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Information System Architecture in Local Government (A Case Study at XYZ Local Government)

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Abstract

Implementing information systems within public organizations often encounters failures, one of which stems from inadequate information system planning. This issue also occurs in local government sectors, where the procurement and development of information systems must be preceded by proper planning. Information system architecture—or the planning framework for developing an information system—is therefore essential. This study aims to describe an information system architecture model for local government as part of developing a strategic plan (blueprint) related to information technology (IT). The architecture is designed for the regional financial management sector, illustrating application architectures based on identified needs and providing guidance for IT implementation solutions within the local government.

I. INTRODUCTION

Today, data and information are classified as technological assets. The rapid growth of information technology has enabled the public to access information more easily and expand their knowledge. To keep up with technological progress, local governments have also begun updating their data systems by adopting various information technologies that support regional data management and improve governmental performance. For example, Sidoarjo Regency aims to implement information technology to access data from its Regional Work Units (SKPD).

Given the large number of reports that must be processed and accounted for, an appropriate information system must be established to support fast and accurate decision-making. With suitable information technology, reports can be accessed and verified quickly and individually, resulting in more efficient and time-saving administrative processes.

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According to Nurhayati [1], the provision of data and information by the government is an effort to achieve public accountability and build a clean, authoritative, and responsible government image. Problems and potentials can be easily identified and directly accessed through web-based interfaces when data is managed in an integrated database system.

Turban, McLean, and Wetherbe [2] define information architecture as a mapping or plan of organizational needs. The goal of information architecture planning is to provide a reference model of organizational information that guides software application design while reducing information redundancy.

Architecture also plays a crucial role in implementing the Electronic-Based Government System (SPBE) to ensure integration. For this reason, the Ministry of Administrative and Bureaucratic Reform (PANRB) encourages the acceleration of developing a national SPBE architecture. The SPBE architecture acts as a fundamental framework describing the integration of business processes, data and information, SPBE infrastructure, SPBE applications, and SPBE security to produce integrated electronic government services. Once the National SPBE Architecture is established, each institution is mandated to develop its own institutional and regional SPBE architecture [3].

However, several regions still lack proper implementation of information architecture, particularly in financial management. According to Member V of the Audit Board of Indonesia (BPK), Isma Yatun, weaknesses remain in regional asset management, including poor administrative order and excessive payments in capital expenditures. Lack of internal control and non-compliance with regulations were also found in the financial reports of East Java regional governments for the 2017 fiscal year [4]. These issues must be addressed to avoid irregularities that may result in state losses.

Further BPK audits of the 2018 Regional Government Financial Reports (LKPD) across nine regions—Bojonegoro, Lamongan, Mojokerto, Pamekasan, Ponorogo, Sidoarjo, Sumenep, Madiun City, and Surabaya—revealed additional problems, including inadequate applications for preparing financial and asset management reports. This deficiency may negatively affect the allocation of regional budgets (APBD) [5].

These problems highlight the need for solutions and structured methods to manage regional finances and assets more effectively and in line with intended objectives. Although only some local governments have implemented proper information architecture, improved and updated methodologies are necessary to enhance organizational structure both at the regional and higher administrative levels.

The research problem addressed in this study concerns the existing form of financial and asset management in local governments, particularly in developing a strategic plan (blueprint) for regional IT management that can be used across governmental sectors. The proposed solution is an information architecture model consisting of applications for managing regional information and financial data. This article is therefore designed to assist local governments in Indonesia in managing financial and asset data through an integrated application, enabling faster information retrieval for decision-making and supporting compliance with governmental regulations.

II. METHODS

In preparing this article, the author employed a qualitative descriptive research method. Qualitative descriptive research is a method that seeks to describe or illustrate the research object based on observable facts as they are [6]. Qualitative research serves as a procedure used to obtain accurate information and real conditions that are relevant to solving a particular problem [7].

