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Website-Based Academic Information System Design At Ma Bumi Persada Reviewed From The Designer Perspective Treasury Enterprise Architecture Framework (TEAF)

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Abstract
This study aims to design a website-based Academic Information System at MA Bumi Persada by considering the designer's point of view using the Treasury Enterprise Architecture Framework (TEAF). TEAF was chosen as the framework because it provides comprehensive guidance for designing an integrated and efficient information system. The research method used is a literature study to understand the TEAF design principles and analyze the needs of an academic information system. Furthermore, a design analysis was carried out involving the identification of business processes, data structures, and user interfaces. The results of the analysis are the basis for designing an academic information system that is in accordance with the needs of MA Bumi Persada. At the design stage, the main focus is to create a structured system architecture that can be easily integrated. The user interface design is carried out by considering the optimal user experience. The application of web technology as a system base provides freedom of access and openness of information. This research is expected to contribute to improving operational efficiency and accessibility of information at MA Bumi Persada. The designed academic information system is expected to be able to support various academic activities, ranging from student management, scheduling, to reporting learning outcomes. With the application of TEAF, it is hoped that this information system can be scalable, flexible, and can develop in line with the needs of MA Bumi Persada in the future.

Keywords: System Design, Designer Perspective, TEAF

INTRODUCTION

The rapid development of information technology has brought significant changes in various aspects of life, including the education sector. In this digital era, the need for operational efficiency and better information management has become increasingly urgent. Educational institutions, such as Madrasah Aliyah (MA) Bumi Persada, face challenges in keeping up with these technological advancements to support academic, administrative, and educational services comprehensively. One solution that can be implemented is the development of an integrated and innovative academic information system.

An academic information system is not only aimed at improving efficiency in data management but also plays a crucial role in supporting better decision-making, enhancing service quality for students, teachers, and parents, and strengthening institutional transparency and accountability. However, designing and developing an academic information system is not a simple task. It requires a well-thought-out and structured approach that takes into account the overall needs and objectives of the institution.

From a designer’s perspective, system design holds a key role in ensuring that the solutions created truly align with the users’ needs. This perspective emphasizes the importance of a deep understanding of user requirements, including students, teachers, and administrative staff, while also considering aesthetic aspects and the system's long-term sustainability. In this context, the *Treasury Enterprise Architecture Framework* (TEAF) becomes a highly relevant approach.

TEAF provides a comprehensive framework for designing information systems by considering various aspects, from organizational structure and operational functions to the technologies employed. By leveraging TEAF, the development of an academic information system

can be approached holistically, ensuring better integration between various system components. This is expected not only to improve operational efficiency but also to provide a better user experience.

For MA Bumi Persada, developing an academic information system based on TEAF is a strategic step in addressing the challenges of the digital era. This system is expected to optimize the management of academic data, such as grades, attendance, class schedules, and other administrative tasks, thereby supporting the educational process more effectively and efficiently. Moreover, the implementation of this information system can also strengthen MA Bumi Persada's position as an educational institution that is adaptive to change and oriented towards quality improvement.

The importance of designing a comprehensive and structured academic information system cannot be overlooked. Such a system will provide broad positive impacts, ranging from improving service quality for all stakeholders to aligning the institution's vision and mission with its operational practices. Therefore, this study aims to explore and design an academic information system at MA Bumi Persada using a Designer Perspective approach that prioritizes user needs and implements the principles outlined in TEAF.

The development of information technology and the need for operational efficiency encourage educational institutions, such as Madrasah Aliyah (MA) Bumi Persada, to adopt an integrated and innovative academic information system. Designing an information system is a crucial step in supporting the success of operations and information management in the education environment.From a designer's perspective, the system design approach is an important factor in creating solutions that are in accordance with the needs and objectives of the institution[1]. The emphasis on the Designer Perspective demands a deep understanding of user needs, aesthetic aspects, and system sustainability. Therefore, the use of the Treasury Enterprise Architecture Framework (TEAF) is a rational choice in supporting the design of academic information systems.

