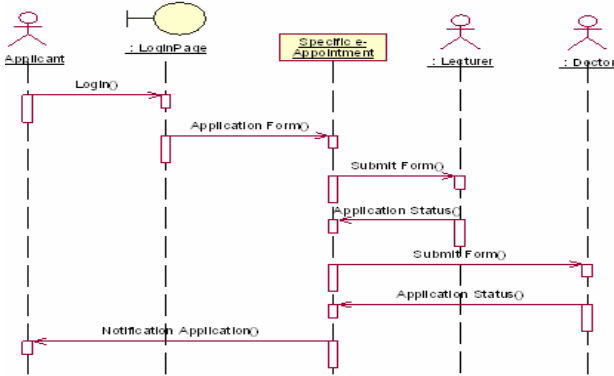

Fig. 4 General Sequence Diagram

Specific Sequence Diagram: There is a sequence diagram for apply appointment in e-Appointment Scheduling, as shown in Fig. 5.
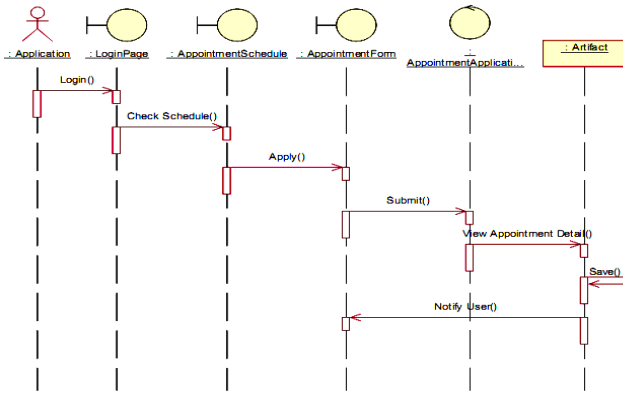

Fig. 5 Sequence Diagram for Apply Application

Fig. 5 shows the flow on how the applicants make an appointment. After applicants login into the EAS, application must choose either want make an appointment with lecturer or doctor. Then put the constraints that are lecturer's name, date and time to set the appointment, if the constraints is not match, system will give suggestion to set an appointment at other available slot for lecturer or doctor. After that, applicants submit the application.

There is sequence diagram for lecturer approval in e-Appointment Scheduling, as shown in Fig. 6.
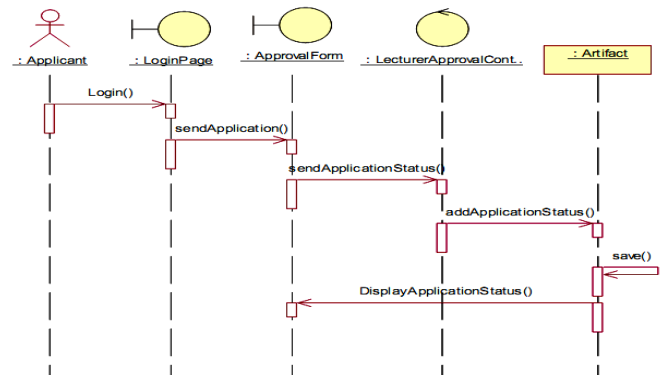

Fig. 6 Sequence Diagram for Lecturer Approval

Fig. 6 shows the approval flow for the application that submits to the lecturer. Lecturer receive the application and that generate by the system and it mean the application is approved by system base on the available slot of the lecturer schedule, but lecturer can reject or edit the application if have the emergency at that time for take the appointment application and the applicants get the notification by the memo as usual.

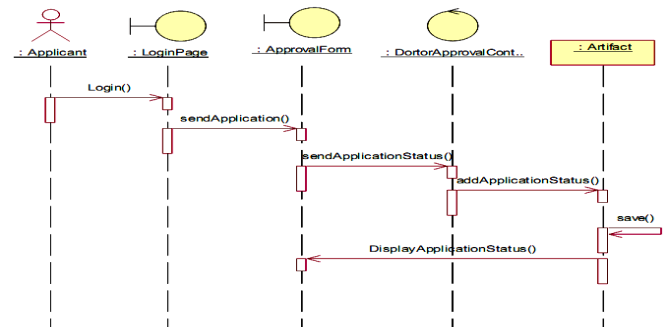There is sequence diagram for doctor approval in e-Appointment Scheduling as shown in Fig. 7.

