Student Data Management Information System Using the Zachman Framework

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Abstract. The purpose of this study is to find out student data management quickly and accurately which can produce information systems for use by schools, students, and stakeholders related to student data management. In the case of improper student data management, it can cause errors in decision making such as payments, student attendance and progress assessment to students. Method used in this study was qualitative technique and literature studies. Interview was conducted to support data analysis. The result showed that Zachman framework able to overcome the existing information system problems. With many perspectives on the Zachman architecture method in this study is expected to provide a significant solution for managing student data management in schools by preparing an integrated system in managing student data and developing data in the future.

1. Introduction
With the development of information technology in the current era, information technology supports all fields, one of which is in the field of education. At present education also requires information technology that is fast and accurate to improve services in organizations. At schools or other educational institutions is very important in managing student data. Because research institutions, it is necessary to develop and meet data management needs [1]. To realize these business objectives, organizations must use the role of IT as a support in accordance with the goals and objectives of the organization [2]. Therefore, proper and planned student data management can help leadership decisions in a variety of policies. Zachman Framework is expected to help manage student data about these problems. Religious multicultural education has major problems, especially in Indonesia, because in its implementation it takes deep thought and its implementation to develop good resources [3].

Madrasa School is an institution engaged in the field of education which adds moral values to Islam. In practice it really depends on the application of the role of technology. Technological progress is expected to be utilized by schools in managing student data management that can be used for the future. The internal information system that is currently running has not been effective in managing student data because the system architecture has not been implemented and has not been integrated. The cause of this information system is the lack of student data management plans. In
previous studies have explained how the role of the Zachman framework in data management can be solution for the needs in the development of information systems but it has not been explained what should be done in data management. The data generated must be in accordance with user requirements, accurate, efficient, and timely from the planner's point of view. In response to the Zachman framework it can reveal the big data technology that will emerge, the various percentages among teachers, and the need to consider how to use technology as a dynamic tool to implement it properly. [4]. That's the picture of Zachman's work in this study.

Management of student data management in schools plays an important role in achieving student success in academic and non-academic learning. Good data management in school organizations is the desire of many organizations. To achieve this, the selection of strategies in planning data governance is needed so that data is more accurate. A good system development must have several components such as defining business architecture, data architecture, applications to be built and information system technology that can support the course of activities in data management. The purpose of this research is how to develop student data management systems to be faster, more efficient, and accurate for use in schools, the methodology to be used to support them all uses the Zachman framework. Zachman Framework is one method to create a design model that can help all management to help manage student data correctly, quickly, efficiently, and accurately in various perspectives.

A. Information System
The system is an interconnected tool to form something intact and integrated with each other. Work systems that have procedures and relationships related to certain activities. The purpose of the information system is to produce information that can be used by the recipient of the system. Information systems for users must be easy to operate and attractive so that users do not feel bored [5].

B. Data Management
Data management is a source of accurate and safe information for all activities. Activities commonly carried out in data management that contain data, data storage, data security, organization and data retrieval. Data management also provides other useful functions that are more specific. the ability of data analysis as a means to improve the ability to store information [6]. Such as providing accurate data and time, controlling information that is controlled and has standard equipment and procedures. In addition, the data must also have effectiveness in its management [7].

Data has a selection purpose so that it can be chosen according to the needs of users and data owners. In managing data there are several steps that need to be taken to manage, some things that must be done in the data process are editing, coding, tabulating data. This needs to be stored so that the managed data can be categorized as needed. Technological advances and increased data volume have led to new tools and techniques to exploit data and improve decision making [8].

C. Zachman Framework
Technology development that has architecture can provide an overview of the elements in an organization. This study proposes a modeling approach that is driven by business processes for corporate integration using the Zachman framework as a guideline for integration modeling [9]. In its development, Zachman is widely used to develop and document architecture in an organization. Based
on this, the author uses Zachman’s theory to design data management that can be explained by the owner who provides his perspective.

The Zachman framework has six perspectives or views: Planners, Owners, Designers, Makers, Subcontractors, and Users. The second dimension of the Zachman Framework addresses six basic questions: what, how, where, who, when and why [10]. The Table 1 below shows some perspectives on Zachman columns and rows that can be used according to needs and functions. In Table 1, it is explained that the Zachman Framework has a $6 \times 6$ matrix that represents the two-column two-dimensional system architecture classification scheme (Table 1).

