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ENTERPRISE ARCHITECTURE DESIGN USING ENTERPRISE ARCHITECTURE PLANNING (EAP) METHOD IN KELURAHAN SINDANGJAYA OFFICE MANDALAJATI DISTRICT BANDUNG CITY

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ABSTRACT

In today's information era, the ability to do business or carry out activities is reliant on the availability of information technology is needed in most of the business sector. Along with the expansion of information technology, however, it frequently introduces new problems such as data redundancy, technological platforms, and excessive information technology spending. To avoid the problem that frequently happens, organizations require IS planning that may create alignment between IT and the business. Enterprise Architecture Planning (EAP) is a Zachman Framework-based Enterprise architecture methodology. The first stage is Planning Initialization, which aims to design information technology for the future utilizing the Enterprise Architecture Planning (EAP) process (starting), second, we'll look at business modeling, systems, and present technology (where we are now) , third, data architecture, applications, and technology (recommendations), and fourth, implementation (Achievements). The existence of a recommendation or blueprint given to the Sindangjaya Ward Office is expected to solve in the resolution of problems at the ward office, and it is hoped that the method used can be applied and understood when the need for future development, particularly in the IT field.

Keywords: Information Systems, Enterprise Architecture, Enterprise Architecture Planning (EAP).

INTRODUCTION

In today's era, information technology has developed rapidly, the role of information systems and information technology has been widely applied in various fields such as education, government, health, business and other fields to support and facilitate operational activities.

In the field of government, especially in the city of Bandung, currently it has begun to apply information technology and information systems in every operational activity. The application of information technology and information systems in the Bandung City government environment is enough to help work in accordance with what is desired by leaders and stakeholders.

Kelurahan is the division of administrative areas in Indonesia under sub-districts, kelurahan is also the front line of government in managing the region and serving the community. Sindangjaya Village is an administrative division under Mandalajati District, Bandung City, whose office is located on Jl. Arcamanik Sindanglaya No.43.

The Sindangjaya Sub-District Office in its operational activities has not implemented an information system in its entirety, for example, for registering letters, it still uses manual writing using books, population records only use a one-processing application as storage media.

As a result of the way of working described above, the data that has been stored is prone to damage or even loss, which is certainly very

detrimental to the Kelurahan Sindangjaya Office itself. The next problem, when one day the data is needed information, an obstacle occurs in data retrieval. The problem is that the data cannot be searched and obtained quickly and accurately. Given the importance of speed and accuracy of absorption of information to support decisions or policies to be made.

As the first step in implementing information technology and information systems at the Sindangjaya Sub-District Office, it is necessary to model the Enterprise architecture at the Sindangjaya Sub-District Office related to business processes, data, applications, and technology.

LITERATURE REVIEW

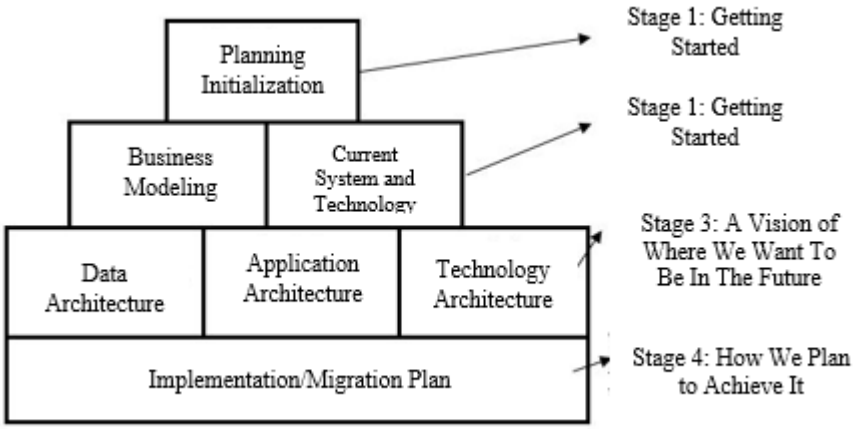

Figure 1 : Theoretical Framework [5]

Layer 1, Initialization of planning (Planning Initiation): the initial step that must be done is to initiate planning, with the hope that the process of building this architectural model can be directed very well. This stage is the basis for the next stage of work. This initial stage is important, especially because at this stage the scope and planning of activities or work plans are defined, determining the methodology to be used, the resources involved and determining the tools to be used. There are stages that are carried out in the initialization of planning, namely as follows [5] :

a. Determining the Scope and objectives of Architectural Planning *Enterprise*
b. Adapting a planning methodology
c. Manage the allocation of computer and HR resources
d. Prepare an Architectural Planning work plan *Enterprise*
e. Get commitments and financing.

