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Online-Based Management of New Student Admission Selection for Postgraduate Study Programs at State Islamic Colleges

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Abstract: Colleges are institutions that hold educational accounts. The role and information technology is in the management of human resources and students as the main customers in this education. The new student admissions information system is one of the information methods in higher education governance. Currently, the information technology infrastructure at UIN Sunan Gunung Djati Bandung is not sufficient to develop business process solutions using information systems. The purpose of this study is to create a new student information system architecture model by utilizing TOGAF ADM to describe business functions related to information systems. The design in this study uses the TOGAF model in the form of three parts. The first part is an analysis of the initial state of the organization, which includes Initial phase, requirements management, architectural vision, and business architecture. The second part discusses the enterprise architecture, which consists of two phases: information systems architecture and technology architecture. The third part is to find answers to enterprise architecture problems in the opportunities and solutions phase. The purpose of this research is to develop a strategy to ensure that the information system to be used is adaptable and that all activities related to new students are integrated with the information system. Blueprint vision of the new student admissions information system architecture is the need for a web-based information system. In addition, the blueprint business architecture and information systems architecture produce academic information systems that support the process of introducing new students. The blueprint technology architecture makes the design of the network infrastructure and server technology used. The blueprint of opportunities and solutions produces a solution gap analysis of the current system and an analysis of the results system that will be developed at UIN Sunan Gunung Djati Bandung.

Keywords: Academic Information Systems; Admissions; Enterprise Architecture; Islamic higher education.

Introduction

The management of the selection of new student admissions becomes very important if it is related to the purpose of establishing a postgraduate program in tertiary institutions. The postgraduate program consisting of a master's program (S-2) and a doctoral program (S-3) aims to produce graduates who are not only able to master and develop science and technology, but also become centers of scientific study/research that are recognized nationally and internationally (Tinggi & Hamzah, n.d.)

Based on these considerations, the quality of postgraduate output at the State Islamic Religious Colleges (PTKINs) is largely determined by the quality of the input. Therefore, the input (prospective students) of PTKINs must be selected through a valid and reliable selection system, taking into account the real needs of society and recognition nationally and internationally. The selection of new student admissions must be a means for universities to get the best input. Therefore, it is important to renew the acceptance system for selecting new students at the postgraduate PTKINs, especially when it is related to the quality of learning and student achievement.

Efforts to improve the registration and acceptance of new students in higher education today can use information technology-based architecture. One of them is the use of enterprise architecture methods. There are various methods that can be used in designing enterprise architecture, including the Zachman Framework, the Federal Enterprise Architecture Framework (FEAF), the DoD Architecture Framework (DoDAF), the Treasury Enterprise Architecture Framework (TEAF), and The Open Group Architectural Framework (TOGAF)(Minoli, 2008).

The aim of the practice of admitting new students at PTKIN is to select prospective new students who are academically qualified so that they are able to attend and complete education at PTKIN in accordance with the time limit and applicable regulations. Expanding access to education for Indonesian people regardless of gender, race, ethnicity, social position and level of economic ability. Creating a valid and reliable new PTAIN admissions system that can be accounted for academically and juridically. In this context Entreprise Architecture (EA) is needed.

Enterprise Architecture (EA) is often referred to as the initial planning or design related to a company. Basically EA itself is intended to create a blueprint to optimize the target to be achieved. EA is effective enough to carry out analysis, design, planning, and implementation of a company in order to achieve successful strategy development and implementation/ [19] EA can minimize redundancies (data duplication), complexity, and business risks associated with Information Technology (IT) investments. In doing so, EA provides a blueprint for an effective IT strategy and guides the controlled evolution of IT in a way that delivers business benefits in a cost-effective manner. So using EA will support existing business functions. [19] Meanwhile, several definitions of Enterprise Architecture (EA) are interpreted as a collection of organizations that have a set of goals. From this, Enterprise Architecture can also mean an entire corporation, a government agency, a single department, a corporate division or a chain of interconnected organizations(Thorn, 2007).

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EA provides quite a lot of benefits for an organization. EA enables organizations to comprehensively review Information Technology (IT) status and organizational goals guided by IT. The benefits of EA itself can be grouped into 5 (five) advantages, namely:

Reducing complexity. Complex systems that are difficult to manage can lead to a lot of errors and reduce efficiency. As mentioned above, EA appears as a solution to the complexity of systems in organizations. Therefore, reducing system complexity is one of the biggest expectations of organizations from EA. This simplifies system management with the right tools. EA reduces system complexity by detecting and terminating processes that are not contributing to the target to be achieved.