TEAF provides a solid foundation in presenting a holistic view of system design, including structural, functional, and technological aspects. By embracing the Designer Perspective and utilizing TEAF, it is expected that the design of academic information systems at MA Bumi Persada can achieve an optimal level of integration and efficiency.The importance of designing a comprehensive and structured academic information system will have a positive impact on data management, improving service quality, and providing clarity of institutional vision. Therefore, this study will explore and detail the design of an academic information system at MA Bumi Persada by prioritizing the Designer Perspective and implementing the principles of TEAF.

RESEARCH METHODS

MA Bumi Persada is a Senior High School level institution under the auspices of the Ministry of Religion. MA Bumi Persada has 1 major, namely Social Sciences (IPS) with a total of 3 classes with a total of 73 students at the end of 2023. And to support its vision and mission, MA Bumi Persada will build a website-based Academic Information System. In EA modeling reviewed from the TEAF designer perspective, it is focused on modeling related to the core of the school, namely the academic field, so that academic activities and all Information Technology needs to support these academic activities will be modeled. Academic Information System with actors in the Academic Administration Field, Student Affairs Field, General and Financial Field, and Head of IT Affairs who are important parts in this EA modeling.

Method

This research method adopts Design Science Research Methodology (DSRM). DSRM is a system of principles, practices, and procedures applied in the branch of design science, another side of information systems research. DSRM is used to create and evaluate IT artifacts to identify problems in organizations. DSRM has 6 stages, namely:

1. Identification of problems and motivation

2. Defining goals and solutions
3. Design and development
4. Demonstration
5. Evaluation
6. Communication

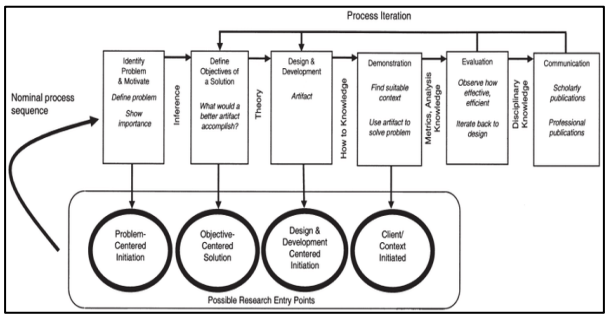

Figure 4. *DSRM* [10]

DSRM, or Design Science Research Methodology, is a research approach used to create and evaluate Information Technology artifacts (IT artifacts) from a designer's perspective. Let's review the functions of DSRM from a TEAF perspective for each stage in the design cycle:

Problem Identification and Motivation

DSRM (Design Science Research Methodology) Helps designers identify existing problems and formulate the motivation behind the development of IT artifacts. Emphasizes understanding problems through observation and analysis.

Defining Goals and Solutions

DSRM (Design Science Research Methodology) Supports designers in formulating the objectives of the IT artifact to be developed and detailing possible solutions. Focuses on designing innovative solutions to solve identified problems.

Design and Development

DSRM (Design Science Research Methodology)Provides guidance on the steps of designing and developing IT artifacts. Encourages designers to create good and practical designs based on related theories and literature.

Demonstration

DSRM (Design Science Research Methodology) Encourages designers to demonstrate and implement the developed IT artifacts. Focuses on implementation and testing aspects to ensure the effectiveness of the solution.

Evaluation

DSRM (Design Science Research Methodology) Places emphasis on evaluating IT artifacts through testing and performance measurement. Involves evaluating design and implementation to ensure that artifacts meet needs and achieve stated goals.

Communication

DSRM (Design Science Research Methodology) Encourages designers to communicate effectively about the IT artifacts they develop. Communicate research findings and learning from the design process to relevant parties.By using DSRM in a TEAF perspective, designers can ensure that the IT artifact development process runs systematically, from problem identification to evaluation of the final results, taking into account aspects of technology, environment, actors, and frameworks.