The results from layer 1, Planning Initialization are as follows:

1. Enterprise Architecture Planning Work Plan
2. Support and Commitment from Enterprise executives and management

Layer 2, Business Modeling (Business Modeling): develop a basic knowledge of

business and information used in conducting business activities. The purpose of this business modeling is to provide a complete and thorough knowledge base that can be used to define the architecture and its implementation plan. There are 3 stages to modeling a business, namely as follows [5] :

a. Organizational structure documentation.
b. Identification and definition of business functions.
c. Key business model documentation, distribution and presentation to all business community to hear the comments.

The results of Layer 2, Business modeling are as follows:

a. Initial Business Model *Enterprise*
b. Business details that complement the business model

Current System & Technology (Current System & Technology): aims to document and define all technology platforms and systems used by the Enterprise today and provide a reference for migration in the long term. Meanwhile, what must be generated in this phase is called the Information Resource Catalog (IRC), which is also called the system encyclopedia or inventory system. The steps to create an IRC are as follows:

a. Define the scope, objectives and framework of the IRC.
b. Preparation for data collection.
c. IRC data collection.
d. Enter data.
e. Validate and review draft IRC.
f. Drawing schematic.
g. Distribute IRC.
h. IRC administration and maintenance.

IRC documentation is made using the help of matrix relationships between business processes and the technology used, while BPMN is used for illustration. The result of the current System and technology stage is the Information Resources Catalog (IRC) or System Encyclopedia.

Layer 3, Data Architecture: defines the main types of data needed to support business activities. The data architecture consists of data entities, where each data has attributes and relationships to other data. Guidelines in defining data architecture are [5] :

a. Register prospective data entities by reviewing the business model and description of the systems and technologies used.
b. Specify the entity to be used.
c. Define each of these entities and document them (ER-Diagram).
d. Connect data entities with detail business functions.

The results of this data architecture stage are, a conceptual data model that describes the details of the data Application Architecture (Applications Architecture): defines the main types of applications needed to manage data and support business functions. The application in question is the process of defining any application that will manage data and provide information to management on its business functions.

The five stages for creating an application architecture are as follows:

a. Register candidate applications.
b. Define the application.

c. Relate application to function.
d. Analysis of the impact of existing applications.
e. Distribute application architecture.

The results at the application architecture stage are, the conceptual application model which refers to the conceptual data model so that it is consistent, comprehensive, and complete.

Technology Architecture: defines the technology platform needed to provide an environment for applications that will manage data and support business functions. The four stages of creating a technology architecture include:

a. Identify technology principles and platforms.
b. Define platform and distribution.
c. Relate technology platforms to business applications and functions.
d. Distribute technology architecture.

The result of the Technology Architecture stage is a conceptual model that defines a technology platform that is consistent with the data application architecture and business model.

Layer 4, Implementation/Migration Plans: defines the stages for application deployment, implementation schedule, cost/benefit analysis and determines a clear path to move from the current position to the desired position in the future, organization of the new information system, and setting standards or procedures. The stages of implementation planning include [5] :

a. Determine the sequence of applications to be built.
b. Designing a scheduleal stages of implementation.
c. Determine the success factors and produce appropriate recommendations.

The result of the Implementation phase is a migration strategy that emphasizes strategic changes from the current business position to the position of the destination in the future.

RESULTS AND DISCUSSION

In the research methodology approach in preparing the Enterprise architecture planning at the Kelurahan Sindangjaya Office, this research consists of the EAP methodology which consists of the following stages:

1) Initialization of planning.
2) Current business and technology models.
3) Data architecture, application architecture, and technology architecture [1].

Business Functional Area Overview

The identification of the main functional areas at the Kelurahan Sindangjaya Office is described in the form of a value chain. The scope of EAP implementation at the Kelurahan Sindangjaya Office is limited to the Government section which is the core business of Kelurahan Sindangjaya Office activities with its supporting sections, namely: Financial Management, Employee Governance, Facilities and Infrastructure Management.