Fig. 7 Sequence Diagram for Doctor Approval

Fig. 7 shows the approval flow for the application that submits to the doctor. Doctor receive the application and that generate by the system and it mean the application is approved by system base on the available slot of the doctor schedule, but doctor can reject or edit the application if have the emergency at that time for take the appointment application and the applicants get the notification by the memo as usual.

IV. RESULT AND DISCUSSION

A. Results for Student Module

At student page, for the first time login into the system all students allow to use their student id as and username and password. Student can view availability of lecturers and doctor before make an appointment. If student choose to make an appointment with lecturer, student must search that lecturer by lecturer name, date and time. System view an available slots that student request, if not system suggest other slot to make an appointment. Appointment is made through memo

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and the request has been triggered to lecturer. It also same with the doctor module but the appointment only triggered to doctor.
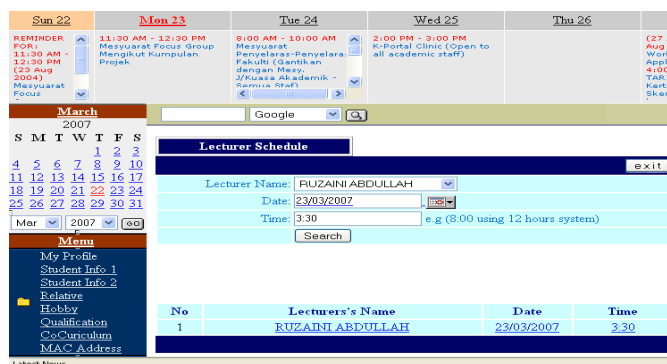

Fig. 8 Search Lecturer Schedule

Then, the system will show for search lecturer's schedule or doctor's schedule with insert the constraint by student to do the appointment. System will search the available slot that student need or give other suggestion available slot if the constraints not match. Students just click the result to do the appointment.
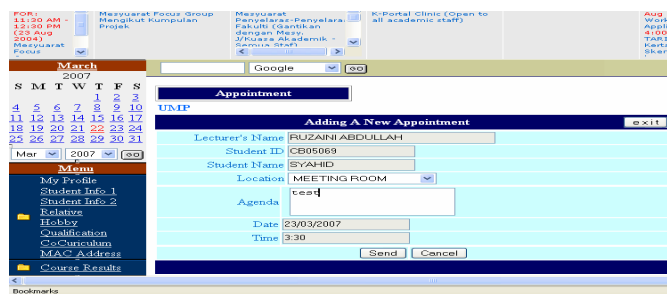

Fig. 9 Make an Appointment

Interface in Fig. 8 and Fig. 9 will appear to make an appointment with lecturer or doctor, which student want date and time that generate from the previous interface. Student must insert location and agenda for the appointment; and click button send or cancel or exit to cancel the appointment.

B. Results for Lecturer Module

After students make an appointment, database is updated. The lecturer can view the request. Every appointment that received by lecturers is based on available slots. Lecturer can reject or edit the time and date to make other appointment when have emergency. Edit schedule can make up of lecturer to update the available schedule. If lecturer wants to check the record can click button report and can view the record.
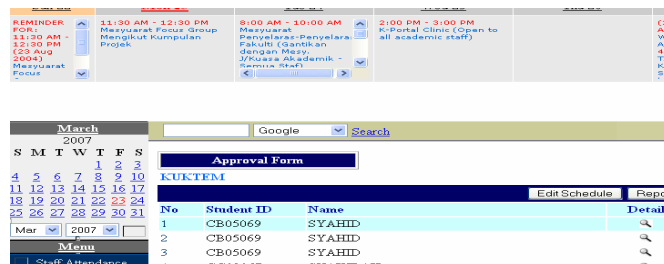