Standardization. EA helps standardize processes and applications resulting in better stability. Standard processes will increase efficiency while reducing risks that may be encountered. EA can also standardize IT processes and IT infrastructure effectively. Better IT infrastructure will lead to more successful outcomes.

Reducing time. EA saves time for IT staff as it will enable optimization of IT tools and processes. This prevents bigger problems by allowing the cause of the problem to be detected more quickly. Therefore EA will reduce the loss of time and labor caused by certain disruptions.

Cost saving. EA eliminates unprofitable processes. It also includes unnecessary repetitive processes. This results in significant resource and cost savings. In addition, EA saves IT budgets by optimizing IT infrastructure.

Change analysis. EA gives organizations greater agility and adaptability. This means being able to analyze and respond to changes in industry complexity more quickly. IT strategies and processes can be adapted to new models or updated as changes occur(Schelp & Stutz, 2007).

This study seeks to conduct a study on the selection management of new student admissions at online-based Islamic Religious Colleges, especially at PTKINs. This study seeks to describe the model of acceptance of new postgraduate students since the online registration period, a test system with two Computer Based Test (CBT) methods and interviews to obtain qualified prospective students according to established standards.

Literature Review

Information technology architecture is a detailed description of the various information processing assets required to fulfill business objectives, the rules for managing them, and the information related to them. Information technology architecture focuses on the basic levels

in the organization. As an example of information technology architecture can be seen from the organization of the newspaper business, among others:

Servers. Servers are hardware devices that serve to provide basic computing power for the entire organization and are usually located centrally. Server equipment is equipment in the computer room that is used as a starting point for organizing business information.

Middleware. The use of software that is above the server level and provides the necessary infrastructure to keep the hardware running and information flowing. These tools are tools used by information technology (IT) professionals in the information business.

Clients. Basically it is a combination of hardware and software. This level provides capabilities that are accessible to users and enable them to access information available within the business. Combined at this point are things reporters use in the newspaper business (personal computers, printers, applications, and so on).

The Enterprise Architecture Framework defines how to create and use enterprise architectures. The EA framework provides principles and practices for creating and using system architecture descriptions. It provides tools and approaches that help enterprise architects optimize different architectural domains across the enterprise to be integrated. An integrated environment will be responsive to change and support the delivery of business strategy. In this case the architectural domain is listed in 4 (four) interrelated basic specialization areas, namely:

The business architecture defines the business strategy, governance, organization, and key business processes of the organization.

The application architecture provides a blueprint for each system to be used. In addition, the application architecture streamlines the interaction between application systems and their relationship with the organization's core business with a service framework that will be exposed as an integrated business function.

The data architecture describes the logical and physical structure of an organization's data assets and associated data management resources.

The technical architecture describes the hardware, software, and network infrastructure required to support the core deployment.

There are various kinds of paradigms and methods that can be used in designing enterprise architectural frameworks, including Zachman, TOGAF and FEAF (Fauzi & Handoko, 2018).

The Open Group Architecture Framework (TOGAF)

The Open Group Architecture Framework (TOGAF) is the world's valid enterprise architectural framework. In 1995 TOGAF was developed by the Open Group. The TOGAF framework focuses on budgets that enable businesses to plan, design, build, and implement infrastructure with minimal errors. TOGAF is intended to develop Enterprise Architecture, where there is a sufficiently detailed method and tool to apply it. This is what makes TOGAF different from other EA frameworks, such as the Zachman framework (Desfray & Raymond, 2014).

One of the advantages of using the TOGAF framework is that it is flexible and open source. TOGAF provides detailed methods on how to build, manage and implement

enterprise architectures. The core method of the TOGAF framework is called the Architecture Development Method (ADM) (Forda & Kurniawan, 2017).

TOGAF divides enterprise architecture into 4 (four) categories as shown in Figure 1. The four categories include:

Business Architecture

Describes how the business process runs in order to achieve the goals of an organization.

Application Architecture

Describes how a particular application is designed and its interaction patterns with other applications.

Data Architecture

Describes how to manage, store, and access various data in the company.