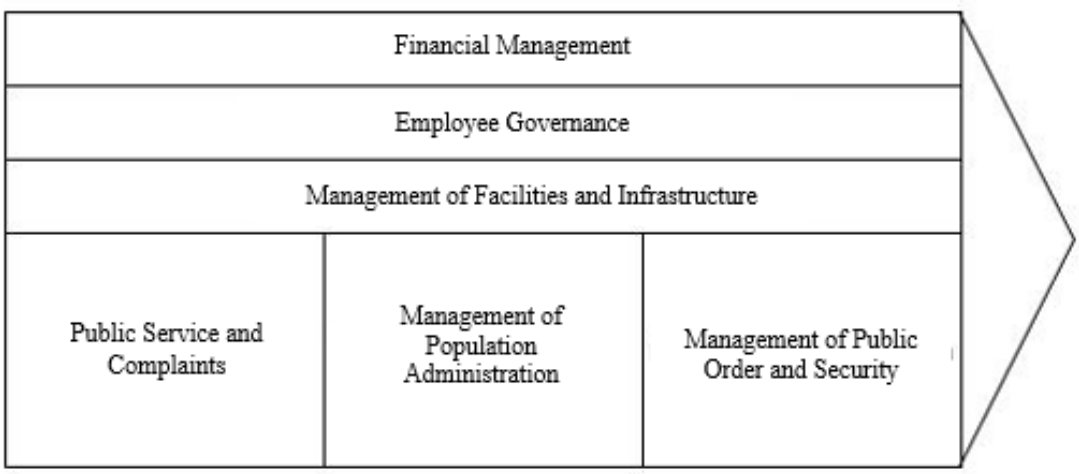

Figure 2 : Kelurahan Sindangjaya Office Value Chain

Each activity is described below:

Main Activities :

1. Public Service and Complaints.

Public service activities for residents of Sindangjaya Village in publishing various types of letters and managing complaints from residents.

2. Population Administration Management.

Activities in making population reports which are updated every month.

3. Security & Order Management.

Activities in the field of security and public order, such as receiving and recording incidents, secure an activity in the Sindangjaya sub-district area.

Support Activities:

1. Financial/Budget Management
2. Employee Governance
3. Facilities and Infrastructure Management

Function Hierarchy Chart

To model business in organizations, there are various techniques such as: function hierarchy charts, Use Case diagrams, Use Case scenarios and Class Diagrams. The main and supporting functions as described above are broken down into sub-functions. The business function hierarchy chart of the Kelurahan Sindangjaya Office can be described as follows:

1. Governance

1.1 Public Service and Complaints

1.1.1 Receipt of files and verification of files

1.1.2 The process of making letters

1.1.3 Print letters

1.1.4 Verification and Signing of Letters

1.1.5 Registration letter number

1.1.6 Receipt of Complaints

1.1.7 Complaint Report Process

1.1.8 Results or Output of Complaints

1.2 Population Administration

1.2.1 Total Population Data at the beginning of the month

1.2.2 Calculation of Population Data Moving In

1.2.3 Calculation of Population Data Moving Out

1.2.4 Calculation of Population Births

1.2.5 Calculation of Population Mortality

1.2.6 Process of updating population data at the end of the month

1.3 Security & Order Management

1.3.1 Active RW Security and Security System Data Collection

1.3.2 Data Collection of Linmas Members

1.3.3 Making a schedule for taking care of the Linmas

1.3.4 Recording of Daily Limas Reports and Incident Reports

1.3.5 Preparation of Monthly Limas Report

2. Financial/Budget Management

2.1 Budget Planning

2.2 Monthly Cash Budgeting

2.3 Selection of the General Plan for the Procurement of Goods/Services

2.4 Issuance of DPA (Budget Implementation Documents)

2.5 Budget Execution

2.6 Budget Changes

2.7 Budget Return

3. Employee Governance

3.1 Determining the Needs of Honorary Employees

3.2 Recruitment of Honorary Employees

3.3 Honorary Employee Recruitment

3.4 Active Honorary Employee Data Collection

3.5 Honorary Employee Performance Evaluation

3.6 Decision to Continue or Not (Employment Contract)

4.Facilities and Infrastructure Management

4.1 Facilities and Infrastructure Planning

4.2 Procurement of Facilities and Infrastructure

4.3 Recording of Facilities and Infrastructure

The value chain analysis in the previous section describes the functions carried out by the Enterprise but cannot be understood by organizational actors because they are considered different from the job descriptions and organizational units they have because value chain analysis emphasizes cross functions. In order for the business model to be well understood, the defined business functions can be linked to organizational units in the form of a matrix. The business function matrix with organizational units illustrates who is the decision maker for each process [4].

System Proposal

Explain the proposed workings of the system in the future which will be described through Use Case diagrams and detailed using Use Case scenarios.

