The Expert System Software application on Lecture Scheduling based on Rule Based Reasoning

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Abstract— **Method of Rule-Based Reasoning is one of the methods in decision support systems that may have had knowledge base. In this method of solving problems based on an artificial intelligence approach using problem-solving techniques based on the rules contained in the knowledge base that can solve the problem sequentially. With the approach, some rules that have been produced can be re-examined by an expert to be able to be repaired or modified to obtain better results. In addition, this method is also used when needed explanation of traces (steps) in getting an achievement of a solution. Research done is to build a knowledge base representation system using Rule-Based Reasoning. Implementation of the system was built using a desktop-based application.**

Keywords— **Rule-Based Reasoning, Decision Support Systems, Knowledge Base, Artificial Intelligence**

I. INTRODUCTION

Lecture Scheduling in a college is a routine work done each face of the new semester. In practice, it is often the schedule that has been issued is uncertain that requires rescheduling. This resulted in the beginning of the semester lectures are not effective because they have to make adjustments to the schedule with the actual situation after the schedule is issued. In addition, the difficulty in finding an empty time slot has also become an obstacle especially when looking for a replacement class schedules or additional courses.

In preparing the schedule is not easy [6]. There are several aspects that affect the preparation of class schedules such as faculty, students, courses, lecture rooms, and a time slot. Each of these aspects has a state that can be a problem and the conflict in the preparation of class schedules. For example, the problems facing the lecturer is a conflict of aspects of lecturers is a professor scheduled to teach at two different locations at one time. Or from the aspect of students, the problem is the amount of class perangkatannya. In addition to these problems, there are many more possible issues that can arise from each of these aspects.

To overcome these problems can be done in a way to build a computerized decision support system. The system will accept all of these issues as a matter of scheduling solutions are structured to produce a good . Structured problem is a problem that it is possible to use the algorithm or rules of the

decision so that problems can be identified or understood. With the use of algorithms or rules, it is also possible to identify a replacement solution and evaluate it, and determine the best solution.

A decision support system requires a model of the completion of the problems encountered. To be able to determine the right model can be done by identifying the problem and analyze environmental problems and identify the variables involved in the decision making. Complex problems can be seen from every aspect in the preparation of class schedules that are interconnected with other aspects. Then the scheduling is done according to the rules - certain rules. So that the appropriate model for this system is the method of Rule-Based Reasoning.

II. PROBLEM STATEMENT

Based on the above Introduction, the identification of problems that arise in this study are:
a. The difficulty of schedule
b. Frequent clashes course schedule
c. Frequent occurrence of rearrangements class schedule

III. THE PURPOSES

The Purpose Of This Study is to Make An Expert System Which Can Facilitate The Preparation Of Class Schedules And Avoidance Of Conflicting Class Schedules So As To Avoid Rescheduling.

IV. RELATED RESEARCH

[3] Applying expert systems to solve problems and make decisions within the scope of the economy. This study uses a pattern-based if-then rules in performing the method of approach to the knowledge base. In these studies have analyzed how aspects of the advantages of using an expert system for decision-making process. In this research it has been discovered that intelligent systems have the performance to do some of the fastest evaluation in taking to calculate the uncertainty on the true state by using fuzzy logic.

[10] Applying a forward chaining on the scheduling of courses, the process is done by tracking ahead of the main components of the scheduling in step by step in processing the information and use of constraint satisfaction problems which

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utilizes some rules that exist in scheduling courses. It can set the working time, so we get the effective working time and organized in accordance with the plan. Forward chaining method can be applied to the information system scheduling with setup 6 major components (data lecturer, the data subject, the data Prodi, the data space, and time data) and the process of classes are offered, and the generated space, schedule messages by faculty, and generate schedules resulting matrix scheduling lectures.

[12] Applying the method of Genetic Algorithm in scheduling activities in the Public Relations of Ministry of Religious Affairs to produce a schedule of activities that do not clash. In the application of Genetic algorithm is a method using six main components: Encryption Techniques, Initialization Procedure, Function Evaluation, Selection, Genetic Operators and Parameters Determination. While the operator described Genetics back to 3 operators: Selection, Crossover, and Mutation. through components - components and stage - the stage of the genetic algorithm, generates the optimal schedule of activities and not clash.

