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Architecture of human resource management system at universities

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Abstract. In carrying out the duties and functions of an agency, human resources are the most important part. The main function of human resource management is to ensure that the strategic objectives of the organization can be achieved and can meet the needs of institutions both in quantity and quality. This article discusses the design of human resource management information system architecture in a university which is integrated into a computer network that is capable of producing quality information to support decision making. The methodology used is The Open Group Architecture Framework (TOGAF) 9.1 which in this article is limited to the architectural stage of technology. The results of this study are in the form of blueprint list of application needs and technology infrastructure needed to support the employment function at the university.

1. Introduction

Information system (IS) and Information Technology (IT) are very influential on the function and effectiveness of the organization as a whole, where every organization seeks to implement information systems to meet the needs and support all business functions [1] [2] [3]. Refers to several research, an information system has a high capability in decision making, the system has an accurate data accessibility and efficient run-time [4], high accuracy [5], and to support a proper decision [6], low cost [7], extended accessibility [8], intensify user knowledge, increase productivity [9], provide a better data and information [10], and in the certain cases are potentially used as data storage [11].

In the implementation, IS and IT that is built must be in harmony with existing business functions [12] the implementation of a system sometimes does not always succeed in supporting existing business functions [13], some factors causing the failure of IS and IT is the lack of careful planning in determining the priority system built [14] [15], and the determination of the technology used [16].

Universities are institutions that have the task of disseminating and gathering knowledge, managing intellectual assets, to create innovative, adaptive, and superior innovations [17] [18] [19]. In general, a university has a major business process in the field of teaching which contains new admissions, education, student release, and alumni and career and supporting business processes which begins from financial management, human resource management, service units, community service, and general bureau [20] [21] [22].

One part of the college process business is the human resource management system or so-called Human Resource Management System (HRMS). Personnel is a job that manages the function and position of an employee in an agency, organization, or agency [23]. Human Resource Management

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(HRM) is one of the foundations in the survival of universities [24], a problem that often occurs where universities focus more on key business processes in establishing IS and IT so the HRM architectural design is rarely prepared and sometimes IT manufacturing between one subsystem with other sub-systems are not integrated. Typically, HRMS on universities are employee payroll systems and employee absenteeism systems, and most colleges are already feeling quite with this system so that in personnel management such as promotion, leave control, and employee performance monitoring takes a lot of time. The cause is lack of planning in HRMS.

2. Methodology

To produce an integrated SI and IT governance scheme, this study uses TOGAF 9.1 framework [25] [26], TOGAF has specific stages and support tools for implementing them. This framework was first released in 1995 and to date has reached version 9.1 issued by The Open Groups Architecture Framework [27]. The core of TOGAF is the Architecture Development Method (ADM): a process-based model that explains the steps required to develop and deploy enterprise architecture [28].

TOGAF generally has the following structure and components [29]:

2.1. Architecture Development Method (ADM)

It is a major part of TOGAF that provides a detailed overview of how to define an Architecture specifically based on its business needs.

2.2. Foundation Architecture (Enterprise Continuum)

Foundation architecture is a "Framework-within-a-Framework" in which there is a link to the relevant architecture collection, as well as providing guidance on the occurrence of different levels of abstraction shifting. Foundation architecture can be collected through ADM. There are three parts to the foundation architecture: Technical Reference Model, Standard Information and Building Block Information Base.

2.3. Resource base

This section provides information on guidelines, templates, checklists, background information and details of supporting materials that assist architects in the use of ADM.

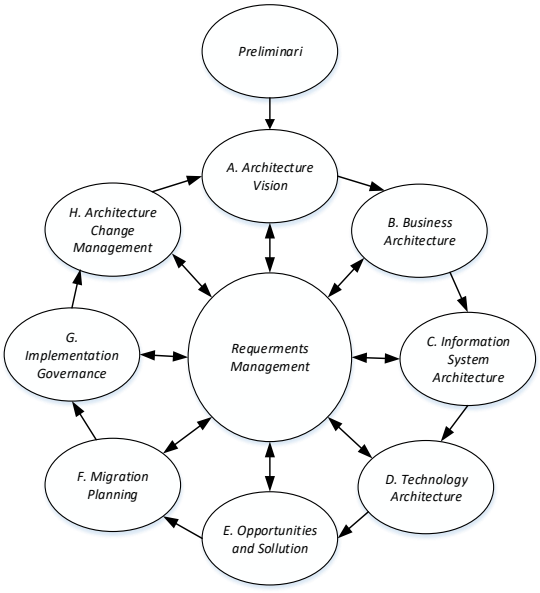


Figure 1. Architecture development method [30].

