

## Information Systems Architecture Online Learning in School with the Zachman Framework

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### *Abstract*

*Media online learning or e-learning in today's world of learning, has become one of the learning methods are very popular and began to be implemented in various educational institutions in particular. High School (SMA) or Vocational High School (SMK) is a continuation of the basic education level. Use of information systems e-learning environment of schools to support educational activities at present, there are schools in the region of South Sumatra Province who already use them and many schools in the area who do not understand e-learning. This research aims to develop an e-learning that can be used by all high schools in the region of South Sumatra. With e-learning, it is expected each school can share information that can balance education in the city and that there dipelosok area. To realize it requires an Enterprise Architecture (EA) in building e-learning teresebut. In this study, the EA will be used is the Zachman Framework. The objective of this framework is to provide a basic structure that supports the organization, access, integration, interpretation, development, management and representation change the architecture of an organization's information systems.*

**Keywords :** *E-learning, Enterprise Architecture, Zachman Framewrok*

## 1 INTRODUCTION

Developments in information technology today is very meaningful for all people but especially in the field of education. Nowadays, the Internet is an information tool that is most widely used by educational institutions, especially in the search for information and communication. Media online learning or e-learning in today's world of learning, has become one of the learning methods are very popular and began to be implemented in various educational institutions in particular. The existence of these learning methods become more cutting edge and up to date because depend on the sophistication of computer technology and the Internet. This is the main attraction for the experts in the field of education to conduct research on the various online learning system. One of them is evidenced by the increasing number of definition or understanding of e-learning experts say that is used as a seminar instructor or writing.

The term e-learning is actually an abbreviation of electronic learning that emphasizes learning by using electronic technology. E-learning as any teaching and learning using electronic circuits (LAN, WAN, or the Internet) to deliver learning content, interaction, or guidance [1]. E-learning in the learning activities occur asynchronously via an electronic device to obtain computer learning materials that fit their needs [2]. According to Hartley [3] E-learning is a type of learning that allows tersampaikannya teaching materials to students using the media Internet, Intranet or other computer network media. Whereas another opinion explaining that explains that the term "e" or an abbreviation of electronics in e-learning is used as a term for any technology that is used to support the efforts of teaching via Internet electronic technology [4].

High School (SMA) or Vocational High School (SMK) is a continuation of the basic education level. In Act No. 20 of 2003 on National Education System Article 18 arranged on secondary education, namely : 1) Secondary education is a continuation of basic education, 2) Secondary education consists of general secondary education and vocational secondary education, 3) Secondary education in the form of secondary school (high school), Madrasah Aliyah (MA), vocational schools (SMK), and madrasah aliyah vocational (MAK), or other equivalent form [5].

Indonesian artifacts in a total of 25 159 units of the school in the academic year 2015/2016. while the upper secondary schools or equivalent in the province of South Sumatera there are 823 units, made up of 414 public schools and 409 private schools [6]. Use of information systems e-learning environment of schools to support educational activities at present, there are schools in the region of South Sumatera Province who already use them and many schools in the area who do not understand e-learning. As for e-learning that is used by a school to support their education process is different from other schools that also have made use of e-learning. The concerns raised from this research aims to develop an e-learning that can be used by all high schools in the region of South Sumatera. In addition, each student or teacher at a school that utilizes e-learning [7] to connect with students or teachers at other schools that have used e-learning or in other words the addition of the concept of social media in e-learning. Given this concept it is expected that each school can share information that can balance education in the city and that there in remote areas. To realize it requires an Enterprise Architecture (EA) in building that e-learning. Enterprise Architecture (EA) is the structure of the components that are interconnected with each other, and there are principles and rules in designing that develops over time [8]. There are many kinds of EA with the advantages of each of them Zachman Framework, The Open Group Architecture Framework (TOGAF), the Department of Defense Architecture Framework (DoDAF), the Federal Enterprise Architecture (FEA, and the CIM Open System Architecture ( CIMOSA).

In this study, the EA will be used is the Zachman Framework. Zachman Framework is one method to help design enterprise architecture models that can help all parties to define the overall management [9]. The objective of this framework is to provide a basic structure that supports the organization, access, integration, interpretation, development, management and representation change the architecture of an organization's information systems. Each object / description of the architectural representations referenced as artifact. Based on the descriptions above, the authors raise the issue as research material for a this study. The selected title is "Online Learning Information System Architecture At school SMA With Zachman Framework".

