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Information System Analysis and Design for Student Scores Management Using Iconix Process

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Abstract— The development of information and technology encourages society, government, business, and the educational sectors to support all initiatives that will boost productivity and effectiveness. For example, an information system is required at *SDI Taman An-Nahl* to handle and provide student data. To make it easier to handle student score data and give parents updates on their children's activities, they have created an analysis and design of a student score for a management information system. The use of information technologies to handle student test results may also enable teachers to process results more quickly and effectively. This study produces a web-based student score for a management information system using the Iconix process approach. The study's results are the analysis and development of information systems for implementing Student Scores Management into practice. Information on teachers, parents, and students is included, along with score records for each subject taught in each class. The proposed business procedures can carry out the results effectively. Additionally, keeping track of students' scores and actions can lead to suggestions for various business actors.

Keywords— Analysis and Design, Web-Based, Student Score, Management Information System, Iconix Process.

I. INTRODUCTION

A country's level of development can be determined by how well its educational system is developing. A country is attempting to improve education standards in Indonesia. The improvement of information and technology pushes society, the government, industry, and educational sectors to use it to support the efforts to make all activities more accessible, effective, and efficient [1][2]. The information obtained can produce fast, accurate, and exact information employed in organizational decision-making. As a result, in order to increase the effectiveness of educational institutions, teachers in educational institutions need to analyze information and data. That offers a great starting point for monitoring and evaluating outcomes [3][4][5].

Student Management Information System (SIMANIS) is an example of the use of information technology in education. *SDI Taman An-Nahl* is responsible for developing this information system, which was designed to record and manage the data of the school's students. This web-based information system is necessary to improve *SDI Taman An-Nahl's* digital services, such as collecting student databases and scores and informing parents about their children's activities. This can be implemented if the information system is practical and adheres to current business processes. The design justification for the current system could give insight into why some features were left out. Document analysis can reveal the guiding principles and regulations for the organization as a whole [6].

Several examples of earlier studies revealed information on designing information systems using the Iconix process approach. As demonstrated by Khrisna Duta Dharmawan's analysis of website development using the Iconix process method for computer sales strategies at CV, Citra Mandiri Semarang requires creating a computer sales website that can function more effectively and efficiently [7]. Yulianta and Petrus Mursanto conducted another look at web application development using the Iconix and UML procedures on the ISI management system. They wanted to give a general overview of the steps required in developing web applications and the results of their application analysis, design, and implementation of Web-based CMS [8]. According to Xing's research, the manual entry option could be more efficient and secure, efficiently creating technology to record scores using the PHP scripting language [9].

The Iconix process method is applied in the Student Management Information System (SIMANIS). In order to improve software development efficiency, the Iconix Process builds software systems with a stronger user-requirements focus. Companies will be able to manage academic activities at *SDI Taman An-Nahl* properly and efficiently due to the development of this information system. The Student Management Information System (SIMANIS) can also precisely record student data and improve reporting academic performance and student activities to parents.

II. RESEARCH METHODOLOGY

The Iconix Process is a technique to build software systems that places a higher value on user needs and streamlines the procedure to increase the effectiveness of the software development process [11]. The Iconix Process has four stages [11][12], but for this study, we just use the following three:

1. Requirements
   - Functional requirements. At this point, an analysis of the functional requirements needed to create software is done.

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- Graphical User Interface (GUI). This first stage provides a simple description of how the system should appear when it is finished.
- Domain Modelling. The primary objects (nouns) involved in a system's business operations are identified [13].
- Use Case Modelling. Along with each standard and alternate scenario, the stage also identifies each actor or user involved in the system's use [13].

2. Analysis and Preliminary Design.
   - A robustness diagram that connects system analysis and design is used in this study stage. The use case's specifics are described in this step [13].
3. Detailed Design
   - A flowchart built on a robustness diagram is called a sequence diagram. For each use scenario, this diagram is created [13].
   - Class Diagrams, a part of the unified modeling language (UML), are used to show the classes and logical relationships within a piece of software's static structure [14][15].