Technical Architecture

An overview of the hardware and software infrastructure that supports the application and how it interacts. ADM is a generic method that contains a set of activities used in modeling enterprise architecture development. This method can also be used as a guide or tool for planning, designing, developing, and applying information system architectures to organizations(Forda & Kurniawan, 2017).

Fig. 1. Architecture Devopment Method

The stages of TOGAF ADM can be briefly explained as follows:

Architecture Vision

This stage is the stage for agreeing a unified view of the importance of enterprise architecture. This process is carried out to achieve the goals of the organization which are formulated in the form of a strategy and determine the scope of the architecture to be developed. Through this stage questions will be formed that are intended to obtain an ideal architecture.

Business Architecture

This stage will define an initial condition and determine the model or activity of a desired business architecture. The steps center on such things as organizational design, enterprise processes, information flow, business capabilities, and strategic business planning.

Through this phase common tools and methods there are several modeling variants, such as: BPMN, IDEF and UML can be used to build the required model.

Information System Architecture

This stage places more emphasis on information system architecture development activities. Defining the information system architecture in this stage includes data architecture and application architecture that will be used by the organization. Data architecture focuses more on how data is used for the needs of business functions, processes and services. Meanwhile, application architecture places more emphasis on how application needs are planned using the Application Portfolio Catalog, and focuses on the application model to be designed(Ross, 2003). Techniques that can be used include: Application Communication Diagrams, Application and User Location Diagrams and others.

Technology Architecture

This phase is the phase of building the required technology architecture, starting from determining the type of technology candidate required by using the Technology Portfolio Catalog which includes software and hardware. This stage in the process also considers the alternatives needed in the selection of technology(Scheer & Schneider, 2006). The techniques used include Environment and Location Diagrams, Network Computing Diagrams, and others.

Opportunities and Solution

This stage is a phase that puts more emphasis on re-identification than the previous phase (enterprise architecture, business, data, applications, and technology). Through this stage a collaborative pattern is sought between business and IT company stakeholders (Bustos, N.D.). This collaborative effort to assess the readiness of the organization's business transformation, identify opportunities, solutions, and identify all implementation constraints. The key to this phase is focusing on business value, flexibility, coordination and compromise.

Migration Planning

At this stage an assessment will be carried out in determining the migration plan of an information system. Usually at this stage for modeling using an assessment matrix and decisions on the main and supporting needs in the organization for the implementation of information systems.

Implementation Governance

This stage emphasizes how the architecture constrains the implementation project and monitors it as it builds. The focus of this stage is the preparation of a reference regarding the management implementation that has been carried out. Management that has been carried out includes management of information technology (IT), organizational management, and management of architecture. Mapping of these stages can be integrated with the framework created for management from the Information Technology Governance Institute (ITGI).

Architecture Change Management

This stage ensures that changes to the architecture are managed in a controlled manner. The goal of the change management process is to ensure that the architecture achieves its business value targets. Monitoring business growth and decline is an important aspect of this phase. In addition, the company's management architectural process monitors environmental changes and developments in organizational technology. These changes and developments cover both internally and externally, and determine whether the next enterprise architecture development cycle will be carried out.

Methods

Through the architectural modeling described earlier, the study process carried out by the author was carried out through several stages. As for the process that will be taken in the deployment of enterprise architecture model construction in a system that helps various activities at the UIN Sunan Gunung Djati Bandung institution, the authors carry out a series of stages which can be described as a whole as shown in Figure 1.