Based on the background of this study, it can be identified the problem as follows: 1) The use of e-learning environment of high school has not been widely used, especially in the region of South Sumatra, 2) E-learning used by each school still alone, and 3) The concept for connecting every learner and teacher in the high school environment does not exist. In this study, formulated the main problems that must be resolved to achieve the goal of "How to Build an Online Learning Information System Architecture At school SMA With Zachman Framework?".

In order to resolve those problems, required the formulation of clear objectives measurable and achievable. The main objectives of this study are: 1) Building Architecture of information systems and e-learning technology with the Zachman Framework, and 2) e-learning architecture that was built to connect the entire high school.

From the results of this study are expected to be useful, both theoretically and practically: 1) Obtain an overview of the architecture of information systems technology in the form of an online learning framework blueprint, and 2) The results of this study can be used as a material consideration whether or not e-learning are built to be applied.

Restrictions on the scope of which is discussed in this paper include: 1) The study was conducted in high schools in the region of South Sumatra Province, and 2) to analyze the feasibility of the implementation of e-commerce with the Enterprise Architecture Zachman Framework in the form of a framework blueprint.

## 2 ZACHMAN FRAMEWORK

The objective of this framework is to provide a basic structure that supports the organization, access, integration, interpretation, development, management and representation change the architecture of an organization's information systems. Each object/description of the representations of architecture referred to as artifact. Zachman framework described in the form of a matrix showing the relationship between perspective and abstraction. Each row represents a level of perspective, namely planners, owners, developers, subcontractors, and functioning enterprise, while each column describe the abstraction / certain aspects of the process, namely the data, function, network, people, time and motivation. Six each of these aspects relating to the basic questions: what, how, where, who, when, and why [10].

Zachman framework is not a method for developing information systems architecture, but Zachman framework is just a framework for categorizing information systems architecture artifact or in other words, the Zachman framework provides an overview of the results of the information system architecture.

In the picture above is explained that the Zachman Framework is a 6 6 matrix that represents the intersection of two classification scheme two-dimensional system architecture. In the first dimension, Zachman described it as a line consisting of six perspectives: 1) The Planner Perspective (Scope Context): List the scope of the description element of business recognized by strategists as a theorist, 2) The Owner Perspective (Business Concept): Model semantic business linkages between the components of a business as defined by the chief executive as the owner, 3) The Designer Perspective (System Logic): A more detailed logic models that contain design requirements and system constraints represented by the architects as a designer, 4) The Builder Perspective (Technology Physics) : The physical model that optimizes the design for specific needs within the constraints of a specific technology, people, costs and scope of time specified by the engineer as a builder, 5) The Implementer Perspective (Com-



Figure 1: Zachman Framework.

ponent Assemblies): The special technology, about how the components are assembled and operated, configured by technicians as the implementer, and 6) The Participant Perspective (Operation Classes): The events of the real functioning system that is used by the technicians as a participant.

For the second dimension, each issue of perspective requires a different way to answer the fundamental questions: who, what, why, when, where and how. Each question requires an answer in a different format. Zachman describe any of the fundamental questions in the form of field/focus [11] form: 1) What (column data): the material used to build the system (inventory set), 2) How (column function): carry out the activity (process transformations), 3) Where (network column): location, tofografi and technology (network nodes), 4) Who (the column): rules and organization (organization group), 5) When (time slot): incidence, cycles, schedule (time periods), and 6) Rev (field goal) : objectives, motivation and initiative (motivation reason).

For each cell in the matrix which is the intersection between the perspective and the focus should be distinctive and unique.

### 3 RESULTS

Zachman Framework For E-learning, for the preparation of the planning application e-learning necessary stages in the Zachman Framework, which includes the following stages:

#### 3.1 Scope

At this stage often called contextual architecture. At this stage defined functional business model globally and various external requirements of the organization.

#### 3.2 Business Model

At this stage often called the conceptual architecture. At this stage defined models of business processes, business functions allocation, the process of elimination of overlapping

Table 1: Scope

Field/Focus	Notes
Why	Build e-learning that can be used by all high schools in the region of South Sumatra
When	Each user account data processing and generate reports and notifications
Who	Users of e-learning Recommended: Admin, Teacher and Student
Where	Applications include users throughout South Sumatra region
How	Generate e-learning architecture with the concept of social media that can connect all high schools in the region of South Sumatra
What	Generate Blueprint architecture Learning Online In High School With the Zachman Framework. School high school or equivalent in South Sumatra province are 823 units, made up of 414 public schools and 409 private schools

functions and ambiguous.

