



Designing Enterprise Architecture Systems Information on Cloud Computing based TOGAF ADM Clinic (Case Study in Healthy Family Clinic In Kampar District)

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ABSTRACT

Healthy Family Clinic is one of the clinics that is crowded with patients who are open from 4pm to 9pm, depending on the clinic there are four specialists who join a healthy family clinic, delivered by ophthalmologists, ENT, internal medicine and others. But at this clinic for the patient registration process is still manual, still recording using the guest book and a guest book for patient four specialist doctors at once. Outpatient book consisting of a piece of paper. Because the problem is to improve the quality of family clinics, it is necessary to have a system of Company Architecture information to support business processes that are suitable to be applied to these healthy family clinics. With data storage using cloud computing. And using a complete and easy Framework, namely TOGAF ADM. TOGAF ADM is one solution that is easy to use in making this system architecture for clear and structured stages. The purpose of this building design is for information system applications that are useful for Healthy Family Clinics.

Key words : Togaf ADM, Cloud Computing, Enterprise Architecture, Healthy Family Clinic.

1. INTRODUCTION

The important role of Information Technology (IT) as part of the Information System and science at the time of globalization has collaborated with many other fields of science and spread to all fields. At this time, IT is not only expected to be a supporting tool for organizational activities but has been part of the strategy of an organization to achieve its objectives. But the problem now is how to align business strategies and technology strategies. Almost all fields have taken advantage of current IT developments. One area that utilizes current IT development is in the health sector[1].

Since the construction of the healthy family clinic in Bangkinang, the patients prefer to go to the clinic because of the relatively low cost, 24 hours and providing 4 specialist doctors at once. But at this clinic for the patient registration process is still manual, still recording using the guest book and a guest book for patients of four specialist doctors at once. which when using the manual method is vulnerable to loss of guest books, susceptibility to damage and the occurrence of patient data redundancies especially with 4 specialist doctors at once.

The expected goal of this study is to be able to produce an architectural proposal on the patient registration system, resulting in the Enterprise Architecture Framework that best fits the Healthy Family Clinic, can produce the best solution that must be applied in making information systems

Cloud computing is an information technology architecture where computing resources are available as services that can be accessed via the internet. Cloud computing is basically using an internet-based service to support business processes. Cloud services usually have several characteristics, including being very fast deployed, so fast means instant for implementation. [2]

The Open Group Architecture Framework (TOGAF) ADM is defining preparations namely by identifying the strategies of the architecture to be developed, second is defining the strategy of the architecture and determining the parts of the architecture to be designed, starting from business architecture, information system architecture, technology architecture, and determine the capabilities of the architecture that will be designed and developed. [3]

By utilizing the features of TOGAF, the Architecture Development Method (ADM) will enable the Healthy Family Clinic to design and build architectures that are more specific to business needs. Coupled with using Cloud Computing technology which will be the technological infrastructure of the information system that will be created.

2. LITERATURE STUDIES

2.1 Enterprise Architecture

Corporate architecture or better known as company architecture is a description of the stakeholder mission which includes information, functionality / usability, organizational location and performance parameters. Architectural firms describe plans for creating a collection system or system. [4] How can the implementation of enterprise architecture be used by organizations, asking organizations to implement methods or frameworks that can be used to develop the company's architecture. Associated with existing methods of architectural companies that are expected to be able to manage systems that can harmonize business and IT that will be invested.[5]

2.2 TOGAF ADM

TOGAF provides a detailed method of how to build and manage and implement an enterprise architecture and information system called the Architecture Development Method (ADM). ADM is a generic method that contains a set of activities used in modeling the development of enterprise architecture. This method can also be used as a guide or tool for planning, designing, developing and implementing information system architectures for organizations [6]. TOGAF ADM, as shown in Figure 1, is also a flexible method that can authenticate various types of modeling techniques used in design, because this method can be adjusted to changes and needs during the design.

