



Enterprise Architecture Planning at the Health Sciences Faculty of UMSurabaya Using the Zachman Framework

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Abstract

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Health Sciences Faculty of Muhammadiyah University of Surabaya (UM Surabaya) is a faculty in UM Surabaya. It has a mission to develop academic, general, and student administration services based on quality management systems and the application of Information Technology. To achieve the mission, it is necessary to design and implement Information Technology in assisting administrative service business processes including a letter management system, the attendance system of staff and lecturer, and a financial submission system for the activity plan of the Implementing Unit, Head of Study Program, and Quality Control Group at the Faculty of Health Sciences UM Surabaya. Therefore, this research aimed to build an Enterprise Architecture Planning (EAP) using Zachman Framework method. This research resulted a structured integrated information system Blueprint design along with application prototypes at the Faculty of Health Sciences UM Surabaya. With the Information System Blueprint design, it made it easier for Developers to develop information systems and documented every system transaction process.

Keywords: Enterprise architecture planning, Zachman framework, Administrative service

Abstrak

Fakultas Ilmu Kesehatan Universitas Muhammadiyah Surabaya (UM Surabaya) merupakan salah satu fakultas yang ada di UM Surabaya. Memiliki misi mengembangkan layanan akademik, umum, dan administrasi kemahasiswaan berbasis sistem manajemen mutu dan penerapan Teknologi Informasi. Untuk mencapai misi tersebut, perlu dirancang dan diimplementasikan Teknologi Informasi dalam membantu proses bisnis pelayanan administrasi yang meliputi sistem pengelolaan surat, sistem kehadiran pegawai dan dosen, dan sistem pengajuan keuangan untuk rencana kegiatan Unit Pelaksana, Kepala Unit Pelaksana. Program Studi, dan Kelompok Kendali Mutu Fakultas Ilmu Kesehatan UM Surabaya. Oleh karena itu, penelitian ini bertujuan untuk membangun Enterprise Architecture Planning (EAP) dengan menggunakan metode Zachman Framework. Penelitian ini menghasilkan rancangan Blueprint sistem informasi terintegrasi yang terstruktur beserta prototype aplikasi di Fakultas Ilmu Kesehatan UM Surabaya. Dengan adanya rancangan Blueprint Sistem Informasi ini memudahkan Pengembang untuk mengembangkan sistem informasi dan mendokumentasikan setiap proses transaksi sistem.

Kata-kata kunci: Perencanaan arsitektur perusahaan, Kerangka zachman, Layanan administratif



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1. Introduction

Nowadays, Information Technology is not only a set of tools for operating activities but also part of an organizational strategy to achieve the business process of a company or organization. Yet, the problem of this era is how to align business strategy and technology strategy. The following guidelines should be followed by organizations if they have difficulty in implementing their information systems architectural planning. Then, it is necessary to have Enterprise Architecture Planning (EAP) approach which will provide a framework for making long-term information technology decisions that support organizational interests. Enterprise Architecture Planning (EAP) is an activity of organizing data that is used and produced by an organization which includes the objectives of the organization's business processes [1].

Health Sciences Faculty of Muhammadiyah University of Surabaya (UM Surabaya) has a mission to develop the application of information technology in academic, general, and student administration services based on a quality management system. To achieve the mission of the Health Sciences Faculty of UMSurabaya in the application of Information Technology, it is necessary to have an architectural design and implementation of information systems that can simplify the administrative service process. Where this research focuses on a discussion on 3 scopes including the letter management system, the attendance system of staff and lecturer, and the financial submission system for the activity plan of the Implementing Unit, Head of Study Program, and Quality Control Group of the Faculty of Health Sciences, UM Surabaya.

Conceptually, the solution to the EAP approach using the Zachman Framework method can help in building data architecture models, application architectures, and technology architectures that can simplify the administrative service process of the Health Sciences Faculty of UM Surabaya.

As an effort should be done in this research to avoid repetition of the research, it is necessary to have a review of previous research, as a basis and reference. The following are some research papers that are relevant to the research's discussions:

- a. A research paper written by Cecep Kurnia Sastradipraja entitled "Perancangan Arsitektur SI Absensi dan Penggajian Menggunakan Zachman Framework " in 2020. The research aimed to produce a prototype application that could handle employee attendance and payroll processes based on the stakeholder perspective, starting from determining the basic

salary of employees, attendance, types of deductions, and several other parameters that influence it [2].

