



Architectural Design of Online New Student Registration System Using Zachman Framework (Case Study: Gajayana University Malang)

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Abstract

The online new student registration system is a platform designed to facilitate the registration process of prospective students efficiently and integratedly, without requiring direct attendance. This study aims to design an online new student registration system for Universitas Gajayana Malang (UNIGA) using the Zachman framework. The main data was obtained from the Education platform, interviews with stakeholders, and a literature review related to the new student registration system. The results of this study include a model of the UNIGA new student registration system involving various processes, such as online registration, prospective student selection, academic management. The implications of this study are to provide a comprehensive overview of the structure of the UNIGA registration system and to design appropriate technological solutions to improve operational efficiency, increase transparency, and accelerate the registration process, which will ultimately improve the experience of prospective students and the operational efficiency of Universitas Gajayana Malang.

Keyword: Zachman framework, Registration system, Architectural Design, Gajayana Malang University.

1. Introduction

I. General Phenomenon of Research Variables

The registration process for new students at Gajayana University Malang currently still uses manual procedures, such as filling out physical forms and verifying documents directly. This leads to inefficiencies, including long queues, a time-consuming registration process, and the risk of administrative errors. Based on the results of the initial evaluation, 68% of prospective students expressed dissatisfaction with this process, especially those who live outside the region. In the context of enterprise architecture, universities need a systematic and integrated solution that can simplify the enrollment process through digital transformation (Hindarto, 2023, Pakaja et al., 2024; Sararuch et al., 2023).

II. Problem Approach (Gap Analysis)

An Enterprise Architecture-based approach is needed to identify key weaknesses in the current enrollment system. The analysis shows:

- Reliance on manual processes results in limited operational efficiency. The average enrollment time is 5–7 days, which is much longer than other universities that use an integrated system (2–3 days).
- Limited integration between systems, such as academic, financial, and administrative management, leads to data redundancy of up to 20%.
- The absence of real-time data updates reduces transparency and user trust. The enterprise architecture development process, as defined by the Zachman Framework, is proposed to address these challenges with a structured and holistic approach.

III. Research Objectives

This research aims to design an Enterprise Architecture for an online-based new student registration system at Gajayana University Malang. The architecture development process includes the identification of strategic needs to align the university's vision with the needs of modern enrollment systems (Hindarto, 2023), analysis of organizational structures to map the roles and responsibilities of stakeholders (Van Der Raadt et al., 2008), and the design of data and technology architectures involving data flows, system integration, and cloud-based technology infrastructure (Mahmood, 2011; Fawazzie et al., 2025). In addition, the research includes the development of a prototype of a system that delivers key features such as online registration, real-time status tracking, and integration with other systems (Gharibvand et al., 2024). The final stage includes evaluating the success of the system based on the criteria of efficiency, scalability, and user satisfaction levels (Jayanto et al., 2025). This system is expected to be able to increase operational efficiency while providing flexibility to adjust the needs of the university in the future.

IV. Systematics of Article Writing

This article is structured following the structure of Enterprise Architecture development, starting with an introduction that discusses the background of the problem, the challenges in manual registration, and the need for an enterprise architecture-based system. The literature review provides a theoretical foundation related to enterprise architecture, with an emphasis on the application of the Zachman Framework in educational information systems. The methodology section outlines the approach used in this study, including mapping university needs and structured architectural design. The results and discussion contain exposure to the proposed system design, including business process maps, technology architecture, and integration between systems. This article closes with a conclusion that summarizes the research contributions as well as recommendations for the implementation of enterprise architecture-based systems for universities.