Use Case Diagram of Public Service and Complaint System

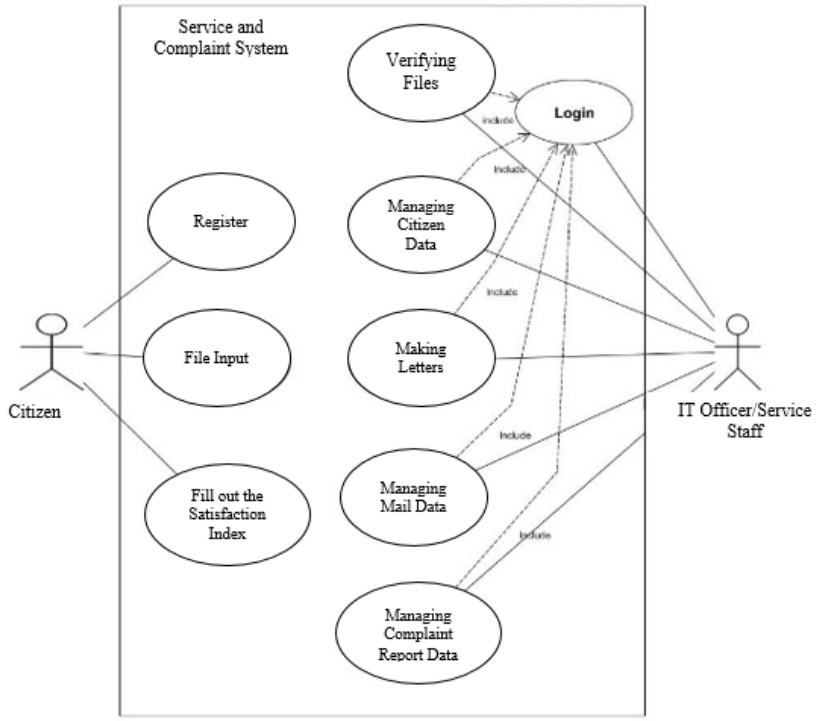

Figure 7 : Use Case Diagram of Public Service and Complaints System

Use Case Diagram of Population Administration System

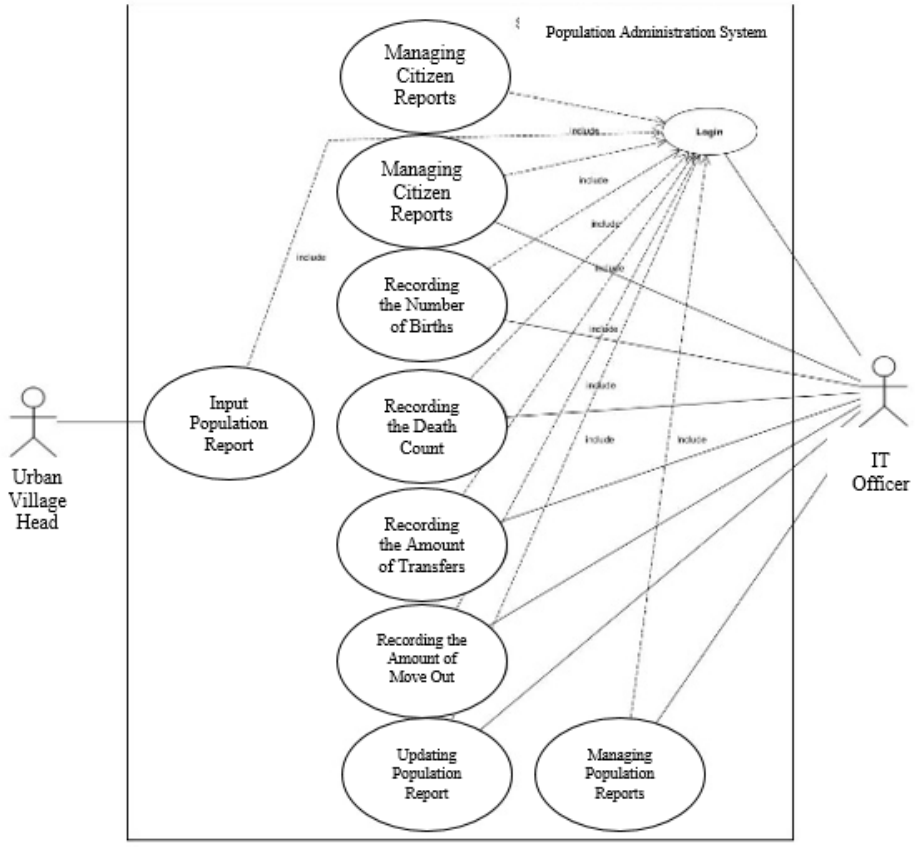

Figure 8 : Use Case Diagram of Population Administration System

Use Case Diagram of Security and Order System

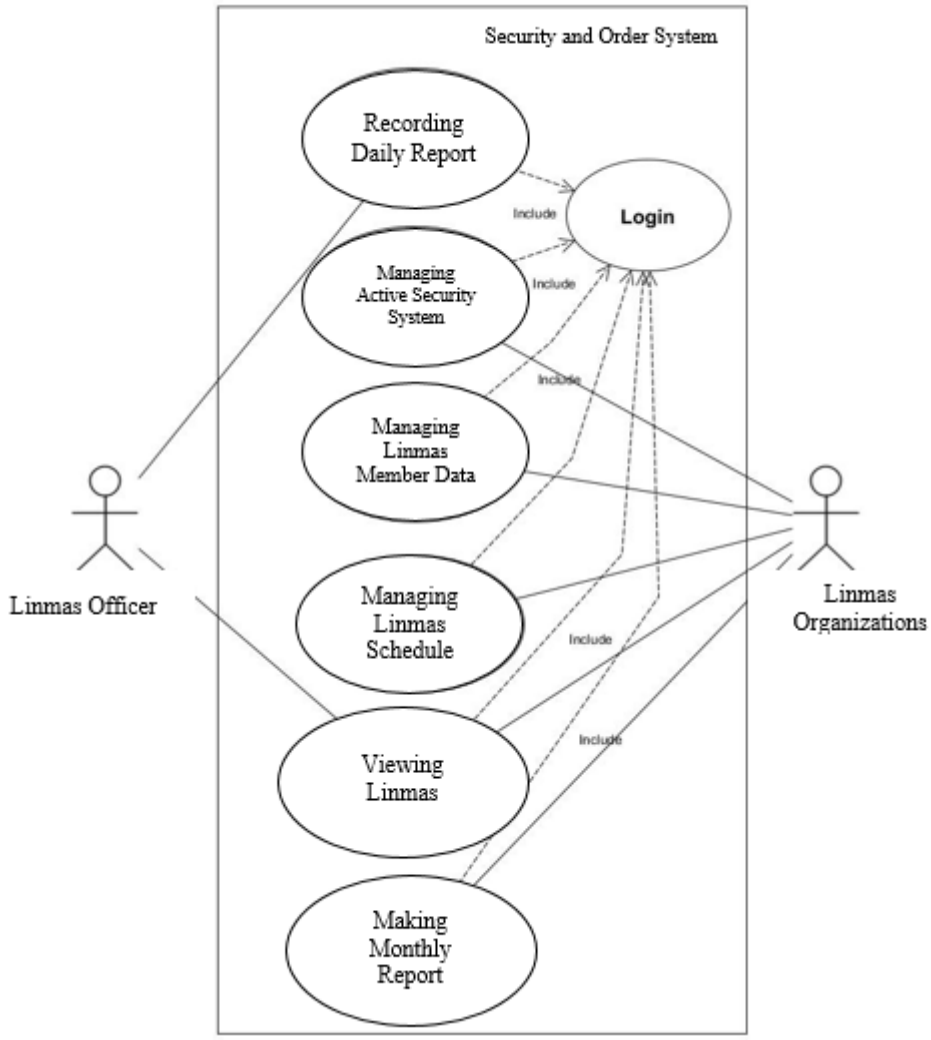

Figure 9 : Use Case Diagram of Security and Order System

Data Architecture

The data architecture is presented in the form of a Class diagram. Class diagram is a description of the relationship between classes or tables used in the system. To make it easier to understand the diagram, Class diagrams will be broken down based on the main functional areas in the business model at the Kelurahan Sindangjaya Office. Solving in some of these diagrams aims to make the diagrams easier to read and understand. The following is the class diagram:

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Class Diagram of Public Service & Complaints