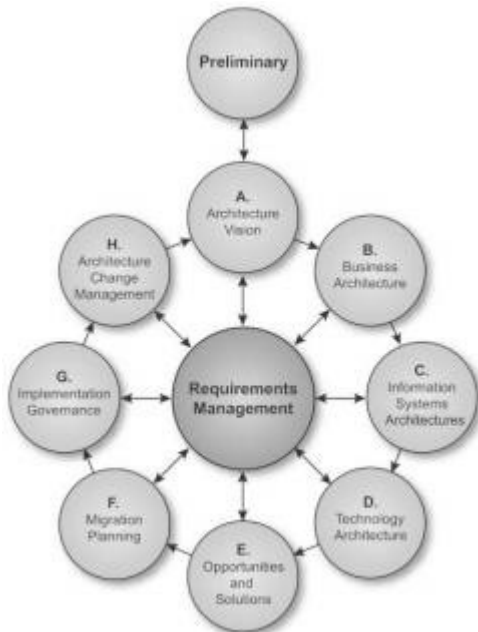


Figure 1: Architecture Development Method

TOGAF ADM also states the clear vision and principles of how to develop enterprise architecture, the principle is used as a measure in assessing the success of enterprise architecture development by organizations (Open Group, 2009), these principles can be explained as follows:[7]

- a. Principles of Enterprise Architecture development is expected to support all parts of the organization, including organizational units in need.
- b. Principles of Information Technology (IT) More direct the consistency of the use of IT in all parts of the organization, including units of organizations that will use.
- c. Principles of Architecture Designing a system architecture based on business process needs and how to implement it. The first step that needs to be considered when implementing TOGAF ADM is defining the preparations by identifying the architectural context to be developed, second is defining the strategy of the architecture and determining the parts of the architecture to be designed, starting from business architecture, information system architecture, architecture technology, and determine the capabilities of the architecture that will be designed and developed.

The stages of TOGAF ADM can be briefly explained as follows [8]:

- a. Architecture Vision Creating uniformity of views on the importance of enterprise architecture to achieve organizational goals that are formulated in the form of strategies and determine the scope of the architecture to be developed. At this stage it contains the questions asked to get the ideal architecture.

- b. Business Architecture Defines the initial conditions of business architecture, determines the business model or desired business activity based on a business scenario. At this stage common tools and methods for modeling such as: BPMN, IDEF and UML can be used to build the required models.

- c. Information System Architecture At this stage, more emphasis on activities is how information system architecture is developed. Defining information system architecture in this stage includes the data architecture and application architecture that will be used by the organization. Data architectures focus more on how data is used for business functions, processes and services. Techniques that can be used are: ER-Diagram, Class Diagram, and Object Diagram. The application architecture is more pressing on how the application needs are planned using the Application Portfolio Catalog, and focuses on the application model that will be designed. Techniques that can be used include: Application Communication Diagrams, Application and User Location Diagrams and others.

d. Technology Architecture Build the desired technology architecture, starting from determining the type of candidate technology needed by using the Technology Portfolio Catalog which includes software and hardware. In this stage also consider alternatives needed in technology selection. The techniques used include Environment and Location Diagrams, Network Computing Diagrams, and others.

e. Opportunities and Solution At this stage more emphasis is on the benefits obtained from enterprise architecture which includes business architecture, data architecture, application architecture and technology architecture, so that it becomes the basis for stakeholders to choose and determine the architecture to be implemented. To model this stage in a design can use the Project Context Diagram technique and Benefit Diagram.

f. 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 assessment and decision matrices for the main and supporting needs in the organization of information system implementation

g. Implementation Governance Arranging recommendations for the implementation of the implementation management that has been carried out, governance carried out includes organizational governance, information technology management, and architectural governance. The mapping of this stage can also be integrated with the framework used for governance such as COBITs from the IT Governance Institute (ITGI).

h. Architecture Change Management Establish an architectural management plan from the new system by supervising technological developments and changes in the organization's environment, both internal and external and determining whether the next enterprise architecture development cycle will be carried out.

TOGAF ADM is also a generic method and is easily implemented based on the needs of many organizations, both industrial organizations and academic industries such as universities. Based on the description above, it can be modeled in general how the stages of the TOGAF ADM are implemented in the design of enterprise architecture.

