Comparative Analysis of Gaudy Booch and Ivar Jacobson Methods in Mercu Buana Mobile Application Database Design

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Abstract. Attendance, presence, or attendance recording is very important for every lecture, office or other organizational activities. Currently, recording student attendance activities at Mercu Buana University is by calling one by one the students by the lecturer, then the lecturer signs attendance on the special application form for lecturers that have been provided. For this reason, it is necessary to design a database to create the database. The analysis used is SWOT to compare between Gaudy Booch and Ivan Jacobson methods. This comparison is used to find out which method is appropriate in implementing a better database. Based on the database design that is made to further facilitate archiving of attendance, increased data efficiency. From the results of the research with class diagram description objects, the class diagram and database model that we use is from Ivar Jacobson, because it shows how actors from class diagrams point to Object-Oriented Software Engineering that has advantages that are easy to learn and have notation simpler.

1. Background
The development of technology, especially in particular information technology is growing very rapidly and information needs are increasingly fast [1]. The new paradigm that makes students as active learners now get the appropriate means to be implemented in the education system in Indonesia with the existence of Information and Communication Technologies [2]. Likewise, attendance recording has now developed into what is called online attendance. Along with the times, the use of the internet for recording student attendance continues to grow. Some universities start using online program attendance applications. Recording student attendance in the classroom is a must in every university. By recording the attendance, it proves that students attend a particular course in the room. Student attendance can be recorded in many ways, from analogue media recording on paper to digital media using applications for recording in the database [3]. The data is information about real events or facts that are formulated in a group of non-random symbols that indicate the number, actions or things
and the data will be record in database. However the current database infrastructure can be revised thus establishing the best optimization approach and planning for better working environment efficiency [5]. The development of ways to record student attendance is to reduce cheating in student attendance the relational data model, which is also develop with the basis of the SQL database language [6]. With good maintenance from the database and by using a relational database management system able to carry out various transactions and to respond to time requirements [7] in this case are students at universities. Currently on the Mercu Buana mobile application the latest recording module will be developed using RFID, a better database design is needed now therefore the right method is needed to make a good data base, with the Gaudy Booch and Ivar Jacobson methods which method will be compared the best in design.

2. Study Literature
The basic of the design databases are developed and customized to answer the demands of the customer [8]. A database is a collection of data, typically describing the activities of one or more related organizations [9]. Library database design will provide an overview and designed according to the Data Base Life Cycle concept. Where in the process of making the library, database will be carried out in accordance with the stage or phase of the Data Base Life Cycle. The focus of the discussion in research is to design a relational database [10]. With the Ivan Jacobson Method (Object Oriented Software Engineering), this method that contain elements from another Object Oriented. This method places more emphasis on the use-case. OOSE has three stages, namely making requirements models and analysis, design and implementation, and testing models. The advantage of this method is that it is easy to learn because it has simple notation, covering all stages in software engineering [11]. The key point in OOSE is the design and analysis phases which play the role and the relation dependency. The object oriented programs generally include objects which use classes to get in relationship [12]. Meanwhile Gaudy Booch Method known as the Object-Oriented Design Method, the conceptual models and design models should not be developed independently [8]. This method makes the process of analysis and design into four iterative stages, namely the identification of classes and objects, identification of semantics and relationships of objects and classes, details of interfaces and implementation [11].

3. Methods
In this case the research method used is a method by collecting and describing data about the situation directly from the field or precisely which is the object of research to obtain relevant data. To achieve the objectives of this study, the authors conducted data collection techniques as follows:
1. Observation method, directly researched by visiting the University of Mercu Buana to find out directly and systematically record the elements under study and analyse a system that was running.
2. Interview Method, the method for obtaining data by interviewing or questioning orally to the lecturer concerned and students in order to obtain the required data.
3. Literature review, literature Study is done by reading and studying reference books that relate to the problems studied to get the information needed, used as a theoretical foundation in carrying out research and report writing.

3.1. Analyse Current Process
After the data collection process is done through several techniques, the existing data will be processed and analysed in order to get a final result that is useful for this research. Furthermore, analyses the reality in the field and is compared with the theory, in the analysis carried out combined with the SWOT method to determine the strategic planning that is used to evaluate the Strengths, Weakness, Opportunities, and Threats. In the system analysis method, there are 5 stages:
1. Conduct research on the current system
2. Analyse information needs
3. Identify information needs
4. Identify database needs
5. Then the results of the analysis are made a report to be included in the proposed database design

3.2. Design Method
In the proposed system design method uses the Unified Modelling Language (UML) design method and the database as its object. Use case diagram is a diagram that captures business needs for the system and to describe the interactions between the system and its environment [13]. In this study, the diagram used in describing this system is only Class Diagram. In this analysis method also includes methods from experts, namely the Ivan Jacobson and Gaudy Booch methods. After including the method, then compare which method is the best that will be used for application development.