Fig. 10 List of the Approved Appointment

This interface in Fig. 10 shows the approved appointment that make by system automatically. Lecturer can view the information about the application at this phase and also can view the detail of the applicant by click image view at column detail.
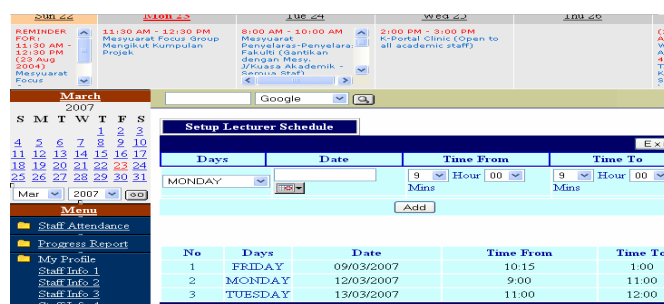

Fig. 11 Lecturer Setup Schedule

Lecturer can setup the schedule at the available time for the appointment, as shown in Fig. 11. Meanwhile, lecturer can change the date and time for the appointment that student booked as shown in Fig. 12. System automatically updates the appointment and sends it to the student through the memo.
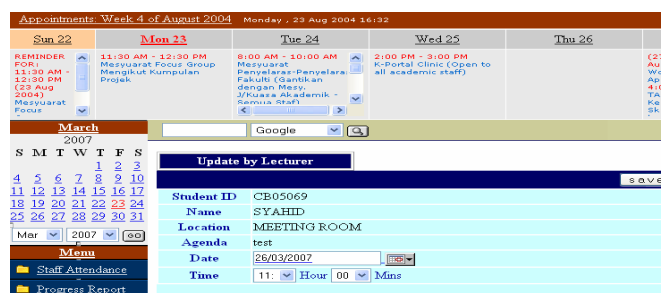

Fig. 12 Lecturer Change Date and Time

C. Results for Doctor Module

After students make an appointment, database is updated and doctor can view the request as shown in Fig. 13. Every appointment received by doctor are approved because the system only approve the appointment at available slot but doctor can reject or edit the time and date to make other an appointment when have emergency. Edit schedule can make up of doctor to update the available schedule. If doctor wants to check the record can click button report and can view the record.

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Fig. 13 List of the Approved Appointment

Fig. 14 shows the approved appointment that make by system automatically. Doctor can view the information of application and the detail of the applicant by click image view at column details.

Fig. 14 Doctor Setup Schedule

Doctor can setup the schedule at the available time for the appointment. Doctor can change the date and time for the appointment that student booked as shown in fig.15. Hence, system automatically updates the appointment and sends it to the student through the memo.

Fig. 15 Doctor Change Date and Time

V. CONCLUSION

In this system, Constraint Logic Programming has been used as a guide line for the scheduling in e-appointment. By using this system, student can make an appointment with lecturers and doctor in Student Medical Center fast, easy and effectively through the web based system. Student can get

suggestion for available slot to make an appointment. Lecturer and doctor department can update their schedule also can give feedback to reject the appointment if have emergency. This system can be an alternative to the lecturers and doctors to make decisions whether to approve or reject the appointments.

REFERENCES

[1] B. Lee, "Story Boarding for Web-Based Information System 1", Reed Elsevier Business Publishing Ltd-National Health Service Online Appointment System, Karl Cushing, 2001.
[2] C.Dudman, "Government Activity, Copyright 2001", Reed Elsevier Business Publishing Ltd., 2001.
[3] Leirer, Morrow, Parinute & Doksum, "Appointment system", 1980.
[4] N.M. Nik Ismail, *E-Meeting with C#, PSM from BCN for Guideline*, University Malaysia Pahang, 2004.
[5] P.F.Dutot, G Mouni'e, D.Trystram, "Operating Systems Internals and Design Principles", 5th International Edition, Prentice Hall, 2004, pp. 189-203.
[6] T.M. Connolly, and C.E. Begg, "Database Systems: A practical Approach to Design, Implementation, and Management", 5th Ed. Addison-Wesley, 2010, pp. 199-205
[7] N. Kaushik and S. Figueira, Scheduling in e-Business. Dollar Universe United State of America, 2005.
[8] F. Benhamou and A. Colmerauer, What is Constraint (Logic) Programming, Sept 1993.
[9] J.A Hoffer, J.F. George, J.S Valancich, "Modern System Analysis & Design", 3rd Edition. United State of America: Prentice Hall, 2002, pp. 88-91.