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RESULTS AND DISCUSSION

Design of academic information system at MA Bumi Persada based on website reviewed from designer perspective Treasury Enterprise Architecture Framework (TEAF) consists of 4 views and 8 work products.

Functional View

The functional view in the designer perspective contains designs for Business Process, Event Trace Diagrams, and State Charts.

Business Process

This work product explains the mapping of business processes to business functions in academic activities at the College of Health, which can be seen in Table 1.

Table 1. *Business Process*

Process Business \ Data Class	Admin	Principal	Teacher	Homeroom Teacher	Students	Student Data	Assessment	Value Data	Attendance	Attendance Data	Finance	Data type supervisor	Extracurricular	Counseling	Report card
PPDB	X				X						X				
Outgoing and incoming mutations	X	X		X	X	X	X								
Student Data	X	X			X	X									
Value input			X	X	X		X	X							
Student Grades		X	X	X	X		X	X							
Odd Semester Report		X	X	X	X		X	X							X
Even Semester Report		X	X	X	X		X	X							X
Value calculation design			X	X	X		X	X							
Attendance Input			X	X					X	X					
list of meetings			X						X	X					
Attendance List			X	X	X				X	X					
Daily Reports			X	X					X	X					
Monthly reports			X	X					X	X					
Semester Report			X	X					X	X					X
Annual report			X	X					X	X					
Payment History	X				X						X				
Delinquent Transaction Data	X										X				
Spp											X	X			
OSIS											X	X			
Deuteronomy	X										X	X			
Additional Payments	X										X	X			
Payment Report											X				
Extracurricular	X				X	X							X		X
Publications					X										
Counseling:			X		X									X	
Report card		X	X	X	X										X

Table 1 explains the mapping between academic activities and the business functions that handle them. This mapping is done to see the relationship between data classes and the business functions that do it.

Event Trace Diagrams

This work product explains the sequence of activities in the MA Bumi Persada Academic Information System process, as follows: work *product* explains the sequence of activities in the MA Bumi Persada Academic Information System process, as follows:

1) PPDB
2) Mutations Out and in
3) Student data
4) Inputting values
a. Daily Value
b. Skill Value
c. Value of Knowledge
5) Student Grades
6) Odd Semester Report
7) Even Semester Report
8) Recapitulation of values
9) Attendance input
10) meeting list
11) Attendance List

12) Daily Report
13) Monthly report
14) Semester Report
15) Annual report
16) Payment History
17) Overdue Transaction Data
18) SPP
19) Student Council
20) Test
    a. Mid Semester Assessment
    b. End of Semester Assessment
    c. End of Year Assessment
    d. Madrasah Final Exam
21) Additional Payments
22) payment report
23) Extracurricular
24) Publication
25) Counseling
26) Report Card

State Chart

work product explains the state chart for academic activities at the College of Health, which can be seen in Figure 5.

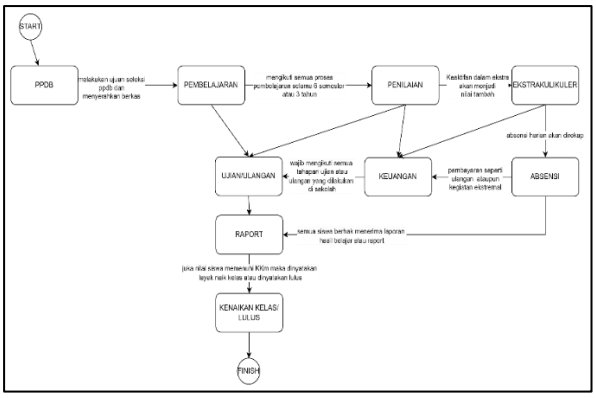

Figure 5. *State Chart of* Academic Activities

State chart describes the sequence of responses from a system or business process to the activities carried out[10]. In this study, it starts from the PPDB process to Graduation, according to the business process and event trace diagram that has been created.