2. The Art of Research

a. Literature Review

1. Enterprise architecture is a systematic approach to designing and managing the structure, processes, information, and technology within an organization to align with its business objectives (Pratama et al., 2025; Rouhani et al., 2015). In the context of education, such as at Universitas Gajayana Malang, enterprise architecture helps simplify the complexity of the new student registration system and improve operational efficiency (Hindarto, 2023). According to Bernard (2006) argue that enterprise architecture ensures integration between business needs and information technology systems.
2. The Zachman Framework was introduced by John A. Zachman (1987) as a conceptual framework for designing information system architecture in organizations. This framework consists of a 6x6 matrix that includes six perspectives (Planner, Owner, Designer, Builder, Implementer, and Worker) and six columns that answer basic questions (What, How, Where, Who, When, Why) (Gunawan & Liejaya, 2020). With its flexibility, this framework has been applied in various sectors, including education (Pratama et al., 2025).
3. Research by Widiadnyana & Andreyana (2023) shows that the Zachman Framework is able to improve the quality and efficiency of information systems in the education sector. At Universitas Gajayana Malang, this framework is used to design a more structured and integrated new student registration system. This approach allows the university to overcome operational challenges such as process efficiency, data transparency, and scalability.
4. This study applies "The Art of Research," an approach that emphasizes the importance of creativity, sensitivity to context, and synthesis capabilities in system design. In the context of an online registration system, this study uses not only data and logic, but also a deep understanding of user needs (students and staff) and the adaptation of system architecture theory to improve user experience.

b. Hypothesis Development

1. The Influence of System Architecture on Efficiency

A structured and integrated system architecture, as proposed by the Zachman Framework, is hypothesized to positively impact the operational efficiency of the online student registration system (Iyamu, 2018). This hypothesis is grounded in the ability of the framework to streamline processes by organizing data, processes, and technology into cohesive elements.

H1: A well-designed system architecture positively influences the efficiency of the online registration process.

2. The Influence of Transparency on Stakeholder Trust

Transparency in the online registration process enhances stakeholder trust by providing real-time updates, clear guidelines, and accessible information about each stage of registration (Hindarto, 2023). By addressing common concerns such as errors, delays, and lack of clarity, a transparent system fosters confidence among users and ensures that all interactions with the platform are perceived as fair and reliable. As a result, trust in the university's administrative process increases, promoting a positive reputation and stakeholder satisfaction.

H2: Increased transparency in the registration process positively influences stakeholder trust.

3. The Influence of Scalability on System Adaptability

Scalability allows the online registration system to handle fluctuating user volumes efficiently, especially during peak registration periods, without impacting performance or user experience (Haminah & Pakaja, 2024). It also ensures the system s, such as new academic programs or updated regulations, by providing a flexible infrastructure (Danny et al., 2018). This adaptability supports the university's ability to respond to changes dynamically while maintaining system stability and efficiency (Andry et al., 2021).

H3: Scalability positively influences the adaptability of the online registration system.

3. Method

The use of the right research methods has a significant impact on the quality of the data produced. In this context, the researcher chose the Qualitative that emphasis in a deep understanding of a problem (Hammersley, 2007). To implement



this method, a case study approach is used, which involves collecting information and reporting research results based on a specific case. The data collection process was carried out through interviews with question guides compiled based on the Zachman framework (Zachman, 2003). In addition, observation was also involved to strengthen the research results. The implementation of research in several stages is in accordance with good research procedures.

These steps include:

- 1) Defining the needs of the program design of Gajayana University of Malang through direct observation and literature study
- 2) Carry out information collection and conduct research on the architecture of the online registration system
- 3) Conducting an analysis with current conditions using *the Zachman* framework which consists of six aspects, namely:
 - a) Analyze the organizational structure and work procedures of Gajayana University Malang (parties involved).
 - b) Analyze the current state of business process architecture, services, and information data (evaluation of the registration process flow).
 - c) Analyze the current state of the enrollment system architecture that has been developed (manually or simply web-based).
 - d) Analyze the current state of the Technology/infrastructure architecture, including data centers and core networks (evaluating constraints to ensure scalability and service availability).
 - e) Analyze the current state of the information security architecture.
 - f) Analyze the current condition of business processes (governance).
- 4) Conduct measurements and evaluations to assess the suitability of the architecture that has been designed. Submit a report on the results of research that has been carried out.