4. Result and Discussion
4.1. SWOT Analysis
The SWOT results obtained after conducting interviews and observations are as follows:

| Parameter | Current Process | Proposed |
|-----------|-----------------|----------|
| Strength  | - Reduce Absent Fraud, - Attendance is faster Organized. Stronger supervision | - Having specifications that are more resilient to fraud is absent and more organized against change - Oriented to a problem, must focus on the problem. Create a new system that has the power according to the problem of the previous system. |
| Weakness  | Attendance is not possible if Scribe Magnetic is scratched | - Because it has a layered Class Diagram pattern, there is a possibility that Magnetic Scribe is not connected to the database - This can be included in the problem record. When this happens, users are allowed to do absences using other methods. |
| Opportunity | The data can be used for other units, can be an innovation for other places | - There is uniformity of data in each class and object so that it is faster and easier to access by other units - As long as the attendance data meets the requirements of Class and Object in other units, of course this can be applied. |
| Threat    | - Access to attendance records can still be duplicated, - The system cannot be accessed at any time because the server is down. | - Human resources that are less experienced make the system must be completely overcome with experts in their fields. - A system certainly requires a backup. This can be handled by manual handling. |

Table 1 explains in the SWOT matrix the Goudy Booch method is more about understanding a problem, focusing on the problem. Create a new system that has the power according to the problem of the previous system. So, create a new system to fix the old system so that the new system has no weaknesses and the Goudy Booch theory also has a backup system, so that whenever data is corrupted or lost we have backup data. While the proposal according to Ivar Jacobson is more concerned with the appearance that can capture logical views of the system, because the main concern is the consistency of the logical view of the actual system behaviour and display description in accordance with the user's appearance and appearance with other systems by sketching or prototyping what the user will look at the screen when displaying the use case. Then the SWOT itself illustrates more about the actor's responsibility.
4.2. Current Class Diagram

This section will describe some data dictionaries for the current database used. The SQL Commands that we use are the Data Definition Language (DDL) and DDL types that we use are Create, Alter, Drop, Describe and Rename and for the result in class diagram show on figure 1.

![Current Class Diagram](image)

Figure 1. Current Class Diagram

4.3. Proposed Class Diagram

In object-oriented analysis, this research looks for better models by identifying the classes and objects that make up the problem records, and in object-oriented designs, we find abstractions and mechanisms that provide the behaviour that this model requires. Object-oriented paradigms are useful when building software systems where there are hierarchies that are defined as ranking or order abstractions. The proposed UML specification does not define a standard process but is intended to be useful for the iterative development process. This is intended to support most existing object-oriented development processes. The Ivar Jacobson model design will refine the analysis model and will adjust to the implementation environment so that the appearance of objects and semantic operations are
defined and decisions can be made for the Database Management System. Blocks are introduced for object types to hide from actual implementations, the comparison methods show on figure 2 and figure 3.

**Figure 2. Results of Class Diagram Ivar Jacobson Method**

Figure 2 Ivan Jacobson's method showing of display must be able to capture the logical view of the system, because the main concern is the consistency of logical view of the actual system behaviour and display descriptions in accordance with the user's appearance and appearance with other systems by sketching or prototyping what the user will see on the screen when displaying the use case and is very important if the user is involved in the details of making a display description.
Figure 3. Results of Class Diagram Application Gaudy Booch Method

in figure 3, the results obtained in class diagram notation, taken from the problem of academic information systems. This diagram only explains a small part of the academic information system class structure. Here we see the class "Mahasiswa" and "Dosen", which includes sub attributes named "Alamat" in "Mahasiswa" and "Alamat" in "Dosen" class. This diagram also shows, the class "Sistem Informasi Akademik" is an aggregate, which contains the classes "Mahasiswa", "Dosen", "Mata Kuliah" and "Ruang". The "Alamat" in "Dosen" and "Alamat" in "Mahasiswa" class as a turn are abstract subclasses. Then from the results of the SWOT and Class Diagram analysis described in the results, here we propose improvements for development of the database. These improvements are in the form of class diagrams used. The results obtained prefer the theory of Ivar Jacobson, because it shows more how actors from class diagrams lead to Object Oriented Software Engineering which has advantages that are easy to learn and have simpler notation. For SWOT analysis based on Ivar Jacobson, it describes more about the actor's responsibility because the main concern is the consistency of the logical view of the actual system behaviour and display description in accordance with the user display and display with other systems.

5. Summary
From the results of these comparisons it was concluded that the method of Ivar Jacobson was better, because it more illustrates how the actor's responsibility is because the main concern is the consistency of the logical view of the actual system behaviour and display description in accordance with the user display and display with other systems, then the class the diagram in the database proposed on the class diagram description object is from Ivar Jacobson, because it shows more about how actors from class diagrams point to OOSE (Object Oriented Software Engineering) which has advantages that are easy to learn and have simpler notation.

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