2.3 Cloud Computing

Cloud Computing is a client-server model, where every available resource such as server, data storage, network and software can all be accessed anytime, anywhere by the user. There is a Cloud Computing service provider that provides microservice concept services such as Google Cloud Platform, Amazon Web Service, Microsoft Azure and others. With Cloud Computing based services, users can manage all parts without directly involving the service provider

technician.[9] There are 3 types of Cloud Computing services:

1. Infrastructure as a Service (IaaS)

IaaS is a service with an infrastructure or hardware, software and network domain. IaaS can also be called the lowest service layer and a Cloud Delivery Service. Users will be given access to increase capacity in managing computing systems, storage media, managing data traffic and network performance. Users can also run operating system software and applications freely. In other words, full control of system infrastructure is given to users. However, service providers still provide restrictions regarding certain components that cannot be accessed.

2. Platform as a Service (PaaS)

PaaS can also be called Middleware Service or an intermediary service which is ready-made software provided by Cloud Computing service providers. PaaS will facilitate various applications in the Cloud Computing service environment. With PaaS users can build applications, perform testing and deployment.

3. Software as a Service (SaaS)

Is a Top Service from Cloud Computing services. SaaS is provided in the form of applications that can be used by users directly from anywhere and anytime using the internet. This application can also be accessed from any device using a Web browser on the user's side.

2.4 Related Research

In connection with this research there are several studies that have been carried out, among others, as follows: Nugroho, 2012 examined the EA of the Andini RSIA System which is still independent, separate, and has limited scope on the use of organizational units so that information technology cannot be optimized. The solution to overcome this problem is the need to be made as a reference for corporate architecture in the construction of integrated information systems. The application of corporate architecture aims to create harmony between business processes and information systems with organizational needs. To create a architecture design framework, a company needs to be complete and easy to use. TOGAF ADM is a comprehensive and easy methodology to use in the stage of making a clear and structured enterprise architecture. The next research is Aswati, 2018 about the application of TOGAF ADM in Higher Education. At present, to simplify and streamline the learning process, several universities have utilized e-learning applications in the learning process. With the e-learning teaching and learning process can be done with efficient time and can be done outside the classroom without face to face. The tertiary institution used as the subject of research is Sinar Husni Medan College of Technology (STT), which in its learning process has not utilized e-learning. Therefore the authors designed e-learning using the enterprise architecture TOGAF

ADM that can provide systematic steps to facilitate the development of the system.

Next is a study from Rully Septiaria, Irfan Darmawan, 2018 in which this study discusses DISKOMINFO which must always improve services in the field of ICT and be supported by current technological developments. In aligning business and IT strategies, EA design is required which is assisted by the TOGAF ADM framework as a guide in designing. The results of this study are in the form of a blueprint of business architecture to IT today along with suggestions for making improvements, especially in the Information Technology function.

Furthermore, research from D. S. Nugroho & Lubis, 2018 with a case study of PT Primalogic Global Teknologi. At PT Primalogic Global Teknologi there is a business unit manager who has an important role in the success of an application development project. With the implementation of Enterprise Architecture (EA), it is hoped that the business unit manager at PT Primalogic Global Technology will get the right solution in developing its business to be better in the future. In implementing Enterprise Architecture (EA) requires a framework (framework) that can be used in designing and developing for the EA. To be able to realize changes that support the business needs of the business unit manager at PT Primalogic Global Technology, a TOGAF ADM framework is needed.

Wibisono & Rachmawati, 2018 about tertiary institutions as institutions engaged in education. The need for harmonized information systems and information technology has become a demand for harmony in tertiary institutions. This harmony can be realized by building an enterprise architecture. This research builds enterprise architecture using The Open Group Architecture Framework Architecture Development Method (TOGAF ADM) method. TOGAF ADM has 8 phases, namely architecture vision, business architecture, information system architecture, technology architecture, opportunities and solutions, migration planning, implementation governance, and architecture change management. This research only discusses up to the technology architecture phase.

Firdaus, 2018 discusses Architecture that supports business. Amanah Collection is a business that is engaged in fashion such as clothes, clothing, hats, jackets, shorts, trousers various types of young people today. The purpose of this research is to design a sales application system on a website-based Amanah Collection that previously used a conventional system. The methodology used in making enterprise architecture models is the TOGAF ADM (Architecture Development Method).