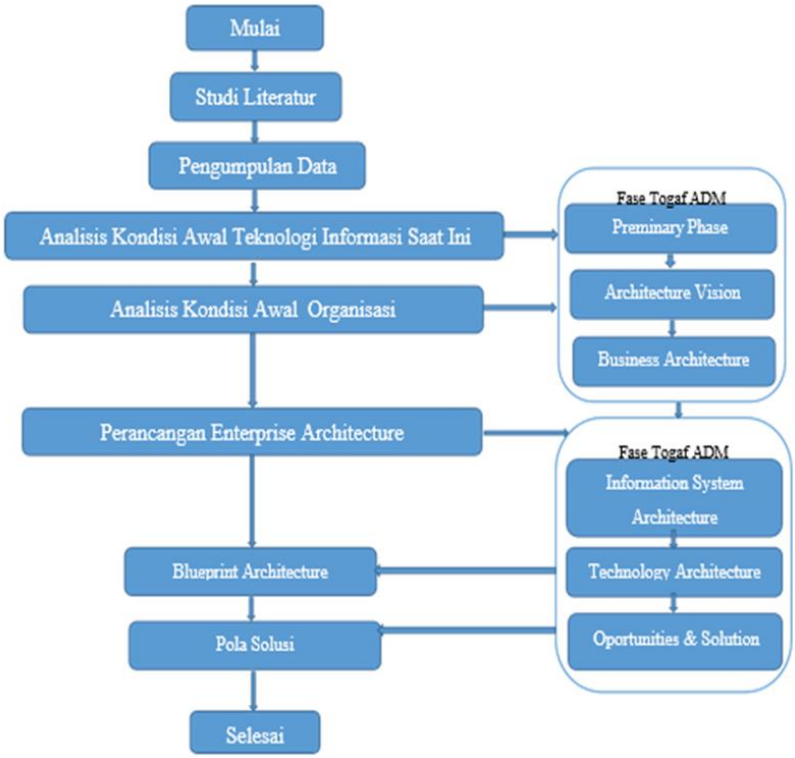

Fig. 2. Research Flow

The enterprise architecture design process starts from the preliminary phase to the TOGAF ADM technology architecture. Analysis of each phase is carried out to obtain a blueprint. Detailed explanation of the stages of enterprise architecture design consisting of the preliminary phase and requirements management in the company as follows:

Preliminary Phase

This stage includes preparatory activities for developing architectural capabilities including TOGAF customization and defining architectural principles. The goal of this phase is to convince everyone involved that this approach is for the success of the architectural process.

Architecture Vision

This phase is the start of the architecture development cycle which includes defining the scope, identifying stakeholders, drafting the architecture vision, and submitting it for approval to start architecture development.

Business Architecture

This phase includes the development of enterprise architecture to support the agreed architectural vision. At this point, common modeling tools and methods can be used to build the required model.

Information System Architecture

This phase is more focused on the development of information system architecture. The definition of information system architecture at this stage includes data architecture and application architecture that will be used by the organization. Data architecture focuses more on how data is used for functional requirements, processes and business services. The technique that can be used is class diagrams.

Technology Architecture

This stage is the stage of building the desired technology architecture, starting from determining the type of technology candidate required by using the Technology Portfolio Catalog which includes software and hardware. In this stage, the alternatives needed in the selection of technology are also considered.

Results and Discussions

The use of Enterprise Architecture (EA) studied in this study can be described in the following phases:

Preliminary Phase

The preliminary stage is the early step in planning the preparation of Enterprise Architecture (EA). This step is carried out to determine how EA is made and implemented. The input stage and the output stage in this step can be observed from Figure 3.

Fig. 3. Preliminary Phase: Input, Process, and Output

In this step input is obtained from important concepts from the Sunan Gunung Djati State Islamic University, Bandung and the system that is currently running. The steps are obtained from the formulation of the problems found at the Sunan Gunung Djati State Islamic University, Bandung, determining the scope and introducing architectural principles. The output stage tested in this step is an Architectural framework and Architectural Principles consisting of business field architecture, information architecture, application architecture and technology architecture that match the wishes of Sunan Gunung Djati State Islamic University, Bandung. This principle describes the character of EA who grew up at the Sunan Gunung Djati State Islamic University, Bandung.

The current system, such as the New Student Admissions Committee, Academic Section staff, and newly appointed students can be seen in Figure 4. This figure shows the process of the new student information system at Sunan Gunung Djati State Islamic University, Bandung.

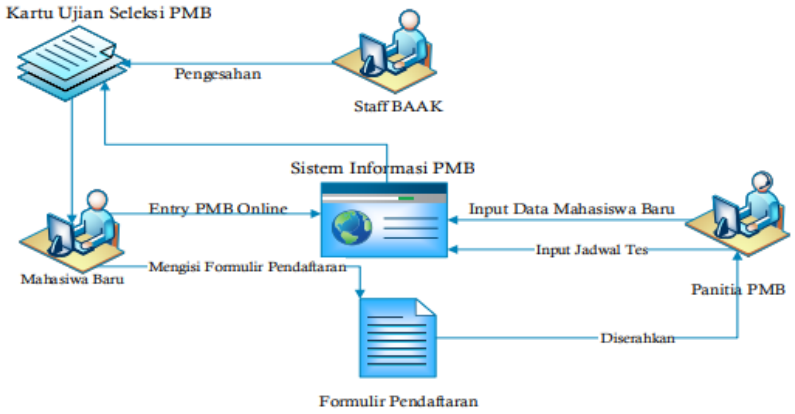

Fig. 4. New Student Admissions Information System

Architecture Vision

The architectural vision of this model can be seen in Figure 5.