- b. A research paper written by Nabella Darsono entitled "EAP Pada PT. Sawit Mas Sejahtera Menggunakan Zachman Framework" in 2019. This research aimed to get a clear picture of how to do an enterprise architecture design and how to get a good enterprise architecture which could be used by organizations to achieve their strategic goals Outputs. Then, from the EA design, what could be achieved were the modeling and basic framework of an integrated information system to support the organizational needs of PT. Sawit Mas Sejahtera [3].
- c. A research paper written by Berny Indrawan entitled "Perancangan Enterprise Architecture Universitas Menggunakan Zachman Framework" in 2019. The research aimed to design Enterprises Architecture in order to improve business processes and IT infrastructure based on the Tri Dharma Perguruan Tinggi at UNIKOM [4].
- d. A research paper written by Hudi Kusuma Bharata with the title "EAP SI Perguruan Tinggi STMIK Bani Saleh Dengan Zachman Framework" in 2018. The research aimed to design an enterprise architecture of STMIK Bani Saleh which could be used as a guide in developing information systems using the Zachman Framework [5].
- e. A research paper written by Riman Irfanto entitled "Perancangan EA Menggunakan Zachman Framework" in 2018. The research aimed to design a good enterprise architecture and to create the harmony between information technology and business needs which could run business processes in accordance with the goals and targets of the company [6].

Based on the background of the problem, this research discusses the Design of Enterprise Architecture in the scope of academic and administrative service business processes at Health Sciences Faculty of UM Surabaya, so that the Health Sciences Faculty had a good design Architecture Enterprise and it can be used to develop information systems through Enterprise Architecture Planning approach Using Zachman Framework method by adopting 5 columns (What, How, Where, Who, When) and 4 rows (Planner, Owner, Designer, Builder). The purpose of this research was to produce a design Blueprint structured integrated information system with an application prototype at Health Sciences Faculty of UM Surabaya.

2. Method

2.1 Material

a. Enterprise Architectur Planning

EAP is a method that uses a data quality planning approach that is oriented to business needs and how the implementation of the architecture is carried out in such a way as to support the turnaround of the business wheels and the achievement of the Vision and Mission and the objectives of IS strategic planning. (Spewak, 1992) [7].

b. Zachman framework

Zachman Framework is designed to identify a framework with six architectural levels starting from the conceptual level to the detailed design and construction of a system. Another important aspect is the clear definition and differences of the three architectures, namely: data architecture, process (application) architecture, and network architecture. The construction of a system in the Zachman Framework is arranged in lines. The column in the Zachman Framework describes the problem analysis with 5ws (what, where, who, when, and why) and 1h (how) approach. An important aspect is the clear definition and real differences of the three architectures, namely: data architecture (what), application architecture (how), and network architecture (where) [8]. The Zachman Framework is presented in **Figure 1**.

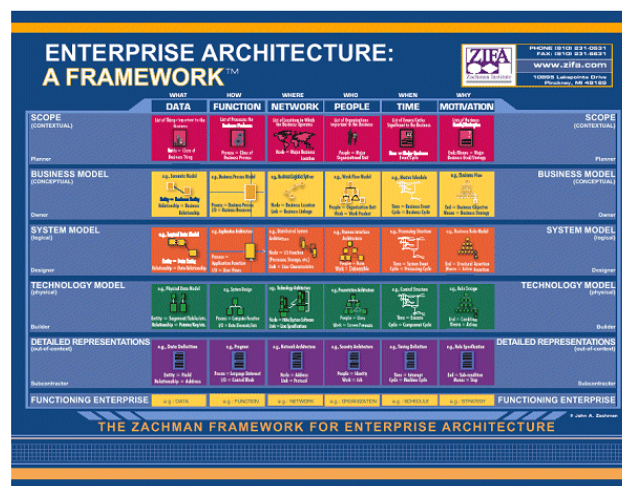


Figure 1. Zachman Framework

c. UML

UML is a business process modeling or describing the process flow of user-computer interaction using diagrams. The use of UML is thus not limited to one method and also describes the need for an information system to help system analysis meet the needs of software engineering implementation (Fitriani, 2011) [9].

d. PHP

Hypertext Preprocessor (PHP) is a programming language used to create dynamic webs, although it can also be used to create other programs. Of course the PHP programming language is different from HTML the PHP script or code that is created cannot be displayed on the front page of the website just like that, but must be processed first by the web server and then displayed in the form of a website page in a web browser. PHP script can also be inserted in HTML [10].

e. Blackbox Testing

Black box testing is a testing method where the tester only focuses on what the system should do. A test can be said to be successful when a system can process data and the results are in accordance with what is expected. When using the black box method, the tester does not need to know how the structure and design of the data in the system is. They only see whether the system has bugs or not [11].