Furthermore, research from SULANDARI, 2013 about PT.

Bali Double C as a ornamental fish collection and export business company has not utilized SI / IT to support its business, such as the procurement and sales process. Therefore, an enterprise architecture (EA) design is needed that results in alignment between IS / IT and business needs. In this research, EA design was made using TOGAF (The Open Group Architecture Framework) with the ADM (Architecture Development Method) method which consists of stages namely Preliminary, Vision Architecture, Business Architecture, Application & Data Architecture, Technology Architecture, Opportunities & Solutions and Migration Planning and will produce a business architecture blueprint, application architecture, data architecture, technology architecture, gap analysis on each architecture, as well as an application implementation roadmap for PT. Bali Double C. Sudarma, 2017 This study aims to analyze the architecture design of the Udayana University Faculty of Agricultural Technology. The method used in developing company architecture is the TOGAF framework. The TOGAF framework covers the initial stages, vision architecture, business architecture, information systems architecture, technology architecture, opportunities and solutions, migration planning, implementation governance, and change management architecture. Research reveals that corporate information systems can create integrated information systems. TOGAF ADM can produce an architectural design that will be applied in the archive unit of the Faculty of Agricultural Technology, Udayana University, and is able to meet the needs of business processes and users of the faculty's archive unit. TOGAF ADM can produce an IT blueprint from the faculty archive unit.

Anisa *et al.*, 2018 discussed the Rezky Mentari Savings and Loan Cooperative. Currently in the recording process is still using the manual method. Starting from local residents whose members continued to grow, the Rezky Mentari Savings and Loans Cooperative was formed. The problem faced is data that has not been integrated, which results in information being generated to overlap between sections, and resulting in a slow service to members of the Rezky Mentari Cooperative Savings and Loans. With this problem, an enterprise architecture design is needed that can minimize existing problems, one of which is by using the method of The Open Group Architecture Framework Architecture Development Method (TOGAF ADM).

Bahri & Afrizal, 2017 discusses the case study of CV. Cotelligent Indonesia is a company engaged in the field of employee recruitment services. The company has clients spread across Europe and Canada with its head office in London. The company already has information systems but

there is no information flow between systems. In addition, the company does not have a blueprint that describes the whole system so there is no guide that can be used in case of changes or development. Companies need blueprints that are used to describe the whole system, assist developers when developing, and help operational performance of the need for information flow between parts and systems. Enterprise architecture is a recording plan, a blueprint of the structure, arrangement, arrangement, functional grouping, interface, data, protocol, functional logic, integration, technology, from IT sources and needed to support business functions or corporate or organizational mission. Separate systems in the company can communicate with one another using a webservice. Webservice is built using SOA. The company information system blueprint was built using TOGAF ADM 9.1.

3. RESEARCH METHOD

The main methodology used in conducting research refers to the TOGAF ADM method which includes:

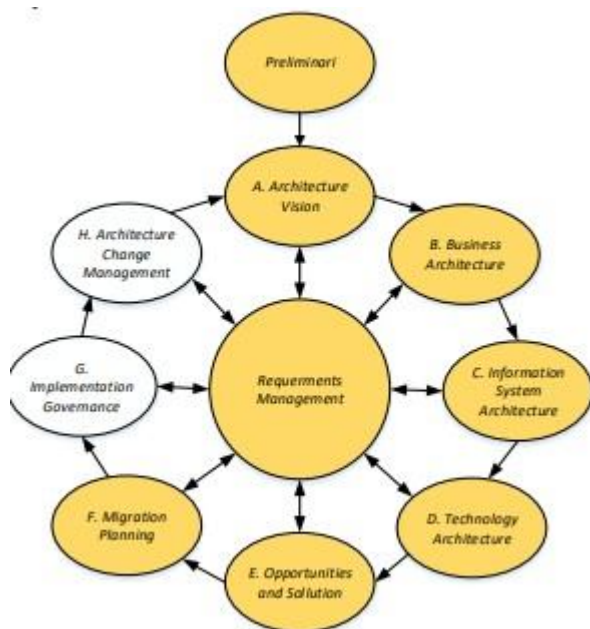


Figure 2: Research Method

A. Preliminari At this stage, identification of business processes related to the system that will be built maps it using the value chain.