III. Result and Discussion

A. *Requirements*

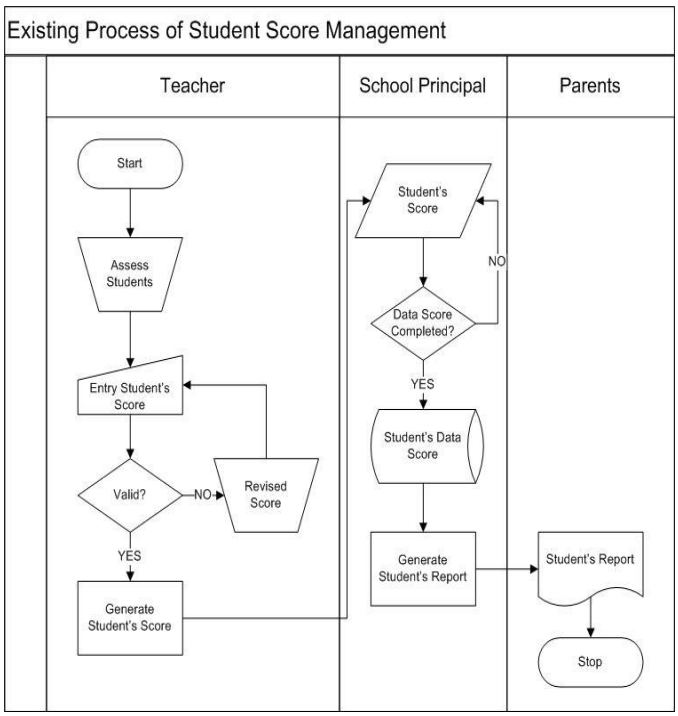

Figure 1. Existing Process of Student Score Management

Before and during the submission of proposals, this process is carried out as an examination of business processes or system flows. Design the functional requirements next, then create a domain model and evaluate the specifications. According to Figure 1, student scores at SDI Taman An-Nahl are managed by hand. Figure 2 depicts the process of building a system for managing student scores. According to the suggested approach, student test scores are stored in a database. Furthermore, it can automatically create reports for each Student that are sent to their parents.

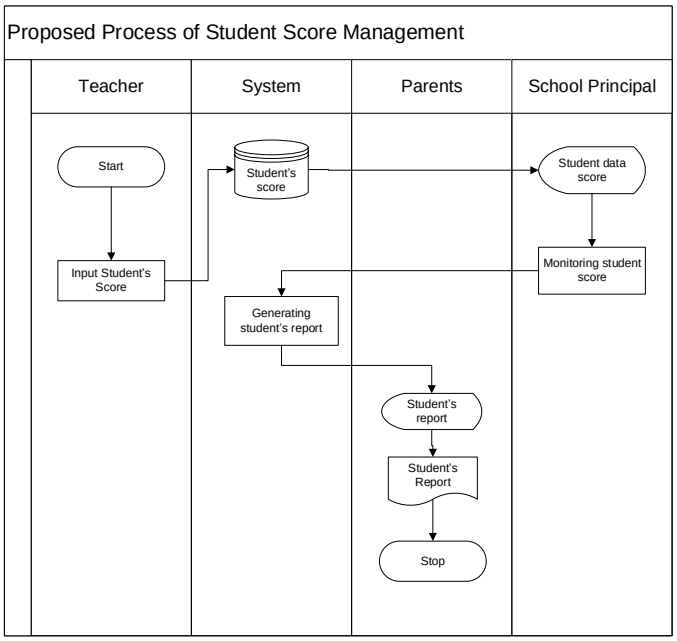

Figure 2. Proposed Process of Student Score Management

The features and functions of the *SDI Taman An-Nahl* student score management system are described in the original display design or GUI. The student score management system's home page and the menus that show student grades are shown in Figures 3 and 4 below, respectively.

Figure 3. GUI Home

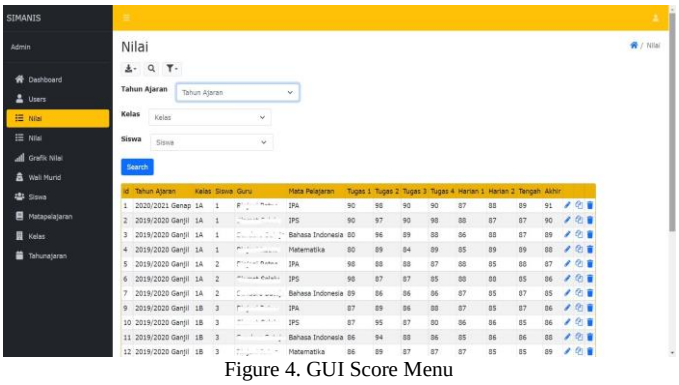

Figure 4. GUI Score Menu

Eleven domains were obtained after locating the nouns connected to the system, displayed in Figure 5.