For data collection, the author used the literature study technique, in which data are obtained from various relevant sources. The literature study method involves searching for and gathering information from multiple materials related to the research topic. These data originate from journals, research reports, news articles published on the internet, and websites associated with the research theme [8].

The data analysis technique used by the author is qualitative analysis. The author conducted an analysis of issues related to village governance as reported in online news platforms and subsequently formulated the necessary ideas for the article. In addition, the author examined various academic journals relevant to the research theme [9].

III. RESULTS AND DISCUSSIONS

A. Information Systems

According to Yakub, a system is a network of interrelated procedures that are brought together to perform specific activities or achieve certain goals [10]. Information, meanwhile, is data that has been processed and possesses meaning [11]. An information system is defined as a system within an organization that brings together the needs of daily transaction processing, supports operational functions, and integrates managerial and strategic activities to provide relevant reports for internal and external stakeholders [12].

Laudon states that an information system consists of interrelated components that work together to collect, process, store, and present information to support decision-making, coordination, management, analysis, and visualization within an organization [13].

Ardana and Lukman identify several characteristics of information systems: (1) they function as an integrated part of an organization; (2) they consist of multiple components such as employees, management, and computer subsystems; (3) they maintain strong interrelations among procedures and managerial interactions; and (4) they aim to produce high-quality information that is accurate and timely for stakeholders [14].

Information systems are designed to produce useful information that must meet three key pillars: relevance, timeliness, and accuracy. If information is timely but accessed by malicious actors, or if the information is accurate but delivered too late, it becomes less valuable for decision-makers. As computers evolve, information systems have become increasingly easy to implement.

O'Brien explains that information systems consist of several main components [15]:
a) Data Resources – Input data that are processed into information, which later form reports, knowledge, and outputs for organizational operations.
b) Human Resources (Brainware) – Individuals who operate and control the information system; without them, the system cannot function.
c) Software Resources – Programs and procedures that define the flow and processing of data.
d) Hardware Resources – Physical devices required to run the software; both are interdependent.
e) Network Resources – Networks that enable data exchange, development, communication, and information dissemination.

B. Information Architecture

According to the IEEE 1471-2000 standard, architecture is the fundamental organization of a system, consisting of components, the relationships among components and with the environment, and the principles guiding system design and evolution [16]. Similarly, The Open Group describes architecture as the foundational organization of a system that connects components within a system environment and is

governed by design and evaluation rules [17]. Architecture is widely used in various domains, from urban planning to hardware development and information system construction.

Information architecture refers to the structured organization of information to enable better understanding, simplify access, integrate systems, and help users find, understand, and manage information efficiently [18]. It plays an important role in ensuring that information is well-organized and easy to interpret, especially in system development within an organization.

The primary goal of implementing information architecture is to reduce information redundancy while supporting organizational business strategies and serving as a foundation for software application design. In constructing information system architecture, two major elements are typically defined: data architecture **and** application architecture**.**

a) Data Architecture

Data architecture identifies data entities, describes associations between data and processes, and maps ata schemas. It specifies the characteristics and usage of data within application architecture. Relationships among data entities are often presented in diagram form. In financial and asset management domains, numerous data entities are typically required to describe interactions and processes comprehensively.