Fig. 5. Input, Step, Output Architecture Vision

In the architecture vision phase input is obtained through the organizational history, such as the vision, mission and goals of the organization. Through this stage, the business strategy is then analyzed using SWOT analysis to analyze the internal and external business scope. The steps in this phase then use the identification of related stakeholders and the resulting output is a value chain diagram. The value chain of Sunan Gunung Djati State

Islamic University, Bandung, describes input as a business architecture stage that has two functions, namely the main function and support function.

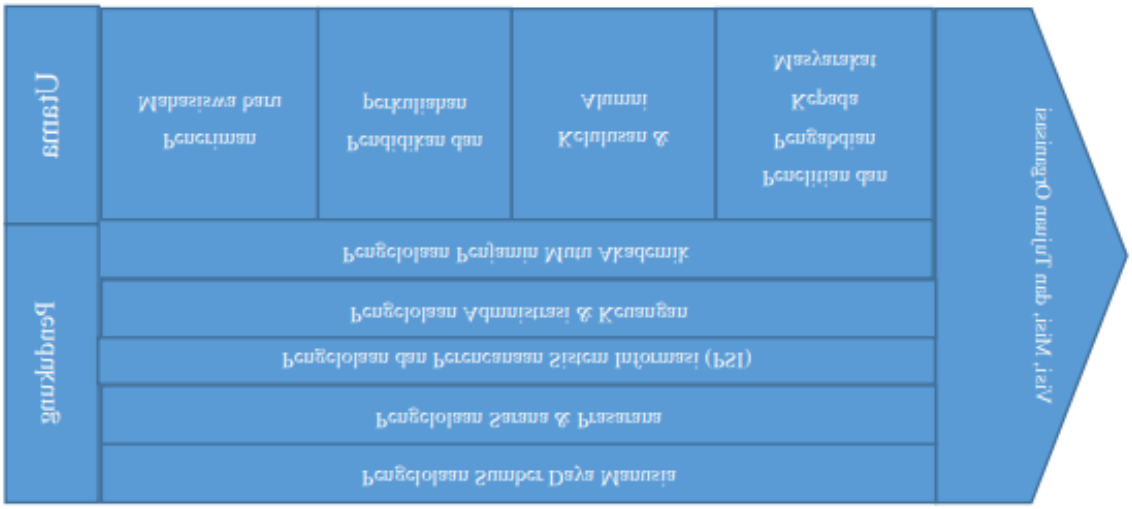

Fig. 6. Value Chain of Sunan Gunung Djati State Islamic University, Bandung

Figure 6 shows the value chain of Sunan Gunung Djati State Islamic University, Bandung, where there are 2 (two) activities, namely the main activity and supporting activities. The main activities consist of several activities, including: Admission of New Students, Education and Lectures, Graduation and Alumni, Research and Community Service.

Enterprise Architecture Design

The Enterprise architecture design was carried out at the Sunan Gunung Djati State Islamic University, Bandung, applying the TOGAF ADM framework. As explained above, the TOGAF ADM framework starts from several stages, namely the stages of business architecture, information system architecture, and technology architecture.

Business Architecture

Services at the State Islamic University of Sunan Gunung Djati, Bandung which were developed are centered on improving student academic services. The service developed is new student acceptance based on enterprise architecture as an enhanced service. This service is inseparable from one of the foundations of compulsory higher education services to carry out New Student Admissions. A good student admissions system is one of the factors that can attract prospective students to continue their education at Sunan Gunung Djati State Islamic University, Bandung. This process can become a business process for the main services of Sunan Gunung Djati State Islamic University, Bandung as can be seen in Figure 7.