B. Architecture Vision Creating uniformity of views regarding the importance of enterprise architecture for the goals of Healthy Family Clinics which are formulated in the form of strategies and determine the scope of the architecture to be developed. At this stage, the vision of the enterprise architecture design is carried out to support business activities in accordance with the vision.

C. Business Architecture At this stage an analysis of current business processes is carried out.

D. Information System Architecture At this stage modeling information system architecture will be designed in accordance with previous results, including modeling data architecture and modeling application architecture and process architecture. In its implementation, it is not only fixed on the data architecture first and followed by the application architecture, but the implementation of the application architecture can be done first.

4. RESULTS AND DISCUSSION

4.1 Preliminary

Following is the determination of the structure healthy family clinic organization that will be very decisive in the business modeling step. So that the main functional area can depicted based on the value chain concept in figure 3 which can generally be grouped into the main activities and supporting activities.

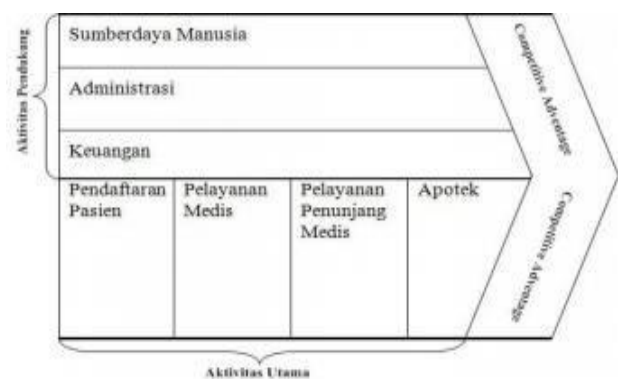


Figure 3: Value Chain

4.2 Architecture Vision

The vision of enterprise architecture modeling is:

1. Make an enterprise system architecture plan that is aligned with end user needs and business needs at the family health clinic, so as to produce an architectural model that is expected to improve performance in the process of servitude to patients.
2. Specifically with the existence of information systems that are built based on the enterprise system architecture can provide information quickly, precisely and accurately so.
3. Technically the concept in enterprise architecture is web-based, where web selection is based on the flexibility that is not limited to the computer operating system used.

4.3 Bussines Architecture

Based on the main tasks and functions of the organizational structure and observations of related documents, an analysis of business processes and functions related to the main business

process activities and the definition of sub-processes in the form of more detailed activities.

1. Patient Registration: Patients do Registration and user input patient data, then can register outpatients.
2. Medical Services: Conducting Doctor Consultations, Medical Measures by Doctors and general health checks.
3. Medical Support Services: Health education.
4. Pharmacy: Ordering Medication, Medical Equipment, Payments, Inventory Enumeration, Recording of prescription drugs from a doctor.

4.4 Information System Architecture

In enterprise architecture planning in this phase is done by dividing into 2 stages namely Data Architecture and Modeling Application Architecture. The implementation is not fixed on the data architecture first, then the application architecture, but

can prioritize application architecture and continue with the data architecture.

1. Data Architecture After identifying the main processes that support operational activities in a healthy family clinic, further identification and grouping of data is made and used in the process.

2. Application Architecture At this stage the application architecture is made to define information systems / main applications needed to manage data and regulate business functions in the main business processes of healthy family clinics. Based on the business process mapping, the information system requirements are obtained as supporting the main business activities for enterprise architecture planning, the following information systems are needed:

- a. Patient Registration Menu
- b. Medical service menu
- c. Medical Support Menu
- d. Pharmacy Information Menu
- e. Finance Menu
- f. Patient Data Menu

5. CONCLUSION

Based on the results of the discussion that has been described, it can be concluded that using the TOGAF-ADM methodology as a tool used in designing this information system enterprise architecture, it has been able to produce architectural models in general in accordance with the vision of a healthy family clinic and can be applied in other organizations that have similarities in business processes. Planning this enterprise model information system architecture produces a process of improving performance from the manual to the computerized.

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