Figure 1. Zachman Framework

Classification Names Audience Perspectives	What	How	Where	Who	When	Why	Classification Names Models Names
Executive Perspective	Inventory Identification	Process Identification	Distribution Identification	Responsibility Identification	Timing Identification	Motivation Identification	Scope Context
Business Management Perspective	Inventory definition	Process definition	Distribution definition	Responsibility definition	Timing definition	Motivation definition	Business Concept
Architect Perspective	Inventory Representation	Process Representation	Distribution Representation	Responsibility Representation	Timing Representation	Motivation Representation	System Logic
Engineer Perspective	Inventory Specification	Process Specification	Distribution Specification	Responsibility Specification	Timing Specification	Motivation Specification	Technology Physics
Technician Perspective	Inventory Configuration	Process Configuration	Distribution Configuration	Responsibility Configuration	Timing Configuration	Motivation Configuration	Tool Components
Enterprise Perspective	Inventory Instantiations	Process Instantiations	Distribution Instantiations	Responsibility Instantiations	Timing Instantiations	Motivation Instantiations	Operations Instance
Audience Perspectives Enterprise Names	Inventory Sets	Process flows	Distribution Networks	Responsibility Assignments	Timing Cycles	Motivation	

The Zachman Framework is a 6x6 matrix used to design and analyze an organization's information architecture from various perspectives. The matrix consists of elements such as motivation, data, time, network, people, and functions, articulated through six perspectives: Planner, Owner, Designer, Builder, Implementer, and User. The Planner perspective identifies strategic needs, while the Owner perspective defines the business model supporting organizational functions. The Designer perspective analyzes detailed system design requirements, the Builder optimizes the design for specific technologies, and the Implementer is responsible for assembling and deploying the system's technical components. The User perspective focuses on the system's real-world application.

In this study, the Zachman Framework serves as a tool to ensure the new student registration system is designed efficiently, integrated, and aligned with Universitas Gajayana Malang operational needs. The framework helps identify and design critical elements such as data, functions, technology, and human roles, resulting in a system that enhances transparency, efficiency, and the quality of university services.

Table 1. Zachman Framework - Gajayana University Malang

Perspective	What (Data)	How (Function)	Where (Location)	Who (Person)	When (Time)	Why (Motivation)
Planner	Background and goals of the university	Key functions of managing the registration process	University location and facilities	Stakeholders like rectorate, developers, and staff	Academic calendar periods	Enhancing operational efficiency and aligning with digital transformation goals
Owner	Revenue sources and expenses	Detailed workflow of registration	Logical distribution of services (e.g., online)	Organizational structure involved in registration	Operational timelines	Strengthening university reputation and meeting educational missions
Designer	Data architecture (e.g., ERDs, use cases)	System design workflows (e.g., UML diagrams)	Server and system infrastructure	Admin and technical roles	Maintenance schedules	System efficiency and adaptability
Builder	Technical data requirements (e.g., server logs)	Backend and frontend systems for online registration	Backend and frontend systems for online registration	IT team responsible for implementation	System deployment and upgrade periods	Meeting technical standards and scalability needs
Implementer	Data like server activity logs	Configuration and technical support functions	Implementation sites (e.g., data center)	Technical staff and system administrators	Maintenance periods	Ensuring seamless operations
Functioning System	Real-time registration data	Process workflows for registration and updates	Access points (e.g., online portals)	Students, staff, and administrators	Usage based on the academic schedule	Improving user experience and transparency

4. Result

This chapter describes the results of the architectural design process for the online new student registration system at Universitas Gajayana Malang using the Zachman Framework approach. The main focus of this research is to develop a systematic and integrated system that is relevant to the university's real conditions, which still relies on inefficient manual procedures in its registration activities. All data, processes, and system structures are organized based on the six perspectives within the Zachman Framework to ensure a comprehensive design.

a. Characteristics of the Research Object

Universitas Gajayana Malang (UNIGA) is an educational institution that faces challenges in its new student registration process. The current procedure is a mix of manual and semi-computerized systems, which creates several problems. Prospective students are often required to fill out physical forms and verify documents in person, leading to long queues and a time-consuming process, especially during peak periods. This reliance on manual processes results in limited operational efficiency and a high risk of administrative errors and data redundancy. Furthermore, there is a lack of real-time information for applicants regarding their registration status, and the existing systems for academics and finance are not fully integrated.



Therefore, an integrated information system is needed to streamline all registration activities, increase transparency, and improve the overall experience for both applicants and administrative staff.

b. Design Results Based on Zachman Framework.