Fig. 7. Service Business Process of Sunan Gunung Djati State Islamic University, Bandung

Functional Decomposision Diagram

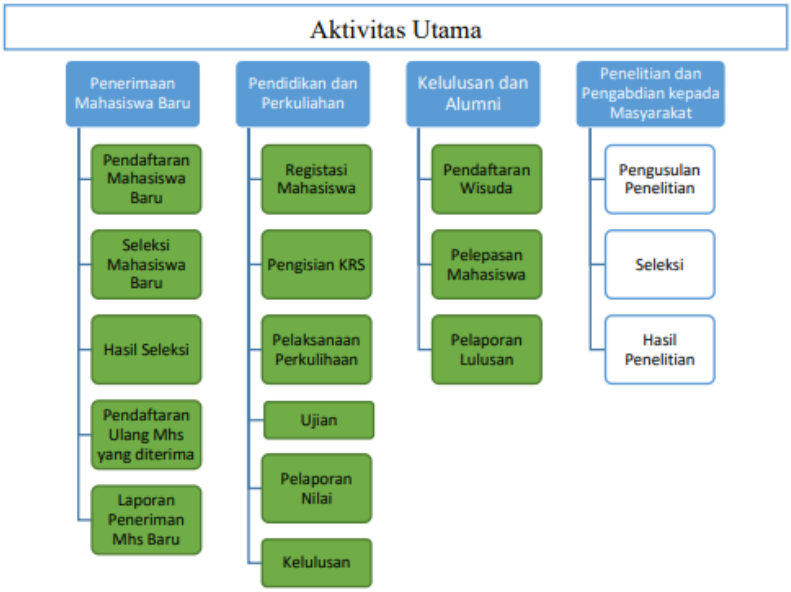

Fig. 8. Functional Decomposision Diagram

Functional Decomposition diagrams describe how the capacities and duties of each division or part of the enterprise (company) are significant to business activities. The diagram patterns the functional aspects of each division of the company. There are 19 functional non-academic and 14 functional academic baseline targets at Sunan Gunung Djati State Islamic University, Bandung.

New Student Admissions business techniques like this place an emphasis on organizing New Student Admissions. This starts from the planning stage (Planning) for New Student Admission, New Student Admission Promotion, until finally prospective students re-register. The results of organizing each new student admissions process can be described in Table 1.

Table 1. Overview of New Student Admission Activities

No	Process	Activity
1	New Student Admission Plan and Promotion	Appointment of the New Student Admission Committee Team Organizing the New Student Admissions Budget New Student Admission Picket Scheduling Promotion Strategy Promotion Strategy Control and Review Promotion Report
2	Entrance Selection	Entrance Selection System Formulation Formulation of Entrance Selection Material

		Registration of Prospective New Students from Entrance Selection Results Organizing Entry Selection Results Announcement of Selection Results Entrance Selection Report
3	New Student Registration	Student Registration Data Collection Provision of student ID numbers Making Student Identity Cards Implementation of Campus Orientation Period Reporting on New Student Admissions

The business activity of implementing higher education in this process emphasizes management of the implementation of higher education which is the main activity at Sunan Gunung Djati State Islamic University, Bandung. This step is mostly held by the academic administration division (Academic Section). The following is the result of classifying the activities of the higher education process.