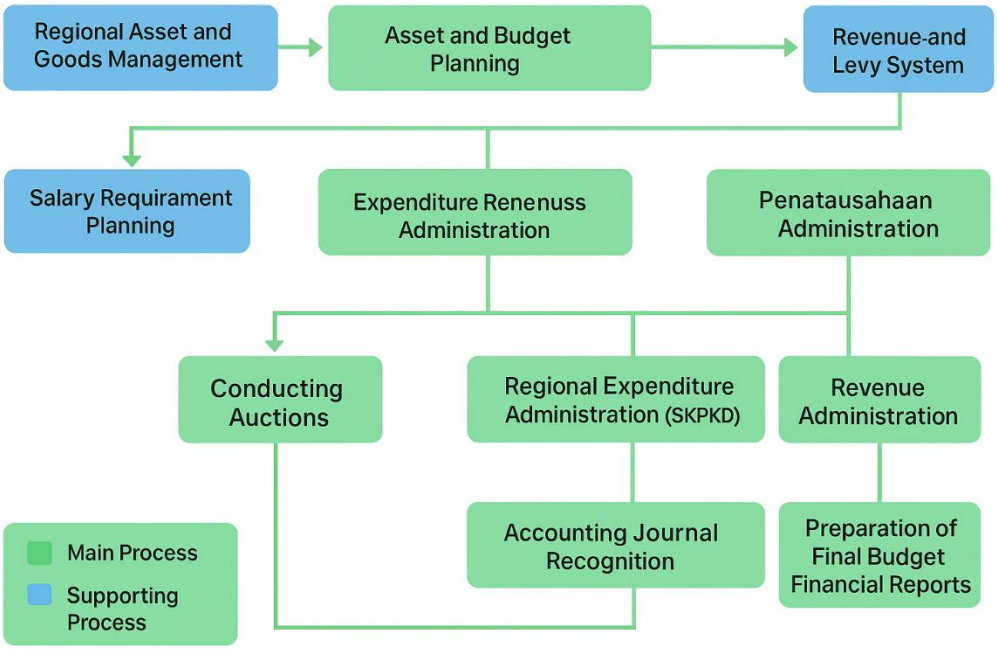

Figure 1. The regional financial management process

b) Application Architecture

Application architecture is the definition of applications used to manage data and support business functions. Each application is identified according to information needs and occupies its respective role so that the definition of each application for managing data becomes clear. One example of such a model is an application for managing regional finance and assets.

Table 1. Regional Financial and Asset Management Application

No.	Code	Application Name	Function	Entity
1	AMAB	Regional Asset and Goods Management Application	Stores regional assets and goods, plans procurement, distributes, and records asset depreciation.	Regional Asset Division / General Section
2	SPEG	Personnel System	Records employee master data, tracks employee transfers in and out, promotions, and ranks affecting basic salary, allowances, and pensions.	Regional Personnel Agency (BKD)
3	SGT	Salary and Allowance System	Records distribution of salaries and allowances for each employee per organizational unit, provides death benefits, and projects salary needs for the next fiscal year.	Payroll Treasurer
4	SPP	Planning and Budgeting System	Manages development needs, especially regarding budgeting, sets priorities and budget ceilings (PPA) and general budget policies (KUA), and issues APBD and budget implementation documents (DPA) as the basis for regional revenue and expenditure.	Regional Development Planning Agency (BAPPEDA) and Budgeting Division
5	STU	Office Administration System	Manages realization of revenue and expenditure budgets at the work unit level (SKPD) equivalent to a department. Final output includes functional accountability reports (SPJ) and general cash book (BKU).	SKPD Revenue and Expenditure Treasurer
6	PERBEN	Regional Treasury System	Manages regional cash, fund provision, and issuance of fund disbursement orders (SP2D).	Regional Cash Office
7	SPRD	Regional Revenue and Retribution System	Records non-tax retribution revenue collected by each SKPD with revenue budgets from mandatory retributions.	Regional Revenue Agency and SKPD Revenue Treasurer
8	SAKD	Regional Financial Accounting System	Records journals for all financial transaction evidence, compiles the general ledger, and prepares final financial reports including balance sheets, budget realization reports (LRA), surplus/deficit changes (SILPA), and operational reports (LO).	Accounting and Reporting Division
9	Portal	Government Portal	Information system accessible to the public, employees, entrepreneurs/companies, and	Regional Electronic Data

			other parties requiring information related to regional financial and asset management.	Service Office (KPDE)
10	Monev	Monitoring and Evaluation System (Monev)	Executive system containing performance achievement graphs for government planning and sustainable regional development.	BAPPEDA and Regional House of Representatives (DPRD)

C. Government Information System

A government information system is an information system used within a government to facilitate data collection, process data, and present information to achieve governmental objectives and support decision-making. Typically, a government information system is used to record incoming data using a database so that reports are well-stored and information can be quickly accessed by anyone.