### Table 1 Zachman Framework

| What (Data)       | How (Function)   | Where (Network) | Who (People) | When (Time) | Why (Motivation) |
|-------------------|------------------|-----------------|--------------|-------------|------------------|
| Scope (Planner, Designer) | Things important to business | List of processes the business performs | List of locations where the business operates | List of organizational units | List of events significations the business | List of business goals/strategies |
| Enterprise Model (Owner, Designer) | Semantic model | Business process model | Business logical model | Organization chart, role, skill | Master schedule | Business plan |
| System Model (Designer) | Logical data model | Application architecture | Distributed system architecture | Human interface architecture | Processing structure | Business rule model |
| Technology model (Physical) | Physical data model | System design | Technology system architecture | Presentation architecture | Control structure | Rule design |
| Detailed Representations | Data definition | Program | Network architecture | Security architecture | Timing definition | Rule specification |

#### 2. Methods

In the research methodology used is to use the Zachman Framework as a design tool to create an architectural model based on this information system because of the framework Zachman's work can evaluate the previous system which is still manual in managing student data. By analyzing the needs needed in business processes. The part of the Zachman framework that is used is row 1 for columns 1, 2, and 3. In general it can be explained that the Zachman framework can be used to manage student data into an information system that can help schools manage data so that the results can be used in various needs such as attendance, student grades etc.

In Table 2 shows how the Zachman framework function in this research process is implemented using 1 row 3 column. The basic of this research is how the owner's perspective will describe how a system will be built and developed based on existing business management in school.
Table 2. Zachman Framework Architecture

| What Data | How Function | Where Network | Who People | When Time | Why Motivation |
|-----------|--------------|---------------|------------|-----------|---------------|
| Data:     | Activity diagram | a. Subject teachers | b. Homeroom teacher | c. Curriculum | d. Headmaster | e. Administration |
| scope     | a. log in | X | X | X |
| Role: planner | b. student scores | c. student attendance | d. Student data | |

With the Zachman method in the table above it is hoped that student data management can improve the quality of education by the existence of an updated system of student data management that is accurate, safe and minimizes human errors before implementing the system.

3. Results and Discussion
In order to produce a system of information that is needed clearly, mapping on the system must be based on problems that are in accordance with the proposed system. Among the solutions offered by Zachman's framework in this study involved the perspective of the planner, including the use of his columns, namely:

A. Data (What)
Based on the column from the side of the planner will explain the data related to making the application. In Table 3 discussed some candidate data that will be used in the implementation of student data management architecture based on the needs of the business scenario of the planner. The conditions are as follows:

Table 3 Data Table

| Data       | Information                        |
|------------|------------------------------------|
| D_login    | this data will be used as a        |
| D_name     | requirement in the proposed system |
| D_Curriculum | system                           |
| D_homeroomt |                                    |
| D_hd       |                                    |
| D_ad       |                                    |

Based on the data scenario in the table above of the proposed system, the expected data are the level of accuracy, timeliness and integration.

B. Function (How)
In this process Zachman will define how the system to be proposed, becomes interrelated into a system that will be integrated with other systems with data storage in a database. In Figure 1 is a process from the perspective of the function of the column planner, the picture can be seen how the process of storing data in the system and database (Figure 1).
Figure 1. Data storage process

In the figure 1 above, it can be seen how the relation of actors in the proposed system is processed and then the data is entered in the database

C. Network (Where)
In Table 4 shows the location that will be used by the user after the proposed system can be implemented. Some of the user lists described in table 4 are proposed systems that will be proposed from the perspective of the planner. In this research perspective planners play an important role in the system to be proposed, but in implementation there must be some other perspective roles to be able to perfect a good system.

| Location  | User List        |
|-----------|------------------|
| School    | a. Student       |
|           | b. Teacher       |
|           | c. Curriculum    |
|           | d. Headmaster    |
|           | e. Administration|

4. Conclusion
In completing the proposed information system using Zachman, in applying this method there are several perspective columns that can explain in full the columns and rows used in various aspects to manage student data that can be used as a solution for problematic information systems so that data processing can be used by schools and related parties

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