2.2 Methods

The research phase in the architectural design process based on the Zachman Framework method approach is presented in **Figure 2**.

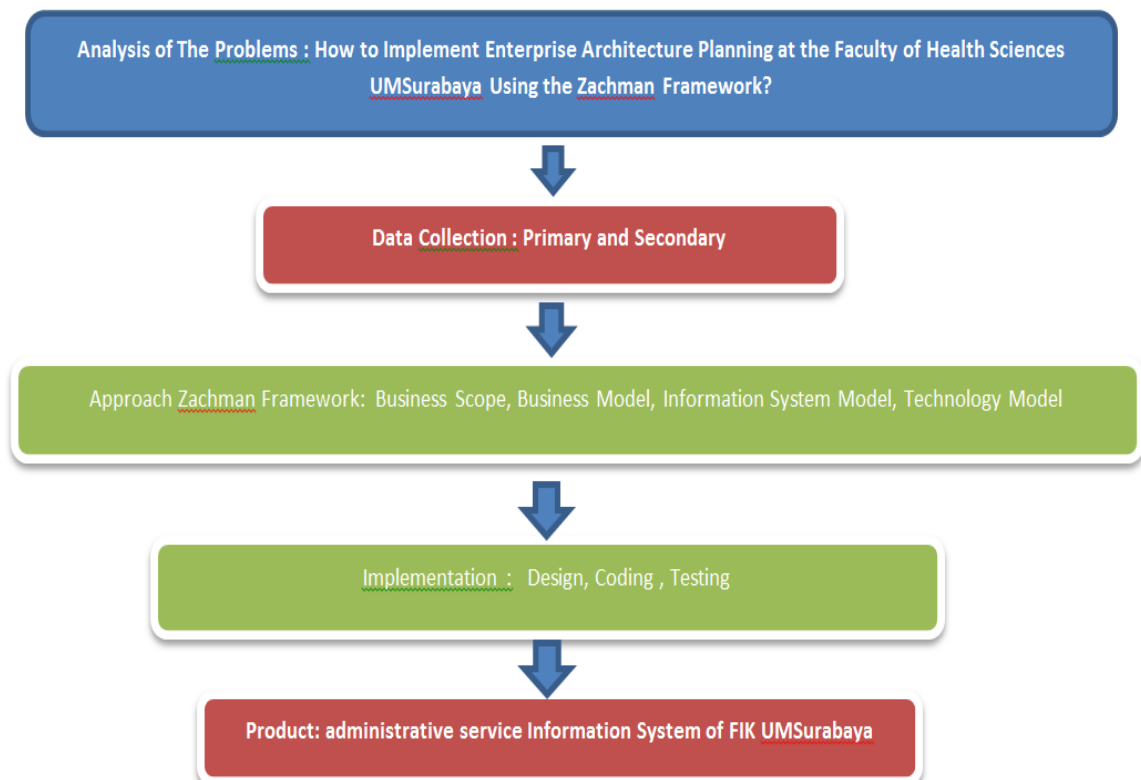


Figure 2. Research Phase

The explanation of the description of research method in each phase conducted by the researcher is as follows:

a. Analysis of The Problems

In analyzing the problem, the researcher did the observations and based on the findings of the problems in the Health Sciences Faculty of UM Surabaya, then the researcher conducted the literature study process. As for the literature review stage, the researcher took relevant sources related to several reputable journals relevant to the research case.

b. Data Collection

In the data collection phase apart from the case study observation, the researcher conducted the interviews with the parties related to the business process of Letter Management services, Financial Submission of Activity Plans, and attendance of staff and lecturer at Health Sciences Faculty of UM Surabaya.

c. Application of Zachman Framework

Based on the findings and data collection in the administrative service business processes of Health Sciences Faculty of UM Surabaya, an analysis and mapping on the two-dimensional matrix of the Zachman Framework were done. So, it produced an architecture which would be developed into a prototype referred to the needs of the administrative information system. In this research, perspective reference was based on planner, owner, designer, and builder with interrogative representations including Data, Function, Network, People, and Time.

d. System Implementation and Testing

In this stage, the implementation is in accordance with the system design based on the design results that refer to the matrix mapping of Zachman Framework. The programming language for coding used PHP and the database management systems used MySQL. And, for software testing, it used black box method by conducting test data and functionality.

