Expert System Design for Web-Based Lecturer Scheduling

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Abstract. In this study contains an expert system design for web-based lecturer scheduling that can facilitate the Chair of the Study Program in scheduling courses for lecturers. This system was built using Notepad ++ software, XAMPP with HTML, CSS, JavaScript, PHP and database programming languages using MYSQL. Subjects in this study are expert system applications as the media schedule lecturer subjects. Data collection in this study uses the interview method and questionnaire method. This system is built with the Waterfall model namely analysis, design, coding and testing. This application in the inference engine used is the forward chaining method. The results of this study are expert system applications to schedule lecturers' subjects according to the questionnaire data. Based on the results of the trial it can be concluded that this expert system application can facilitate the Chair of the Study Program in accurately scheduling courses, classes, days, hours, space, and lecturers.

1. Introduction
Universitas Maarif Hasyim Latif (UMAHA) get more than 500 (five hundred), new students, every year. And each new student is required to fill in his/her data, not to mention the top semester active students. Seeing the large number of students at the UMAHA, of course, more and more student data is stored in the database [1]–[3]. While the UMAHA data is not only student data that is in the database, but data such as lecture hours, classes, buildings, and others. During this time at Universitas Maarif Hasyim Latif, the way to plot the teaching schedule was still manual, and there were frequent collisions between the program of chasing one lecturer and another teaching schedule. Even not even there, space sometimes happens obstacles that also collide.

Therefore, the need for a system that can handle scheduling of web-based lecturer lectures so that they can be more efficient and without collisions in schedules, spaces, etc. [4]–[6]. One of the great benefits of scheduling lecturers' subjects is that the Chair of the Study Program in scheduling the subjects of the regular lecturers and extraordinary lecturers can quickly and accurately. The need to create a scheduling system for lecturer subjects to support the smoothness of lectures so that it can make it easier for the Chair of the Study Program and students as well as other parties concerned. As for the scheduling process, an algorithm or method for selecting courses, lecturers, space and others are also needed. So that the results obtained are accurate [7].

Many selection methods can be applied to the scheduling system of lecturer subjects, namely Forward Chaining and Backward Chaining. However, the authors prefer the process of selection with forwarding Chaining because this method is tracking the future that starts from a set of facts by looking for rules that match the assumptions/hypotheses that lead to conclusions. [8]–[10].
This Forward Chaining method can also be interpreted by a rule that determines an object, forming a path that points to the object. Therefore, only one way to reach an object is to fulfill all the rules. This study aims to apply the Forward Chaining Method to the design of a web-based lecturer scheduling system at Universitas Maarif Hasyim Latif [5], [7].

2. Method
The research was conducted at Universitas Maarif Hasyim Latif, and the object of the research was scheduling lecturers' subjects. To get accurate supporting data, a needs analysis is needed on the system created. The needs analysis was conducted through interviews and questionnaires; this stage was carried out on the Chair of the Study Program, permanent lecturers and extraordinary lecturers at Maarif Hasyim Latif University to find out what subjects were allied or in charge and what hours and days the lecturer able to teach. Then an analysis is performed to identify the needs of the user so that it can be applied to the system to be designed [4], [7], [10]. The last stage of research is by testing and evaluating the system using acceptance testing method after the system through several steps in development using the waterfall method. Evaluation is carried out by the users involved in the order and also adjustments to the business processes that are in Universitas Maarif Hasyim Latif.

3. Result And Discussion

3.1. System/Interface Display Design
At the design stage, the system / interface starts with the phases, including: the design of the login page, the design of the main page, the page design to the lecturer scheduling, the lecturer recommendation page, the lecturer teaching schedule page design, the design of the lecturer input page with the course, the page design lecturer input with day, design the lecturer input page with hours. Stages can be explained in Figure 1.

![Figure 1](image)

**Figure 1.** The design of the user display, in the original version using Indonesian

3.2. Encoding and Implementation
In this coding, coding is shown from a web-based lecturer lecture scheduling system that is applied using the forward chaining method with a partial coding example, as follows:

```php
if (empty ($_GET['mata_kuliah']) == false)
{
    $query_cek_rekomendasi = "select * from rekomendasi_dosen where
```
id_mata_kuliah = {$_GET['mata_kuliah']};
$hasil_cek_rekomendasi = mysqli_query ($host,$query_cek_rekomendasi);
$data_cek_rekomendasi = mysqli_fetch_all ($hasil_cek_rekomendasi, MYSQLI_ASSOC);

$array_kelas = array();
$array_hari = array();
$array_ruang = array();

foreach ($data_cek_rekomendasi as $rek)
{
    $array_kelas[] = $rek['ID_KELAS'];
    $array_hari[] = $rek['ID_HARI'];
    $array_ruang[] = $rek['ID_RUANG'];
}

3.3. User Input Process
The input process in the system is carried out by the user, and a good system is ease of inputting data into the system. In an implementation, the system can be said to be feasible to use; this is indicated by the application of this system with computer specifications that are not too complex, the data input process carried out by the user can be carried out efficiently.

3.4. Design Testing and Implementation
The testing process of the expert system application for lecturer scheduling is done by the user / Chair of the Study Program, to test the truth of the expert system that has been built. Tests have been carried out with several criteria as follows:
• The ease in running the system, the user can run the application efficiently, then the user can choose to schedule the lecturer subject / see the results of scheduling/input of lecturer data. So that the form of each of these choices will appear.
• Complete presentation of choices and information.
• Good system documentation.

The design implementation includes sections including implementation of the login page design, implementation of the main page design, implementation of the lecture scheduling page design, implementation page design of lecturer teaching schedule, implementation of the lecturer input page design with the course. After that implementation of the lecturer input page design with the day, implementation of the design of the lecturer input page with the clock, for example, is shown for the results of the implementation of the design of the lecturer input page with the clock and can be shown in Figure 2.

![Figure 2. Implementation of the design of lecturer input pages with clocks, in the original version using Indonesian](image-url)
4. Conclusion
Based on the results of the analysis and discussion that has been done, the research has several conclusions, among others. The scheduling decision making application for lecturers at Universitas Maarif Hasyim Latif can be applied using the Forward Chaining method. With this web-based application, it will be easier for the Chair of the Study Program at Universitas Maarif Hasyim Latif to schedule lecturer subjects. The application is made to produce output in the form of lecturers' schedule to teach courses in class, day, hour and appropriate space.

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