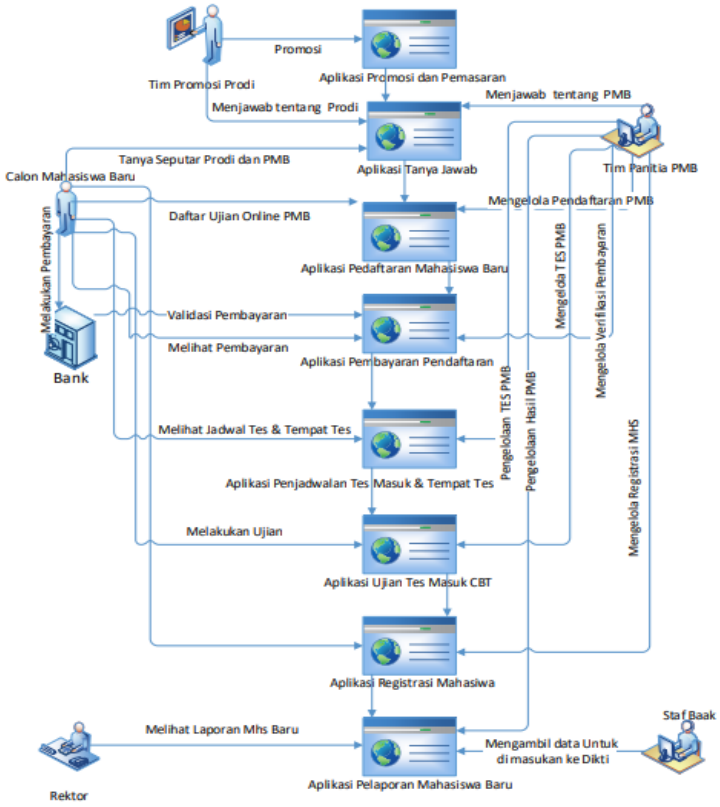

Fig. 9. Architectural Design for Admission of New Students

Figure 9 shows a business architecture scheme at the Sunan Gunung Djati State Islamic University, Bandung, whose system was developed to meet the needs of the academic process. These needs include the New Student Admissions Information System. This system was developed so that the New Student Admissions process is far more accurate, efficient and effective in its organization. This can be seen when the business processes in the New Student Admissions system are related to each other. This relationship describes the relationship between the four subjects, namely prospective students, study program promotion committee team, new student admission committee team, academic staff, and the chancellor.

Fig. 10. New Student Registration Application Business Architecture Design

This application is intended for prospective new students to explore information about enrollment in Higher Education. The information provided is generally regarding the Study Program to be taken by new students. In addition, this system is intended so that new students can explore information that they do not yet know about higher education. Interrelated actors such as prospective students, Study Program Promotion Team, New Student Admission Committee Team will relate to each other in real time within the application (Hicks & Sinkinson, 2011). Meanwhile, the next application business architecture plan is intended for new student registration. The new student registration scheme can be seen in Figure 10.

This application is a continuation of the previous system, which is a system that students can use to obtain information on test schedules and test locations via digital maps (Motiwalla, 2007). This application was created to help prospective new students not have trouble finding a predetermined test location. Meanwhile, the New Student Admissions Committee is the subject that manages determining the schedule and location of the test. The next business architecture design for running the entrance exam test can be seen in the schematic in Figure 11.

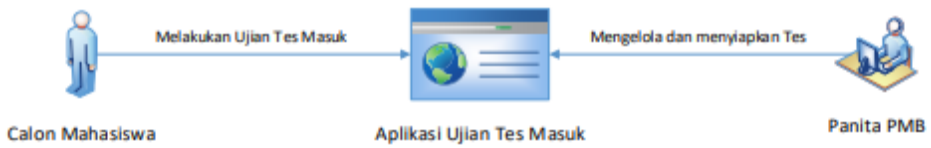

Fig. 11. Entrance Test Application Business Architecture Design

This application is also addressed to prospective students when carrying out the entrance test. The process is carried out through the inclusion of a pin code that has been obtained by prospective new students so that they can enter the exam test system. The New Student Admissions Committee has the right to determine and prepare exam materials that will be taken by prospective new students. Then, after completing the test, prospective new students will wait for the results and be entered into this system and can be accessed anywhere.

Phase C: Information System Architecture

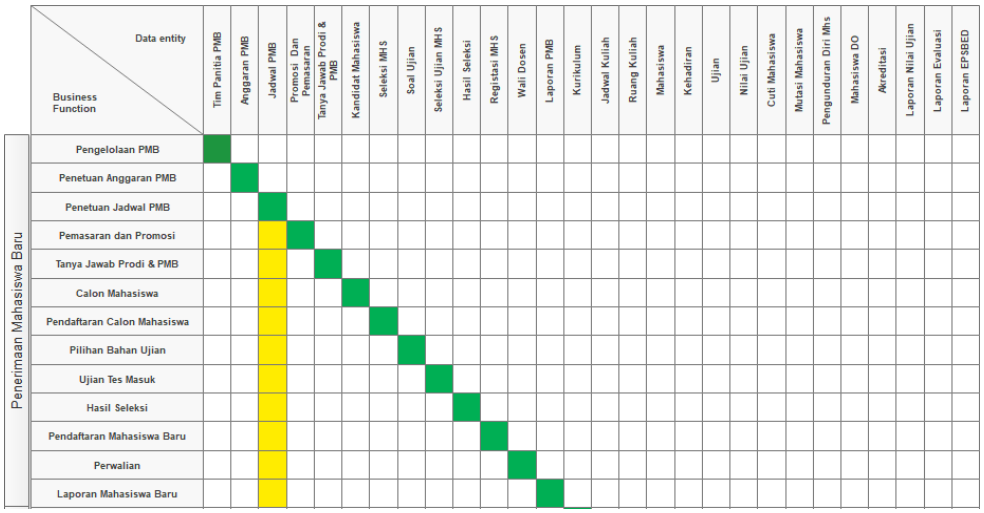

Fig. 12. Relationship Matrix between Data Entities and Business Functions

Figure 12 describes the relationship between the business function and data of newly enrolled student entities and teaching and learning activities. Through it can be described diagonally. The cells colored "Green" become markers that are arranged from “top-right” to “bottom-right” which still stabilizes the consistency of the business organizational function.