Regions that do not have an information system will struggle to resolve governmental issues because it is impractical for government officials to meet citizens every day who want to raise issues about their region, and it is impossible for officials to individually ask for each citizen's identity. With an information system, citizens can submit complaints or input data at regional service centers, making it easier for the government to access and search for citizen information. Moreover, government officials can make decisions more efficiently without having to gather data repeatedly.

The development of an information system must be accompanied by the readiness of government resources or the organization itself. However, if some aspects are already functioning well, the information system can be assembled immediately. For example, even if there is a budget but the culture is still technology-averse, the community will follow the process if the government takes action. This can be done through socialization and providing an overview to the public about the importance of current information technology.

According to McLeod (1995), five types of resources need to be considered to improve the use of information systems or technology: human, material, machine, money, and information. The development of information technology, especially in government, must also consider a holistic concept. For instance, in evaluation, planning and design, management, development, and utilization. The success of an information system also depends on the capabilities of government officials. Leaders must be committed to continuously advancing information technology in their region.

D. Information System Architecture Model in Local Government

Based on the TEKNOMATIKA journal, 2015, several factors need to be considered in determining an information system architecture model:

a) Determine the concept of key applications needed;

b) Define the logical structure of the information system that describes the exchange of information between application systems and the role of each user;

c) Design the composition of modules within the information system.

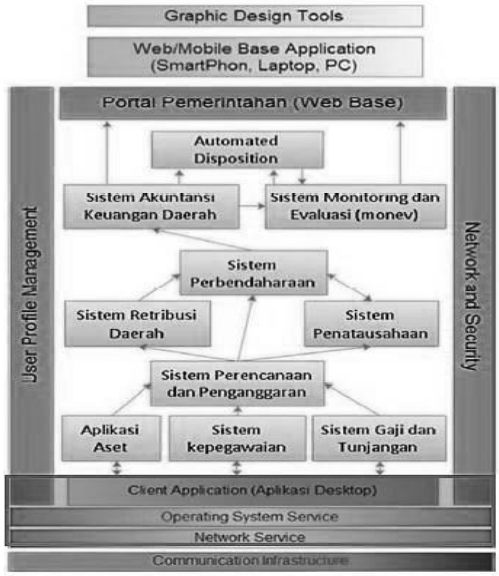

Figure 2. Information System Architecture (TEKNOMATIKA Journal, 2015)

In Figure 2, graphic design tools can use MS Visio or E-Draw Max as tools for creating the architecture model design. Web/Mobile-Based Applications can be accessed using laptops/PCs and Android-based smartphones, with commonly used browsers such as Mozilla Firefox and Chrome, depending on the device. The web portal service is managed by the Department of Transportation, Communication, and Informatics as the CEO of the local government.

Client Applications are a collection of applications that run on a single device. These applications determine asset placement, personnel systems, and salary systems, providing input for planning and budgeting in the preparation of the regional government's APBD (Regional Budget).

The recording of cash inflows and outflows through the treasury acts as a transactional bridge in the retribution and administration systems, which are integrated with the treasury system. From the treasury system, data is transferred to the accounting system to create double-entry journals, general ledgers, and final financial reports of the local government.

IV. CONCLUSIONS

The information system architecture used in local governments consists of a data architecture that can identify and describe data through tables. One method of obtaining data is by inputting personnel information for each region. In addition, the application architecture also affects the pattern of financial data management in a region, such as applications for managing regional finances and assets.

Government information systems are particularly essential in regions that are not technologically literate, as they help create a more appropriate and efficient organizational structure. The development of an information system must be accompanied by the readiness of government or organizational resources.

The information system architecture model in local governments can take the form of graphic design tools or web/mobile-based applications. This architecture model serves as a bridge between different systems for regional government financial and asset reporting. Furthermore, the architecture model can be used as a reference for strategic planning and implementation by local governments.

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