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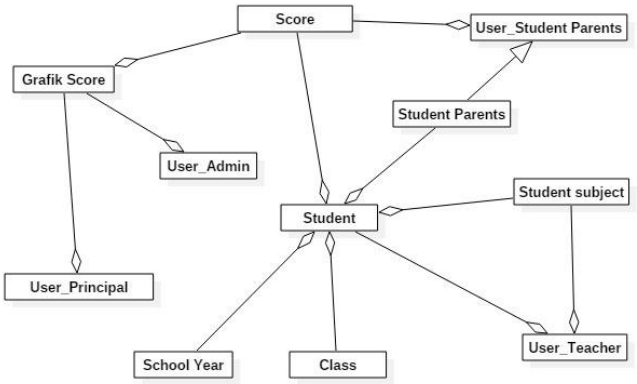

Figure 5. Domain Model Diagram

At this stage, the Use Case Modelling process determines the actors involved and the roles or activities carried out. Figure 6 displays 37 use cases with three actors.

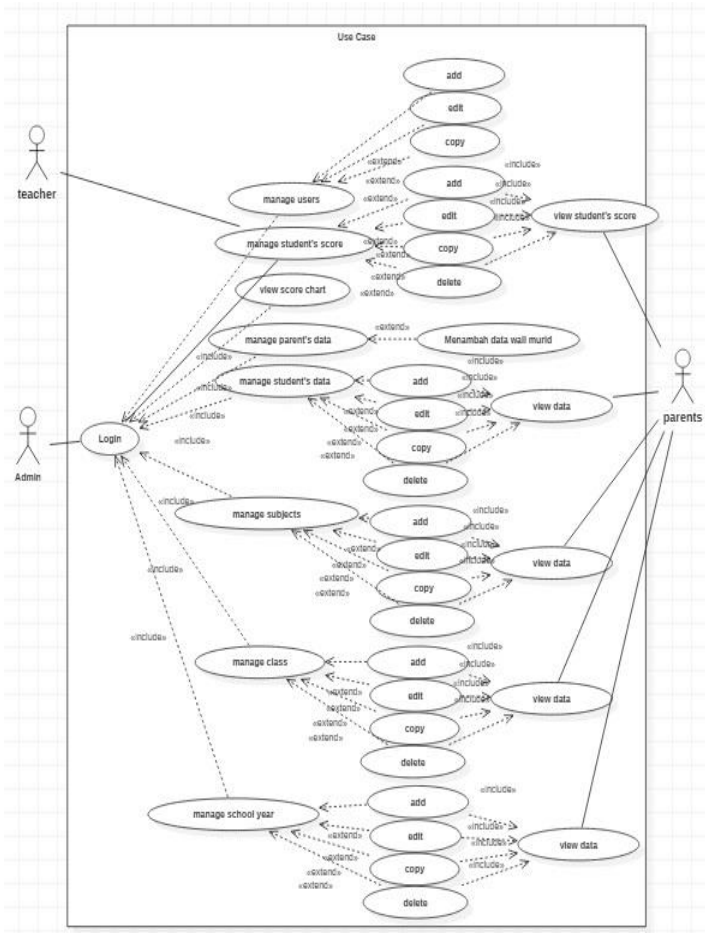

Figure 6. Use Case Diagram

B. Analysis and Preliminary Design

Use case diagrams turned into robustness diagrams using the use case diagram previously created. The robustness diagram provides a more in-depth description of the object.

1) Add Student's Score: The basic flow appears in Figure 7. The system will display the "Add Grades" page when an administrator clicks the "Insert" button on the grades page to add student grades. The Admin clicks "Add" after entering the Academic Year, Class, Students, Teachers, Subjects, and Assignments. The system will record the data into the database and display the Student's score data master page along with the message that "Added successfully" has been made. In the alternate flow, if the Admin fails to enter one of the input fields, the system will alert, "Please enter the required field".

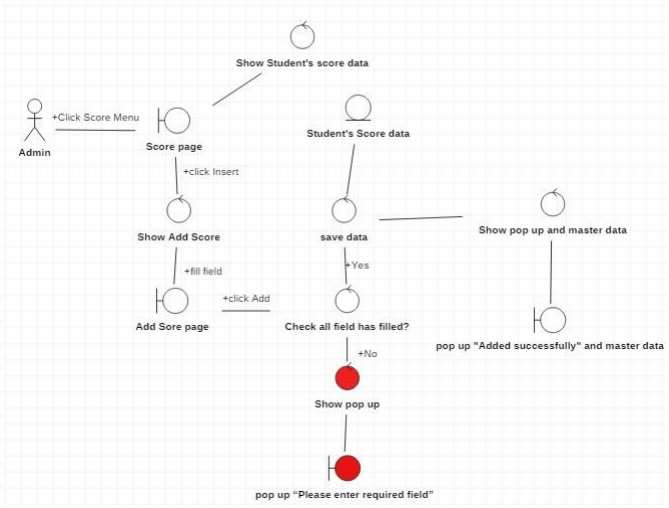

Figure 7. Add Student's Score

2) Edit Student's Score: The basic flow is depicted in Figure 8. For instance, if an administrator wants to alter student score information, they can select the desired information in the grade data table and click the "Edit" button. The system will then display the edit scores page. The Admin will change the input field data before pressing the "Save" button. The system will show the message "Updated successfully." If the Admin does not enter one of the input fields in the alternate flow, the system will alert them, "Please enter the required field".