[11] Applying an expert system which can diagnose plant pests and diseases of onion and chili using forward chaining inference technique and a rule-based approach (rule base reasoning). By using forward chaining data is used to obtain a conclusion has been obtained from an expert knowledge and other literature such as journals, articles and books, by matching the various rule premise matching, matching is done by a variety of symptoms that occur in two types of horticultural crops is contained in the knowledge base. Rule-based approaches (rule base reasioning) in this study is used as a form of approach to the classification of the data obtained in the knowledge base in order to facilitate the transformation process of the inference engine. By using the if-then pattern then an expert can also easily modify the data contained in the knowledge base.

V. RESEARCH METHODOLOGY

The design and implementation of the Lecture Scheduling System Lecture held at the Faculty of Computer Science, University of Bandar Lampung using a rule-based approach (rule-based reasoning) is an approach using the IF-THEN rules.

Analysis and design of Class Lecture Scheduling System is done through the phases of the System Development Life Cycle, which consists overcome six phases, namely: (1) preliminary investigation, (2) systems analysis, (3) system design, (4) the development of the system, (5) system implementation, and (6) treatment systems. Based on these phases, formulate the framework (frame work) as a guide for design. The framework is shown in Figure 1.
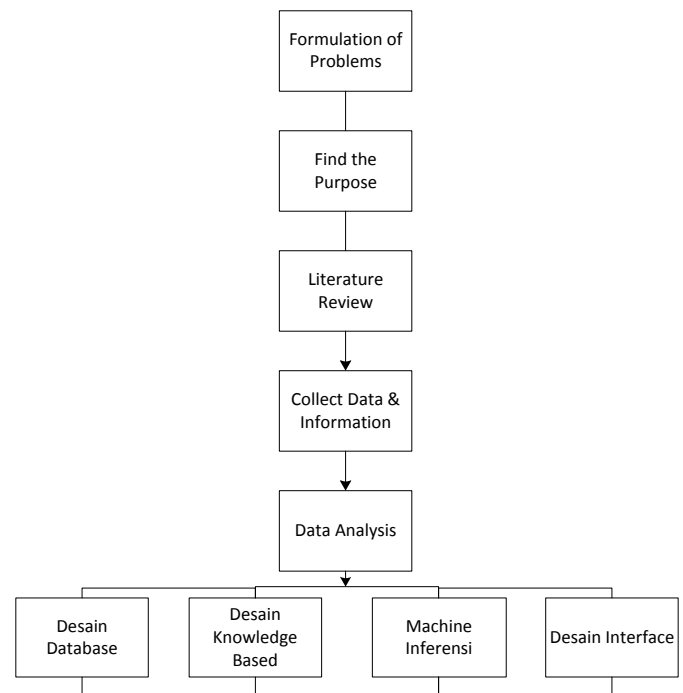

Fig. 1 Lecture Scheduling Expert System Development

VI. ANALYSIS & DISCUSSION

A. Rule Based Reasoning Application

To facilitate the application of the rule based reasoning into this course scheduling system, the required variables that will be created to facilitate the application of coding and analyzing the data. The variables involved are as follows:

1) Variables

In these research there are a lot of variables such as; Subjects, Lecturer, Prodi, Credits, Amount of Students, Class, Day, Time, Type of Lecture, Semester and Classroom.

2) Coding

Table 1 Class

Code	Name of Class
R1	E.2.4
R2	E.2.3
R3	E.2.2
R4	E.3.1
R5	Lab. Computer

3) The Day

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Table 2 code of the day

Kode	Name of the Day
H1	Monday
H2	Tuesday
H3	Wenesday
H4	Thursday
H5	Friday
H6	Saturday

4) Time

Table 3 Code of Time

Code	Time
P1	08-00 - 09.45
P2	10.00 - 11.45
P3	12.30 - 14.15
P4	14.30 - 16.15
P5	16.30 - 18.15

B. Rules Class Lecture Scheduling

There are some rules such as:

1. If a space has been filled at the same time, the space can not be replenished.
2. If the type of is the practicum must be in the Lab space. computer
3. If the type of is the theory of the space can be in E.2.4, E.2.3, E.2.2 or E.3.1
4. If the faculty has been teaching in the same day and at the lecturer can not teach in two different rooms.
5. The number of students should not exceed the capacity of the room.
6. If the faculty do demand schedule, the lecturer will take precedence.