3. Results and Discussion

3.1. Discussion of Zachman Framework Table

a. What Column

It defines the data based on the perspective of taken column. 'What' in various perspectives on 3 information systems include a letter management system, an employee and lecturer attendance system, and a financial submission system for the Implementation Unit, Head of

Study Program and the quality control group of the Health Sciences Faculty of UM Surabaya, and is presented in the **Table 1**.

Table 1. What Column In Various Perspectives On The Letter Management System

Perspective	What
Planner	Data related to the attendnce information system: 1. Incoming mail data 2. Outgoing mail data 3. Desposition data 4. Data of Head of study program, UPF, GKM 5. Desposition flow transaction log data
Owner	
Designer	

What column in various perspectives on financial submission system presented in the **Table 2**.

Tabel 2. What Column In Various Perspectives On Financial Submission System

Perspective	What
<i>Planner</i>	<p>Data relating to the Financial Submission information system:</p> <ol style="list-style-type: none"> 1. Financial Submission Data 2. Final data for budget submissions 3. Data Desposition 4. Data from the Head of Study Program, UPF, GKM 5. Transaction log data for Financial Submission flow
<i>Owner</i>	
<i>Designer</i>	

b. How Column

It defines the processes occurred in the attendance and payroll based on the perspective taken. A complete description of the how column in various perspective is presented in **Table 3.**

3.

Table 3. How Column in Various Perspectives

Perspective	How
<i>Planner</i>	<ol style="list-style-type: none"> 1. Lecturer data input process 2. Staff data input process 3. Data of attendance 4. Attendance report 5. Head of study program, GKM and UPF data input process 6. Financial submissions data input process 7. Financial submissions data 8. Financial submissions report 9. Incoming mail data input process 10. Outgoing mail data input pricess 11. Deposition data of incoming and outgoing mail 12. Incoming and outgoing mail report
<i>Owner</i>	<ol style="list-style-type: none"> 1. Staffs Log in attendance 2. Lecturer's log in attendance 3. Administrator checks attendance data 4. Attendance reporting 5. Head of study program, GKM and UPF log in to the financial 6. Chairman validate financial submission 7. Administrators check financial submission 8. Filing reports 9. Head of study program, GKM and UPF log in to the Management System for incoming and outgoing mail 10. Administrators input outgoing mail and incoming mail 11. Chairman input disposition letter 12. Head of study program, GKM dan UPF received a letter disposition from the chairman
<i>Designer</i>	System behavior activity diagram can be seen in activity Diagram

c. Where Column

It defines the main business location of the attendance and payroll information system operates. A complete description of the where column in various perspectives is presented in **Table 4.**

Table 4. Where Column in Various Perspectives

Perspective	Where
<i>Planer</i>	Health Sciences Faculty of UM Surabaya
<i>Owner</i>	Network map in the room of the Health Sciences Faculty
<i>Designer</i>	Network map proposed
<i>Builder</i>	Network map of management letters, financial submissions and attendance of lecturers and staffs

3.2. Administrative Implementation of Service Information Systems

Results of implementing system with a programming language for coding using PHP and database management systems using MySQL are in the first page is the Login Page of the Administration service system to authenticate user roles in the system for the first roles are staffs, lecturers, head of study program, UPF and GKM input the service transaction process, then log in by entering the username and password. After that, the service features will appear, including the feature of inputting attendance and activity plans, financial submissions, and receiving letter dispositions from the chairman, while for the Administrator page, it can see the attendance recap, input letters, and financial submissions recap. Display of login page of Administration service system presented in the [Figure 3](#).

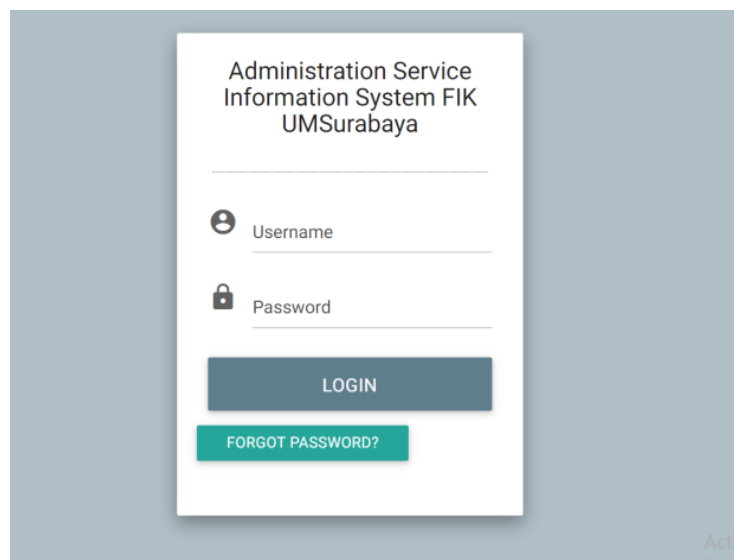


Figure 3. Display of Login Page of Administration Service System

Display of attendance input page and activity plan presented in the [Figure 4](#).