Phases of TOGAF ADM in Figure 1 can briefly explain as follows:

Phase A : Architecture Vision

Creating homogeny of views on the importance of enterprise architecture to achieve organizational goals formulated in the form of strategy and determining the scope of the architecture to be developed.

Phase B : Business Architecture
Defining the initial state of business architecture, determining the business model or desired business activity based on business scenarios.

Phase C : Information System Architecture
This stage emphasizes more on the activity of how the information system architecture is developed.

Phase D : Technology Architecture
Building the desired technology architecture, starting from determining the type of technology candidate required by using technology portfolio catalog which includes software and hardware.

Phase E : Opportunities and Solution
This stage emphasizes more on the benefits derived from enterprise architecture that includes business architecture, data architecture, application architecture and technology architecture, so that becomes the basis for stakeholders to choose and determine the architecture to be implemented.

Phase F : Migration Planning
This stage will be an assessment in determining the migration plan of an information system.

Phase G : Implementation Governance
Preparing recommendations for the implementation of governance implementation that has been done; the governance is done covering organization governance, information technology governance, and architecture governance.

Phase H : Architecture Change Management
Establish an architectural management plan of the new system by monitoring the technological developments and changes in the organizational environment, both internal and external and determining whether the next enterprise architecture development cycle will be undertaken.

3. Result and discussion

3.1. Preliminary

The preliminary stage is the initial stage of TOGAF framework, at this stage, the identification of needs is carried out. There is an involvement based on organizational structure in which the activities carried out by HRM are not only managing the usual data sources such as payroll, employee attendance, recruitment, and leave but we need a system that can support the needs of the promotion management, analysis of periodic payment increasing, reward and punishment management, staff education.

3.2. Phase A: architecture vision

At this stage, the vision of the design activity is explained. The vision of this architecture design is:

- Establish HRMS planning that is aligned with the needs of end users and the business needs of universities in managing Human Resources;
- Create an integrated system design and can be integrated with existing systems;
- In particular, with the existence of HRMS architecture, it can provide information needed both by the internal organization and external parties;
- Technically the concept in this HRMS is a multi-platform that can be accessed by various devices;
- Providing services to internal or external organizations more quickly.

3.3. Phase B: business architecture

At this stage, the identification of the functional areas related to the HRMS processes is described in Table 1.

Table 1. Functional areas on HRMS**.**

No	Functional Area	Notes
1	Payroll Management	Payroll management is the process of managing wage calculation, entering wage data, producing reports and producing financial statistics for both educators and education personnel
2	Human Resource Management	Personnel management is the process of managing personal information and comprehensive personnel activities (including Recruitment, Leave, Retirement, as well as signing, appointment and renewal of contracts, Reward and Punishment).
3	Institutional Management	Institutional management is the business process of organizational management, organizational structure, authority, relationships between institutions and management
4	Civil Service Management	Personnel management is the basis for the establishment of recruitment, training, salary management and performance appraisal. From this management colleges can gradually realize the appropriate management objectives, Improved staff capacity according to the position, improve the organizational structure according to position and appointment position according to available one; this function deserves more to be called decision support system
5	Education and Training Management	Education and training management includes capacity management of staff and lecturers by including them in training and / or further studies.
6	Performance Evaluation Management	This management provides evaluation results as a reference for personnel management, education and training, and Personnel Management. It is where the results of staff performance evaluation or lecturer can be seen with reports that can be adjusted for the evaluation results.
7	Function Management	Function management is a module that is set to improve system security by setting permissions, log management, permission and system authority

3.4. Phase C: information system architecture

Design Applications to be built apply Cloud Computing, the consideration is to support all operating systems both computer and mobile operating system (multi-platform). The system to be constructed is presented in 5 (five) layers (Figure 2), which consists of:

- Interface Layer: This layer provides a user-oriented front-end interface;
- Application Layer: This layer is an important part of the system, this layer bridging between users with the system through the list of existing applications;
- Support Layer: This layer provides basic functionality and support services for application layer functional modules, and the main functional components of the application platform and supportive services.
- Data Layer: The layer where the entire employee data is stored.

Base Layer: This layer is the basis for the HRMS which contains an operating system, software infrastructure used, server, Network and other IT infrastructure. This layer is the main foundation and is responsible for the whole process and computerized resources.