Figure 13 describes the relationship between data entities and the business function of admitting new students and teaching and learning activities. Annotated color markers, such as green, are designated as updating, viewing, and creating. Meanwhile, the yellow marker is only limited to describing it as a reference.

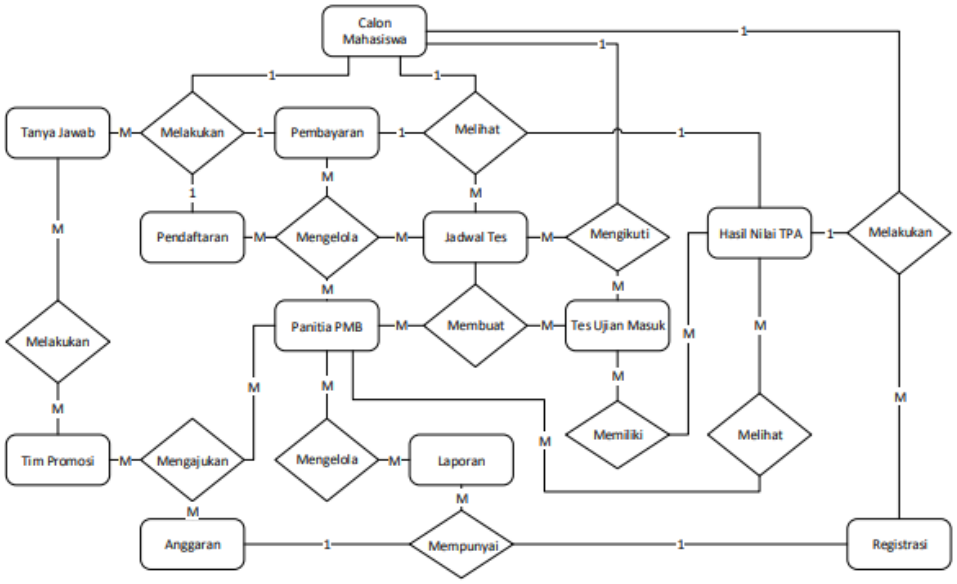

Fig. 13. Entity Relationship Diagram for New Student Admissions

Deployment of data diagrams is intended as a depiction of the relationship between business services, data entities, and application elements. The previous diagram (Figure 13) describes how logical entities are physically realized by application elements. This allows more effective computations to be performed and the information technology footprint can be

refined. In addition, assigning business value to the data will indicate the business criticality of the application elements that can be obtained. Diagrams can also describe data replication and system ownership of the main reference that will be used as data. Through this process, two copies can be described and the master-copy relationship between them (Söbke et al., 2013). This diagram includes services that encapsulate data, subjects residing within the application, and accessing data encapsulated within the application.

Conclusions

Based on the research output that has been explained in sync with the research stages, the following conclusions can be drawn: First, the academic business process information system for new students at Sunan Gunung Djati State Islamic University, Bandung has been successfully analyzed using TOGAF ADM and value chain technology. Based on the study results, the environmental system used in the academic process of the Sunan Gunung Djati State Islamic University Postgraduate Program, Bandung consists of three main activities, namely New Student Admission, Selection System, and Online. Second, the development of an enterprise architecture model at Sunan Gunung Djati State Islamic University, Bandung is based on the five phases of TOGAF ADM, which are based on the vision architecture phase to the opportunities and solutions phase. The results of this study indicate that the information system architecture vision of student admissions has now become the need for information systems based on web technology. Additionally, business architecture, information systems architecture, and technology architecture all produce blueprints for academic information systems that assist the new hiring process. The results of the analysis of opportunities and solutions provide a comparison of the old system with the new system at Sunan Gunung Djati State Islamic University, Bandung.

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