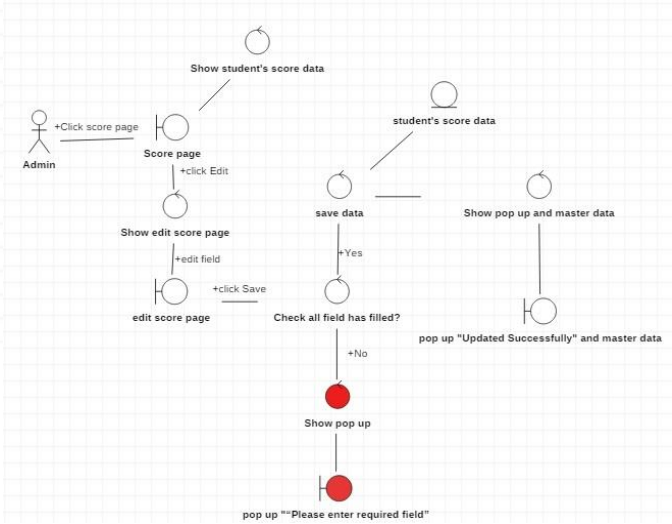

Figure 8. Add Student's Score

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3) Delete Student's Score: The basic flow is illustrated in Figure 9. The "Delete" button is activated by clicking on the data you want to remove from the student score data table if the Admin wants to remove the scores of students from the master student grade data. The system will show the Delete Scores page. The Student's score data master page will display a "Deleted Successfully" pop-up when the Admin clicks the "Delete" button. If the administrator clicks "Cancel," the page with the student value data will load again.

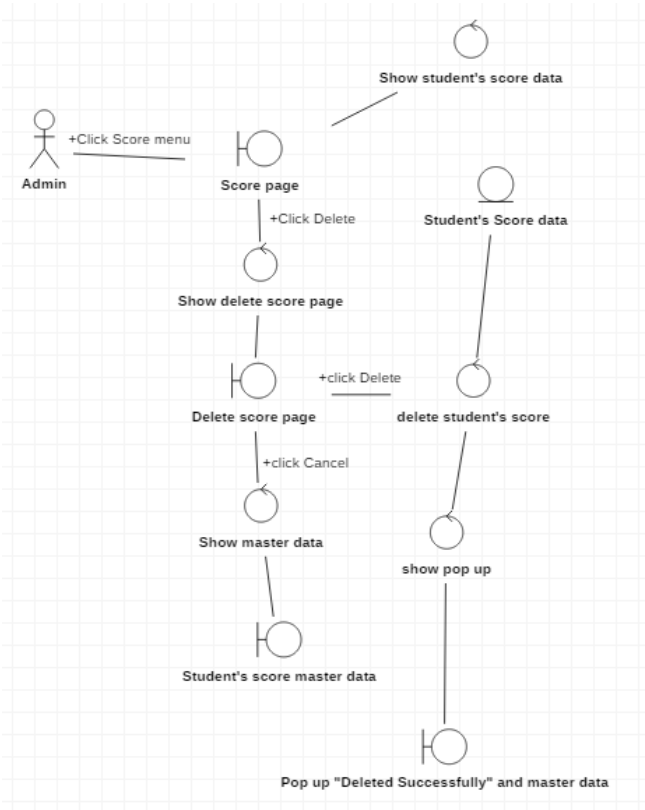

Figure 9. Delete Student's Score

C. Detail Design

The use case scenario and robustness diagram's conclusions are inseparable from the sequence diagram, which comes next. The specifics of the Student's scoring system are detailed in sequence diagrams. An illustration of the menu entering values is shown in the sequence diagram below: Figure 10 shows the sequence diagram of adding the Student's score, Figure 11 shows the sequence diagram of editing the Student's score, and Figure 12 shows the sequence diagram of deleting the Student's score.

The structure, description, attributes, methods, and relationships of each class are all clearly outlined in the class diagram. Since the design of this class diagram is the outcome of the development of the domain model, class diagrams are almost identical to the domain model. A class diagram is shown in Figure 13.