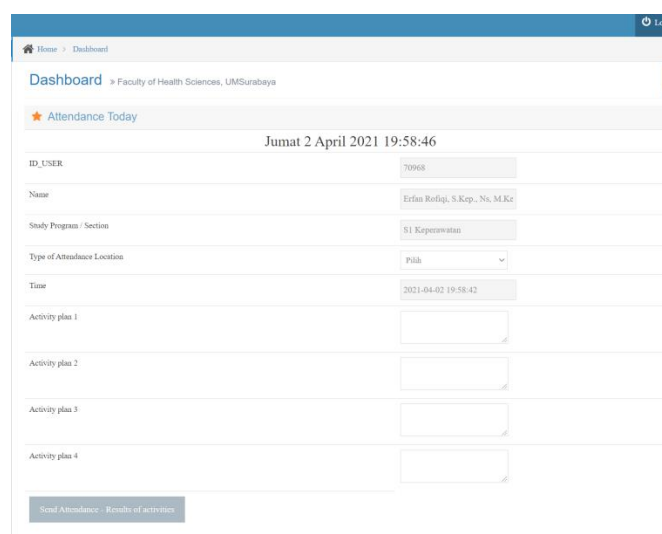


Figure 4. Display of Attendance Input Page And Activity Plan

Administrator page display Attendance Recap presented in the **Figure 5**.

No	ID-User	Name	Location	attendance time	activity plan	Photo
1	70941	Siti Mardiyah, S.Si., M.Kes	Work From Home (WFH)	10:03:59	Online Lecture of Physics and Health Chemistry S1 Midwife	-
Click here to view the point location						
2	70941	Siti Mardiyah, S.Si., M.Kes	Work From Home (WFH)	10:03:02	Online Lecture of Physics and Health Chemistry S1 Midwife	-
Click here to view the point location						

Figure 5. Administrator Page Display Attendance Recap

User Page Display for Financial Submission Input presented in the **Figure 6**.

Financial application form

Nominal financial submission: example: 4500000

Brief description of the Activity financial

Range Waktu Kegiatan

Types of Financial Activities Scale

> Submission Time
mm/dd/yyyy

Beginning of Activity Time

Important notes from the Head of Study Program / Head of Study Program / GKM / UPF to the Leaders:

FINANCE EXCEL FILE 5 MB

*The format that are allowed excel file maximum size of 5 MB

SAVE ✓ CANCEL ✗

Figure 6. User Page Display for Financial Submission Input

Administrator page display for letter input presented in the **Figure 7**.

form add incoming mail data

Agenda number

Letter From

Range Waktu Kegiatan

the subject

> latter Time
mm/dd/yyyy

letter year

reference number

LETTER FILES 5 MB

SAVE ✓ CANCEL ✗

Figure 7. Administrator Page Display for Letter Input

3.3. System Testing

The system testing for each indicator in this functionality test, administrative service information system goes through a series of function using a test case on the availability of the system in fulfilling functionality. The Suitability Indicator Functionality Test is presented in [Table 5](#).

Table 5. Suitability Indicator Functionality Test

Function Description	Form Filling	Expected Result	Test Result
Login Valid	Enter username And password	According to needs of user	According to needs of user
To input data Valid	Fill in the data form existing in the administrative service	According to needs of user	According to needs of user
To change data Valid	change the data existing in the administrative services system	According to needs of user	According to needs of user
To check the data Valid	Press the print button	According to needs of user	According to needs of user
To back up the data Valid	Change the backup data of the administrative services system	According to needs of user	According to needs of user

4. Conclusion

The following are the conclusions based on the result of this research:

- a. The implementation of the Zachman framework method in this research results in a design of Blueprint Information System and application prototype in the Health Sciences Faculty of UMSurabaya integrated structured.
- b. Implementing a prototype of administrative service information system application made it easier and faster for user to interact with the mail management system, the attendance system of staffs and lecturers, and the financial submission system for activity plans.
- c. With the design of Blueprint, the Information System made it easier for Developers to develop information systems and document every system transaction process

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