Information View

The information view in the designer perspective contains three *work products* , namely Information *Exchange Matries (Logical)* , Data CRUD *Matrices* , and Logical Data Models.

Information Exchange Matries (Logical)

This work product explains Information Exchange Matrices (Logical) with examples of data exchanged in the Academic Administration Sector in Table 2.

Table 2. *Information exchange matries (Logical)*

Table Name	Field Name	Data Type	Wide
PPDB	+ id_ppdb (pk)	Integer	5
	th track id (fk) receipt		
	admin_id (fk)	Integer	5
	casis_id (fk)	Integer	5
		Integer	5
Prospe	Case_id_(pk)	Integer	5
ctive	Chassis_name	Varchar	255

Studen	Casis_jenkel	Varchar	255
ts	Chassis_tmp_thr	Varchar	255
	chassis_date_Ihr	date	8
	chassis_address	Varchar	255
	chassis_file_pend	Varchar	255
	chassis_status_build	Varchar	255
	casis_parents	Varchar	255
	id_ppdb_(fk)	Varchar	5
	Admin	Integer	5
	id_login_(fk)	Integer	5
Admin	id_admin_(pk)	Integer	5
	admin_name	Varchar	255
	admin	Varchar	255
	admin_Ihr_date	date	8
	admin_address	Varchar	255
	admin_position	Varchar	255
	id_ppdb_(fk)	Integer	5
	id_login_(fk)	Integer	5
	id_out_(fk)	Integer	5
	id_pemb_(fk)	Integer	5
Track	track_id_(pk)	Integer	5
	track_name	Varchar	225
	id_admin_(fk)	Integer	5
	casis_id_(fk)	Integer	5
File	File_id (pk)	Integer	5
	file_name	Varchar	255
Teache	Teacher_id (pk)	Integer	2
r	teacher name	Varchar	255
	jenkel_teacher	Varchar	255
	Teacher's Eid date	date	8
	teacher address	Integer	255

Information Exchange Matries (Logical) describe the exchange of information between nodes and attributes in terms of the quality, quantity, and interoperability of the data required.

CRUD Matrix Data

This work product explains the relationship between system functions and the entities involved, which can be seen in Table 3.

Table 3. *Crud matrices data*

Process Business \ Data Class	Admin	Principal	Teacher	Homeroom Teacher	Students	Student Data	Assessment	Value Data	Attendance	Attendance Data	Finance	Data type supervisor	Extracurricular	Counseling	Report card
PPDB	C				C						C				
Outgoing and incoming mutations	C	R		R	C	R	C								
Student Data	C	R			R	R									
Value input			C	C	R		R	R							
Student Grades		R	R	R	R		C	R							
Odd Semester Report		R	R	R	R		C	R							R
Even Semester Report		R	R	R	R		C	R							R
The recapitulation of the value			R	R	R		C	R							
Input			C	C					R	R					
list of meetings			C						R	R					
Attendance List			R	R	R				C	R					
Daily Reports			R	R					C	R					
Monthly reports			R	R					C	R					
Semester Report			R	R					C	R					R
Annual report			R	R					C	R					
Payment History	R				R						C				
Delinquent Transaction Data	R										C				
SPP											R	C			
OSIS											R	C			
Deuteronomy	C										R	C			
Payment T Additional	R										R	R			
Payment Report											C				
Extracurricular	C				R	R							C		R
Publications					R										
Counseling			C		C									C	C
Report card		R	R	R	R										

This CRUD Matrix data describes all the functions contained in the Academic Information System with the entities that manage it at MA Bumi Persada.

Logical Data Model

This work product describes the data requirements and business process structure rules that are described using the relational schema in the Academic Information System at MA Bumi Persada. In the relational schema, the relation of the table and each attribute contained in the table will be described. In the Academic Information System of MA Bumi Persafa, there are 6 tables that are related to each other.