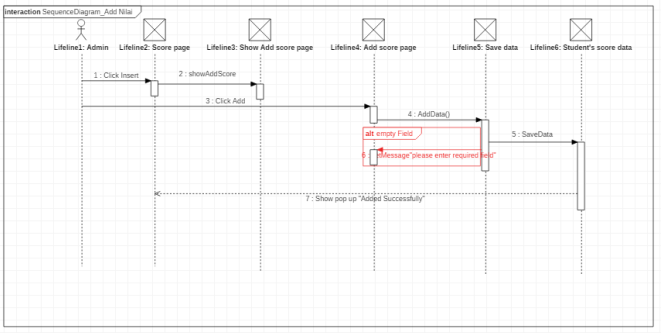

Figure 10. Sequence Student's score

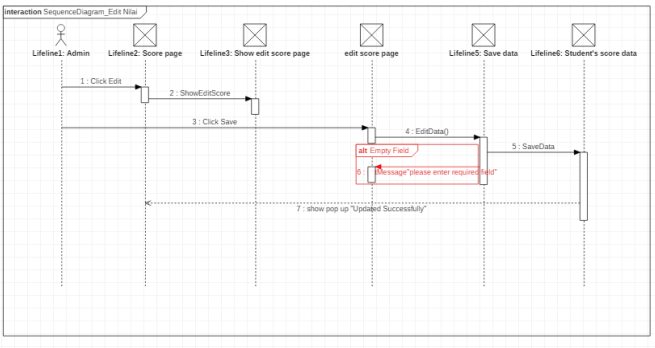

Figure 11. Sequence Edit Student's score

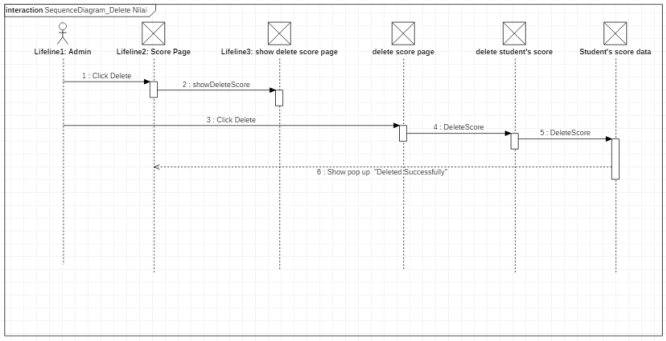

Figure 12. Sequence Delete Student's score

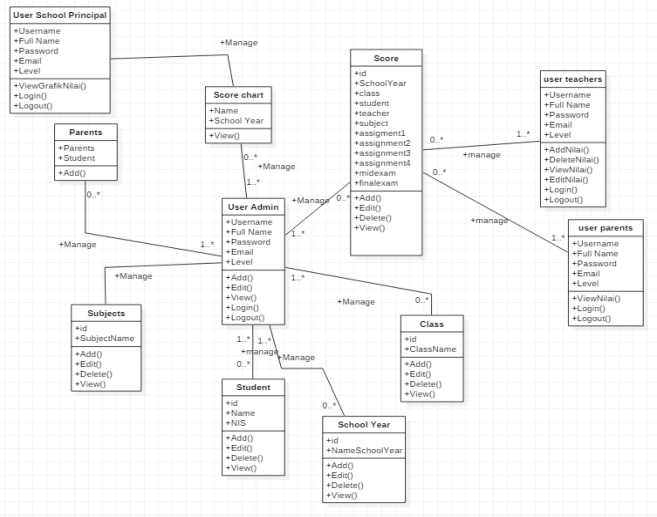

Figure 13. SIMANIS Class Diagram

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IV. CONCLUSION

These conclusions are based on the Iconix process method's study and design of a project management information system. The Iconix Process is a technique for developing software systems that concentrate on user requirements and streamlines the procedure to increase the effectiveness of the software development process. The Iconix process technique in this research has three stages for implementation: requirements, analysis and preliminary design, and detailed design. Functional requirement analysis, GUI, domain modeling, and use case modeling are the four stages of requirements analysis. The stage of functional requirements creates the system features' proposed process. It starts with creating a GUI, the system's first display design. Identifying nouns from the functional requirements stage is done in the domain modeling stage, which results in 11 domains. The system's use case diagram shows 37 use cases involving three actors.

Last but not least, there are two stages to the design process: analysis and preliminary design and detailed design. A robustness diagram, a development of the use case diagram, is created during the analysis and preliminary design stages. The detailed design stage then results in a sequence diagram where the design references the robustness diagram and use case. Class diagram modeling, the last stage of the Iconix Process program design model, is delivered to the programmer to be converted into computer code.

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