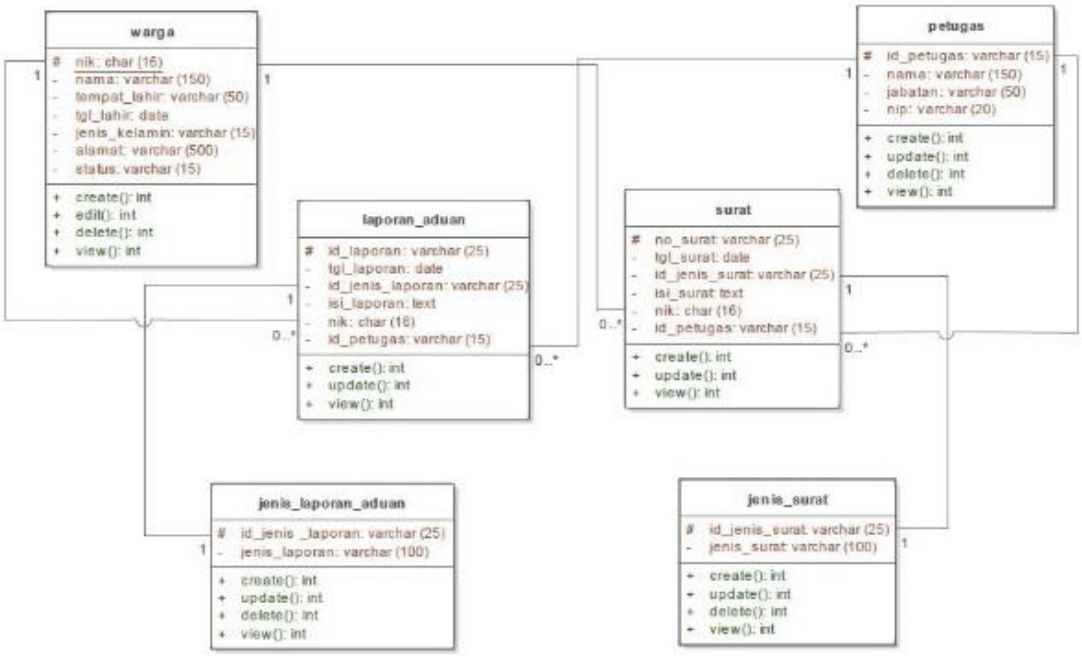

Figure 10 : Class Diagram of Public Service and Complaints

Class Diagram of Population Administration

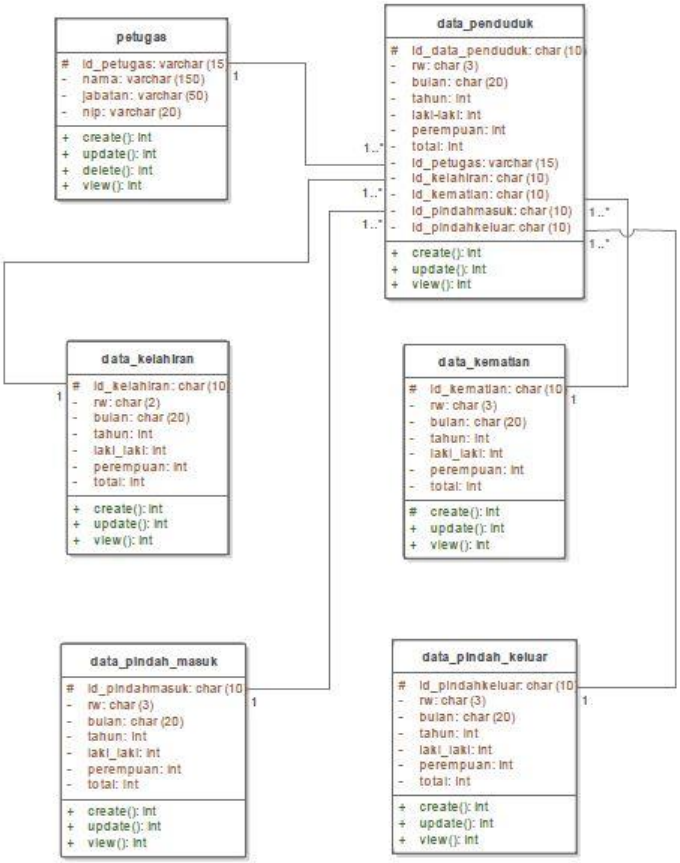

Figure 11 : Class Diagram of Population Administration

Class Diagram of Public Order and Security

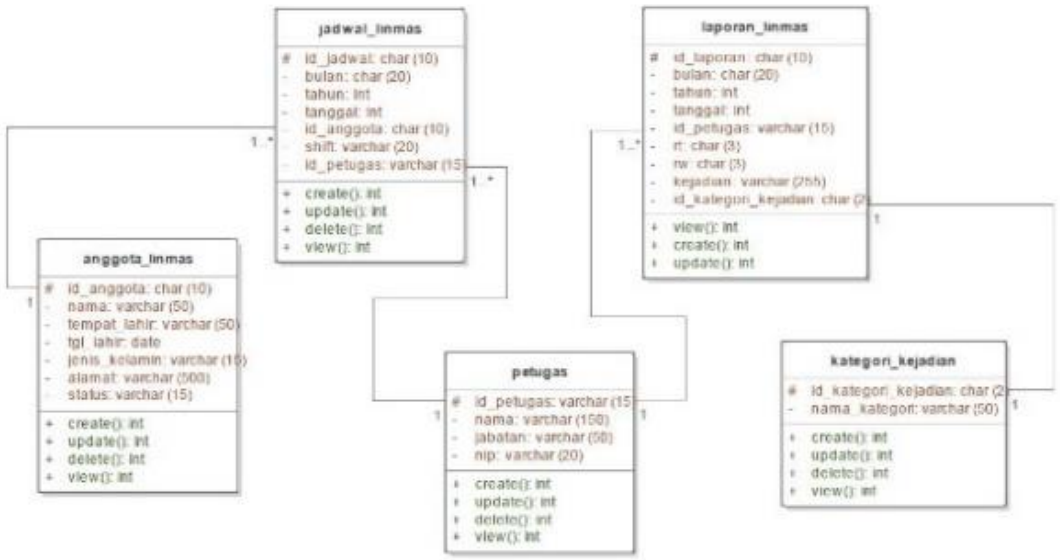

Figure 12 : Class Diagram of Public Order and Security

Application Architecture

Candidate Application

The purpose of this stage is to identify the applications needed to manage data and support the business. The definition of application candidates uses the four stage life cycle tool used in the previous section to decompose stewardship, so a list of application candidates can be determined to support the main business processes of the Kelurahan Sindangjaya Office in providing information. The list of candidate applications is listed in the following table [3]:

Table 1 : Application Candidates

No	Application Group	No	Application Candidate
1.	Service Information System and Public Complaints	1.1	Registration Information System
		1.2	Mail Management Information System
		1.3	Report Management Information System
		1.4	Community Satisfaction Index Management Information System
2.	Population Administration Information System	2.1	Population Data Information System
		2.2	Population Report Information System
		2.3	RW . Population Report Information System
3.	Security & Order Management Information System	3.1	Linmas Management Information System
		3.2	Active Security Information System Management
		3.3	Linmas Report Information System
4.	Village Budget Information System	4.1	Village Budget Management Information System
		4.2	RW Budget Management Information System
5.	Employee Information System	5.1	Honorary Employee Management Information System
6.	Facilities and Infrastructure Information System	6.1	Facilities and Infrastructure Management Information System

Technology Architecture

Identification of technology platforms is a hierarchical decomposition definition of the types of technology platforms contained in an Enterprise. The table below shows the technology platforms at the Kelurahan Sindangjaya Office which are divided into three major groups, namely hardware, software, and communication devices [3].

Table 2 : Technology Architecture

Group	Type
Hardware (Hardware)	1. Microcomputer a. Server PCs (Intel) b. PC Client (Intel) 2. Input Devices (Input Devices) a. Mouse b. Keyboard c. Scanner 3. Output Device (Output Device) a. Line Printer b. Monitor c. Speaker 4. Media Storage (Media Storage) a. Hard Disk b. Compact Disk c. Removable Disk
Software (Software)	1. Operating System (Operating System) a. Microsoft Windows 2008 Server b. Microsoft Windows 7 c. Microsoft Windows 10 2. Database Management System (DBMS) a. SQL Server b. MySQL 3. Programming Language a. Visual Basic b. PHP
Communication Device	1. Network (Network) a. LAN b. WAN c. Internet 2. Phone a. Fax 3. Network Device a. Rj45 (UTP/STP) b. Hub c. Router Modems d. Switch e. Access Point

At this stage, the existing Sindangjaya Kelurahan Office applications have been identified and will be related to the business functions it supports and also to the technology platform. The purpose of this stage is to know the business functions that are supported by applications and applications that are supported by technology. The applications defined in IRC are related to the lowest level business functions defined in the business model [3].

According to the results of the analysis, existing applications support 15 business functions out of a total of 35 business functions, of which all business functions

supported by applications are described in the following table.

Application Supported Business Functions:

Table 3 : Business Functions Supported by Applications

No.	Function	description
1	1.1.2	Letter writing process
2	1.1.3	Print letter
3	1.1.6	Complaint Report Receipt
4	1.1.7	Complaint Report Process
5	1.1.8	Complaint Report Results or Output
6	2.1	Budget Planning
7	2.2	Monthly Cash Budgeting
8	2.3	Selection of the General Plan for the Procurement of Goods/Services
9	2.4	Issuance of DPA (Budget Implementation Documents)
10	2.5	Budget Execution
11	2.6	Budget Change
12	2.7	Budget Return
13	4.1	Facilities and Infrastructure Planning
14	4.2	Procurement of Facilities and Infrastructure
15	4.3	Recording of Facilities and Infrastructure

Business Functions that are not yet supported by the Application:

Table 4 : Business Functions Not Supported by Applications

No.	Function	description
1	1.1.1	File acceptance and file verification
2	1.1.4	Letter Verification and Signing
3	1.1.5	Registration letter number
4	1.2.1	Total Population Data at the Beginning of the Month
5	1.2.2	Calculation of Population Data Moving In
6	1.2.3	Calculation of Population Data Moving Out
7	1.2.4	Population Birth Count
8	1.2.5	Population Death Count
9	1.2.6	End of Month Population Data Update Process
10	1.3.1	RW Active Security System Data Collection
11	1.3.2	Linmas Member Data Collection
12	1.3.3	Making a schedule for taking care of the Linmas
13	1.3.4	Limas Daily Report Recording and Incident Report
14	1.3.5	Making a Monthly Limas Report
15	3.1	Determining the Needs of Honorary Employees
16	3.2	Honorary Employee Recruitment
17	3.3	Honorary Employee Admission
18	3.4	Active Honorary Employee Registration
19	3.5	Honorary Employee Performance Evaluation
20	3.6	Decision to Continue or Not (Employment Contract)

Recommendation

The implementation plan is a plan prepared to implement the Enterprise architecture.