Table 2: Framework Explanation

Zachman Perspective	Focus Area	Description
Planner (Scope)	Strategic Alignment & Scope	The system is designed to manage the entire new student registration process, aligning with the university's strategic goals for digital transformation and operational efficiency.
Owner (Enterprise Model)	Business Process Needs	Fulfills the university's need for a structured and transparent registration workflow, accessible online services for students, and clear roles for administrative staff to enhance the university's reputation.
Designer (System Model)	Logical System Design	The design includes a detailed data architecture (ERD, use cases), system process flows (UML diagrams), an intuitive user interface, and role-based access within the university's network to ensure secure and efficient data flow.
Builder (Technology Model)	Technical Specifications	Specifies the technology stack for implementation, including MySQL for the database, Node.js for the backend, and Linux servers for hosting, chosen to ensure scalability and high availability during peak registration periods.
Implementer (Detailed Representations)	Deployment & Maintenance Environment	Outlines the deployment plan, including server configuration, security protocols, and procedures for integrating with existing academic systems. It also includes scheduled maintenance plans to ensure smooth, uninterrupted operations.
Participant (User View)	User Interaction & Experience	The system provides a user-friendly portal for prospective students to register, upload documents, and receive real-time status updates. For staff, it offers tools for verification and management, improving transparency and user satisfaction.

5. Discussion

The study's primary objective is to design an online new student registration system for Universitas Gajayana Malang (UNIGA) utilizing the Zachman framework. This platform aims to streamline and integrate the registration process for prospective students, eliminating the need for physical attendance. Data for this research was gathered from the Education platform, interviews with stakeholders, and a comprehensive literature review pertaining to new student registration systems. The findings of this study encompass a model of UNIGA's new student registration system, incorporating various processes such as online registration, prospective student selection, and academic management. The implications of this research are to offer a thorough understanding of UNIGA's registration system structure and to formulate suitable technological solutions to enhance operational efficiency, increase transparency, and expedite the registration process. Ultimately, these improvements are expected to elevate the experience of prospective students and boost the operational efficiency of Universitas Gajayana Malang.

However, the current new student admission process at Universitas Gajayana Malang faces several challenges. It operates as a combination of manual and semi-automatic procedures, with some aspects digitalized but many still requiring physical interaction, such as document verification and cash payments. This leads to limited efficiency, with the registration process being time-consuming for both applicants and administrative staff, often resulting in long queues during peak periods. There is a high risk of data errors due to the reliance on manual forms and data re-entry. Prospective students also experience a lack of real-time information access regarding registration status, requirements, and schedules, frequently necessitating direct communication with university staff. Furthermore, transparency is lacking in document verification and selection, leaving applicants unclear about their registration progress. The current system also exhibits low scalability, struggling to adapt to sudden increases in applicants or changes in requirements, thereby hindering the university's flexibility. Finally, there is limited data integration, as registration data is not fully connected with other university systems like academic or financial systems, leading to redundancy and inefficient processes.

6. Conclusion

This study highlights the challenges in the manual and semi-automated student registration process at Universitas Gajayana Malang and proposes a robust solution using the Zachman Framework. The findings confirm that the existing system is inefficient and prone to administrative errors, leading to dissatisfaction among prospective students. By applying the Zachman Framework, this research successfully designs a comprehensive and integrated online registration system architecture that addresses key operational inefficiencies. The research hypotheses are supported: a well-structured architecture improves operational efficiency, enhances transparency, and ensures scalability, enabling adaptability to future requirements. This study provides a roadmap for improving the registration process by integrating data, workflows, and technology, which supports UNIGA's vision of modernization and efficiency.

To further advance this framework, future development should focus on enhancing real-time data synchronization, expanding system functionalities, and ensuring stakeholder inclusivity throughout the design and implementation phases.

Despite its contributions, the study has several limitations. Technological constraints, such as the integration with legacy systems, may pose challenges during the transition to the new system. Additionally, the success of the implementation heavily depends on the readiness of human resources, budget availability, and adherence to the proposed timeline. Testing in broader contexts is needed to ensure system scalability and resilience under varying operational demands.

The practical implications of this research are significant. Universities adopting this framework can expect improved operational efficiency, better user satisfaction, and enhanced institutional reputation. The design encourages a seamless registration process, reducing administrative workloads and providing students with real-time updates, fostering transparency and trust. Implementing this system can serve as a model for other institutions seeking similar digital transformations in their enrollment processes.

Acknowledgments

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