Organizational View

Organizational view in designer perspective contains Node Connectivity Description (Logical) which explains the building plan at MA Bumi Persada as a place for academic activities and where the Academic Information System is located. This study explains an example of the MA Bumi Persada Building plan.

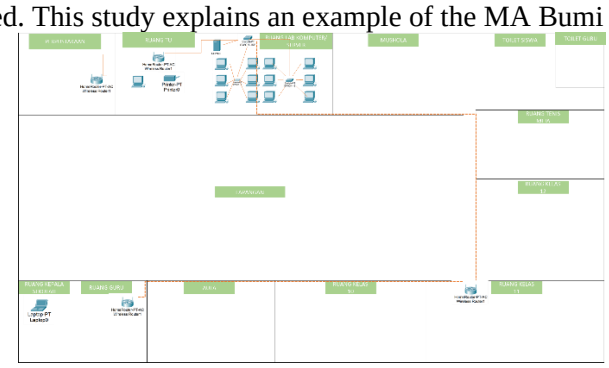

Figure 6. *Connectivity node Description (Logical)*

Infrastructure View

Infrastructure view in designer perspective contains System Interface Description Level 2 & 3 with a depiction of interface components in the form of servers and network topology at MA Bumi Persada in this study illustrates an example of a Backbone network and LAN network topology for Lab Room/Server. and LAN sales to each Wireless Router.

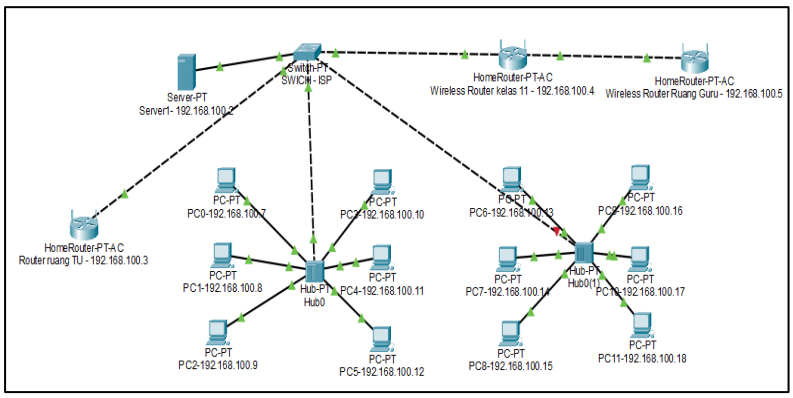

Figure 7. LAN Network Topology

Evaluation

Table 4 is the evaluation result of EA modeling viewed from the TEEAF *designer perspective* that has been carried out with the work products that should be available.

Table 4. Evaluation of Analysis Results

No	*Work product*	Availability
1	***Functional View***	
1.1	*Business Process / System Function Matrix*	Available
1.2	*Event Trace Diagrams*	Available
1.3	*State Chart*	Available
2	***Information View***	
2.1	*Information Exchange Matrix (Logical)*	Available
2.2	*CRUD Matrix Data*	Available
2.3	*Logical Data Model*	Available
3	***Organizational View***	
3.1	*Node Connectivity Description (Logical)*	Available
4	***Infrastructure View***	
4.1	*System Interface Description Levels 2&3*	Available

CONCLUSION

Conclusion of the journal of academic information system design at MA Bumi Persada based on website, reviewed from the designer's perspective using the Treasury Enterprise Architecture Framework (TEAF). The academic information system designed at MA Bumi Persada has successfully accommodated the principles and framework proposed by the Treasury Enterprise Architecture Framework (TEAF). The system design takes into account critical aspects of TEAF such as strategic planning, business architecture, data architecture, application architecture, and technology architecture. Thus, the overall design of the academic information system at MA Bumi Persada based on the website with the designer's perspective using the Treasury Enterprise Architecture Framework (TEAF) can be considered a positive step towards achieving more efficient, integrated, and user-oriented educational goals. Alignment with the principles of TEAF provides a strong foundation for future system development and improvement.

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