Enterprise architecture plans to be implemented are based on business models, information resource catalogs and predefined architectures. The initial step taken is to arrange the order/priority of system implementation based on the application architecture that has been prepared previously, so from here it can be seen that the Enterprise architecture that will be implemented is the implementation based on the order of the application architecture that has been generated, by first implementing the planning initiation, business model, catalog of existing information resources and data architecture. The sequence of implementation plans is also carried out by considering the grouping of applications based on the application portfolio. For technology architecture, because what is being done is to define the main technology requirements to support applications and data, and not a detailed requirements analysis, the implementation must still be seen based on real conditions that will exist later. But at least, the technology architecture that has been defined can provide an overview of the technology requirements that must be provided to support applications and data [2].

The relationship between the application and the data entities presented in the application and entity relationship matrix is the result of an application architecture that has benefits, including:

1. Shows the state of data sharing in the application architecture;
2. Can be used to create a sequence of applications to be built with the principle "applications that create or create data should be applied before applications that use or use". This principle is important to determine the priority order criteria for applications to be developed in accordance with the architecture that has been created. With this principle, the sequence of application implementations as suggested in the EAP can be done. Here are what application systems should have new development and what applications already exist.

Table 5 : New and Existing Development Application Systems

No	Application System	Information
1	Registration Information System	New Development
2	Mail Management Information System	Already available
3	Report Management Information System	Already available
4	Community Satisfaction Index Management Information System	New Development
5	Population Data Information System	Already available
6	Population Report Information System	New Development
7	RW . Population Report Information System	New Development
8	Linmas Management Information System	New Development

No	Application System	Information
9	Active Security Information System Management	New Development
10	Linmas Report Information System	New Development
11	Village Budget Management Information System	Already available
12	RW Budget Management Information System	New Development
13	Honorary Employee Management Information System	New Development
14	Facilities and Infrastructure Management Information System	New Development

CONCLUSION

The conclusions obtained in the process of working on this thesis are as follows:

1. The systems and technology currently running at the Sindangjaya Sub-District Office have not fully used the information system as a whole and there is no integration in each system to run existing business processes. The business process at the Kelurahan Sindangjaya Office is divided into 2 parts, namely the main activities and supporting activities.

The main activities at the Kelurahan Sindangjaya Office are:

a. Public Service and Complaints

1. File acceptance and file verification
2. The process of making letters
3. Print letters
4. Verification and Signing of Letters
5. Registration letter number
6. Receipt of Complaints
7. Complaint Report Process
8. Complaint Report Results or Outputs

b. Population Administration Management

1. Total Population Data at the beginning of the month
2. Calculation of Population Data Moving In
3. Calculation of Population Data Moving Out
4. Calculation of the Number of Births of the Population
5. Calculation of Population Mortality
6. The process of updating population data at the end of the month

c. Security & Order Management

1. Active RW Security and Security System Data Collection
2. Data Collection of Linmas Members
3. Making a schedule for taking care of the Linmas
4. Recording of Daily Limas Reports and Incident Reports
5. Preparation of the Monthly Limas Report

Supporting activities at the Kelurahan Sindangjaya Office are:

a. Financial/Budget Management

1. Budget Planning
2. Determination of Monthly Cash Budget
3. Selection of the General Plan for the Procurement of Goods/Services
4. Issuance of DPA (Budget Implementation Documents)
5. Budget Execution
6. Budget Change

7. Budget Return

b. Employee Governance

1. Determining the Needs of Honorary Employees
2. Honorary Employee Recruitment
3. Acceptance of Honorary Employees
4. Active Honorary Employee Data Collection
5. Honorary Employee Performance Evaluation
6. Decision to Continue or Not (Employment Contract)

c. Management of Facilities and Infrastructure

1. Facilities and Infrastructure Planning
2. Procurement of Facilities and Infrastructure
3. Recording of Facilities and Infrastructure

2. The process of making a blueprint for the Kelurahan Sindangjaya Office can be made using the Enterprise Architecture Planning (EAP) method which produces an Enterprise architecture, namely:

a. Data Architecture

The data architecture is explained by describing the Class diagram and also the table structure.

b. Application Architecture

Based on the business processes and data architecture obtained, it can be described only application recommendations needed by the Kelurahan Sindangjaya Office.

c. Technology Architecture

Technology architecture is needed as hardware to run recommended information systems or applications, adjusted to what hardware specifications are needed.

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