Table 2: Business Model

Field/Focus	Notes
Why	Provide online learning, ease of learning, flexible time, e-learning with the concept
Why	of social media is that it can search and friendship and exchange of information between users
When	e-learning can be accessed anytime and anywhere access to eraser school
Who	Admin as the main data processing and Teachers give feedback in an online learning activities Student tasks and accessing information from school
Where	E-learning with the concept of social media can do so friendship between users can be connected
How	Between users can exchange information Each user has their own account so that it can store data history Each user can see the history of another user with friendship and permits
What	e-learning is intended per school

### 3.3 Systems Model

At this stage often called the logical architecture. At this stage defined logical models, project management, and defining requirements.

### 3.4 Technology Model

At this stage, often called the technology architecture. At this stage defined physical models, technology management, and defining solutions and development.

Table 3: Systems Model

Field/Focus	Notes
Why	The system goes online. To membangunya by using the PHP programming language and MySQL Database
When	Anywhere and anytime
Who	E-learning applications to serve the needs of the learning process online admin, teachers and students.
Where	The process of storing data into the database is distributed
How	Applications also have a system
What	Transaction processing systems use described by use case diagram

Table 4: Tehnology Model

Field/Focus	Notes
Why	Models describing the technology needs of each user in accessing the system
When	Scheduling system
Who	The use of data described using a hierarchical model of the system
Where	Calculating bandwidth requirements so that the system conditions do not occur down
How	Overview of connections between computers in data access speed
What	Overview of the structure of the data in applications built

### 3.5 Detail Representation

At this stage described how the management system configuration and implementation of the system development.

### 3.6 Function Enterprise

At this stage, delivering a wide range of guidance for the user to be able to the functioning of the system, perform management operations, and evaluate the system.

## 4 CONCLUSSIONS AND RECOMMENDATIONS

Based on the discussion made it can be concluded that:

1. The results of this research is a blueprint of the architecture of information systems technology online learning.
2. The information system online learning feasible to secondary schools to improve the quality of learning of students.

## References

- [1] J. K. C. Koran, "Aplikasi E-Learning Dalam Pengajaran dan Pembelajaran Di Sekolah-Sekolah Malaysia," ed: Cadangan Pelaksanaan Pada Senario Masa Kini, Pasukan Projek Rintis Sekolah Bestari Bahagian Teknologi Pendidikan, Kementerian Pendidikan Malaysia, 2002.
- [2] H. Kamarga, *Belajar sejarah melalui e-learning: alternatif mengakses sumber informasi kesejarahan*: Intimedia, 2002.
- [3] D. E. Hartley, "E-valuation: Pricing e-learning," *Training & Development*, vol. 55, pp. 24-24, 2001.
- [4] A. A. Hartanto and O. W. Purbo, "Teknologi e-learning berbasis php dan mysql," Elex media komputindo, Jakarta, 2002.
- [5] Kemdikbud. (2015). *Peserta didik sekolah menengah atas*.
- [6] Dirjen. Pendidikan Dasar dan Menengah Kemendikbud. (2015). Data Pokok Pendidikan Jenjang SMA-SMK. Available: <http://dapo.dikmen.kemdikbud.go.id/portal/web/laman/datapokok>
- [7] L. A. Abdillah, "Students learning center strategy based on e-learning and blogs," in *Seminar Nasional Sains dan Teknologi (SNST) ke-4 Tahun 2013*, Fakultas Teknik Universitas Wahid Hasyim Semarang 2013, pp. F.3.15-20.
- [8] C. Council, "A Practical Guide to Federal Enterprise Architecture," 2001.
- [9] M. Adhani, et al., "Analisa dan perancangan sistem informasi penerimaan siswa baru dan pembayaran SPP menggunakan Zachman Framework," in *Seminar Nasional Informatika 2015 (SNIif2015)*, Medan, 2015, pp. 641-647.
- [10] J. A. Zachman, "Enterprise architecture: The issue of the century," *Database Programming and Design*, vol. 10, pp. 44-53, 1997.
- [11] J. Zachman, "A framework for information systems architecture," *IBM Systems Journal*, vol. 26, pp. 276-292, 1987.

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