C. Process Flow Lecture Scheduling based on Rule Based Reasoning

Example 2:
    Code of Data   : KD001
    Code of Course: KI3120
    Courses   : Multimedia & Animasi
    Lecturer   :Tyas Sukmana, S.Kom,
    Prodi   : Informatic Engineering
    Type of Lecture:Practikum
    Amount   : 33
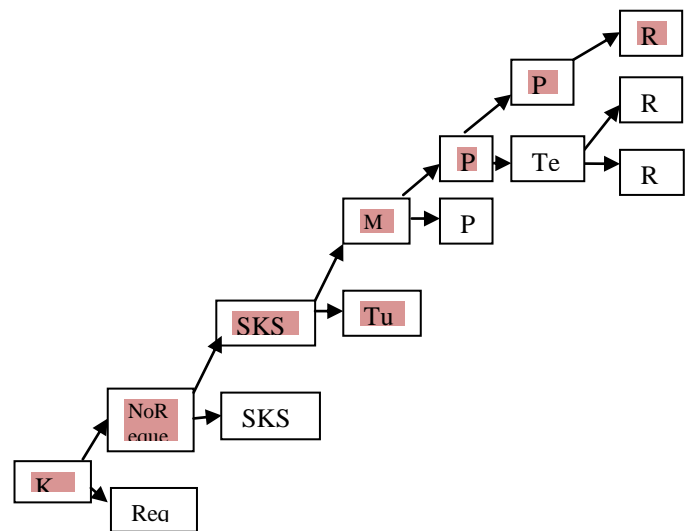   Credit   : 3

Fig 2. Rulebased Flow SKS>2

Example 2:
Code of Data   : KD002
Code of Course: KS3413
Courses   : TATA KELOLA & AUDIT SI
Lecturer   :AYU KARTIKA PUSPA, S.Kom,M.TI.
Prodi   : Teknik Informatika
Type of Lecture: Sistem Informasi
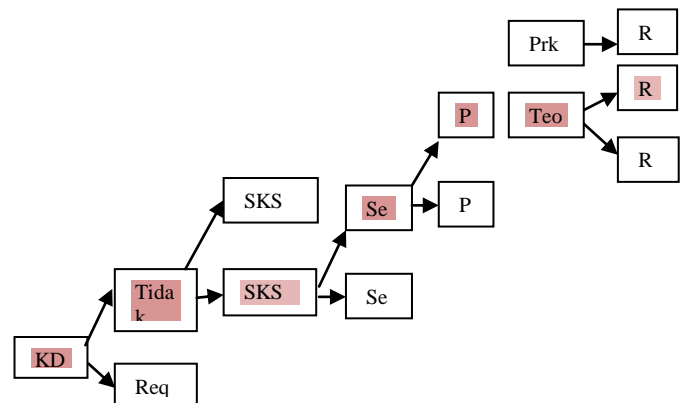Amount   : 25
Credit   : 2

Fig 3. Rule Based Flow SKS<3

VII. CONCLUSIONS & FUTURE WORK

Based on the results of research and discussion, which is done from design to testing of the system information, the conclusions that can be drawn from this study are as follows:

a. From the analysis and design of The Expert System software has been successfully created Class-Based Lecture Scheduling System Based Rule Based Reasoning To Simplify Lecture Scheduling Lecture, with the stages of planning, analysis, design, implementation and testing. This provides a system built to present information to the Faculty Lecture Schedule for Students and Lecturers

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b. Lecture Scheduling The Expert System software Class-Based Expert System Rule Based Reasoning To Simplify Lecture Scheduling This lecture has to be used to reschedule . Because of the assay to obtain outcomes more optimal scheduling, efficient and easier through the measurement process blackbox and whitebox who said that when the application is run, it is seen that the node has been executed once. Based on these provisions in terms of the feasibility of the software, this system has been qualified so as to reduce schedule conflicts that often occur. This information system is able to manage the data subjects that have enter into an optimal schedule.

For the future work; a. Class Lecture Scheduling System can be used as a complementary tool in the preparation of the schedule needs enrolled in the Faculty of Computer Science University of Bandar Lampung.

b. For further research in order to increase the functionality of a Class Lecture Scheduling System Based Rule Based Reasoning this.

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