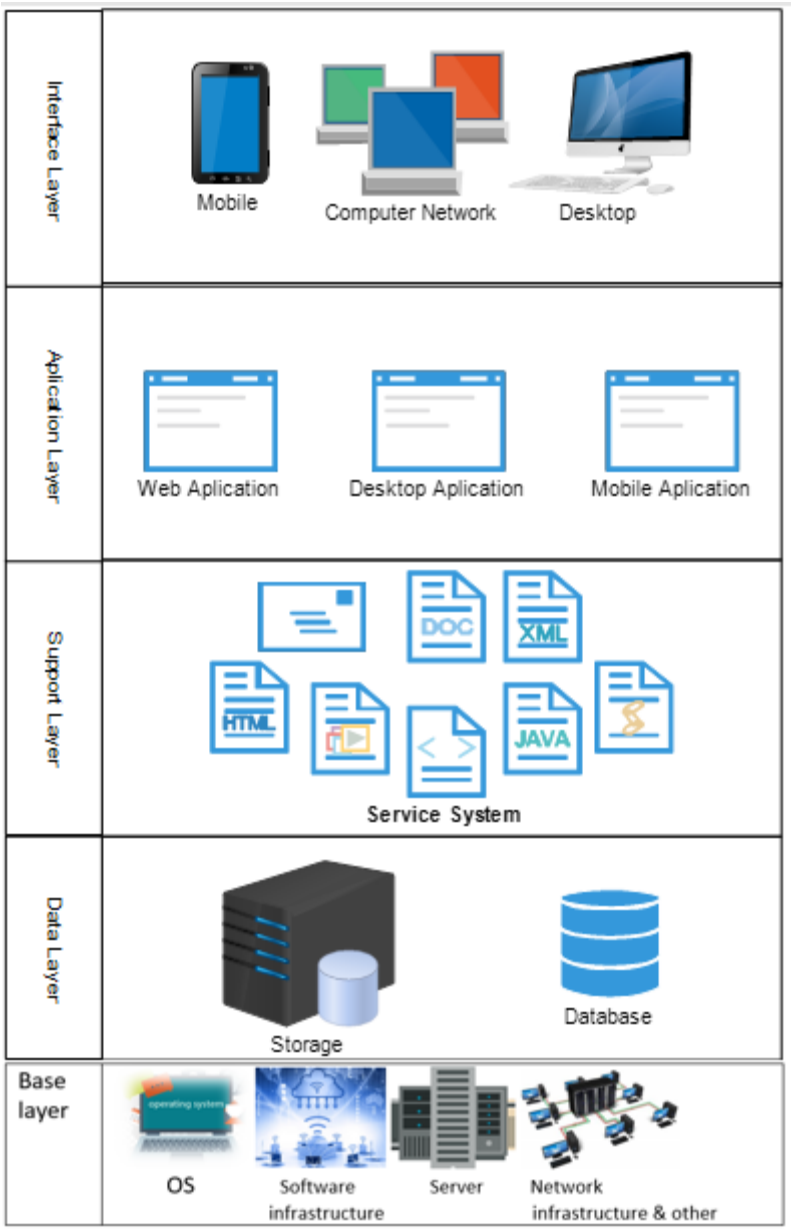


Figure 2. Architecture layer design.

3.5. Phase D: technology architecture

In planning the architecture, IS will certainly determine the technology to be used in supporting reliable information systems. In this stage, the technological alternatives needed in determining the use of technology are also considered:

3.5.1. Network architecture design. In plotting the architecture of the IS, it should be ensured that the technology to be used can support a reliable information system. Figure 3 illustrates the conceptual enterprise network. It is flexible and adaptable to accommodate changes without disturbing operations.

3.5.2. Technological Architecture Target. From the existing network architecture design, it will result in the target of technological architecture, which is derived from the principles of IS and IT development. The principles will be outlined in Table 2.

3.5.3. Disaster management strategy.

3.5.4. Business impact analysis. Determining the critical level of business processes, associated IT resources, and the recovery time period required for processing with IT should be resumed after a disaster. This analysis is carried out periodically in accordance with the specified policy.

3.5.5. Centralizing data processing in the data center. This is useful in facilitating the handling and management of all sensitive information processing resources. All sensitive data will be centralized in the data center with physical security covering adequate environmental and logical aspects.

3.5.6. Reserve facility preparation. Some of the major processing devices (determined by analysis) will have backup device facilities, to prevent lightning or burning damage due to frequent power failure.

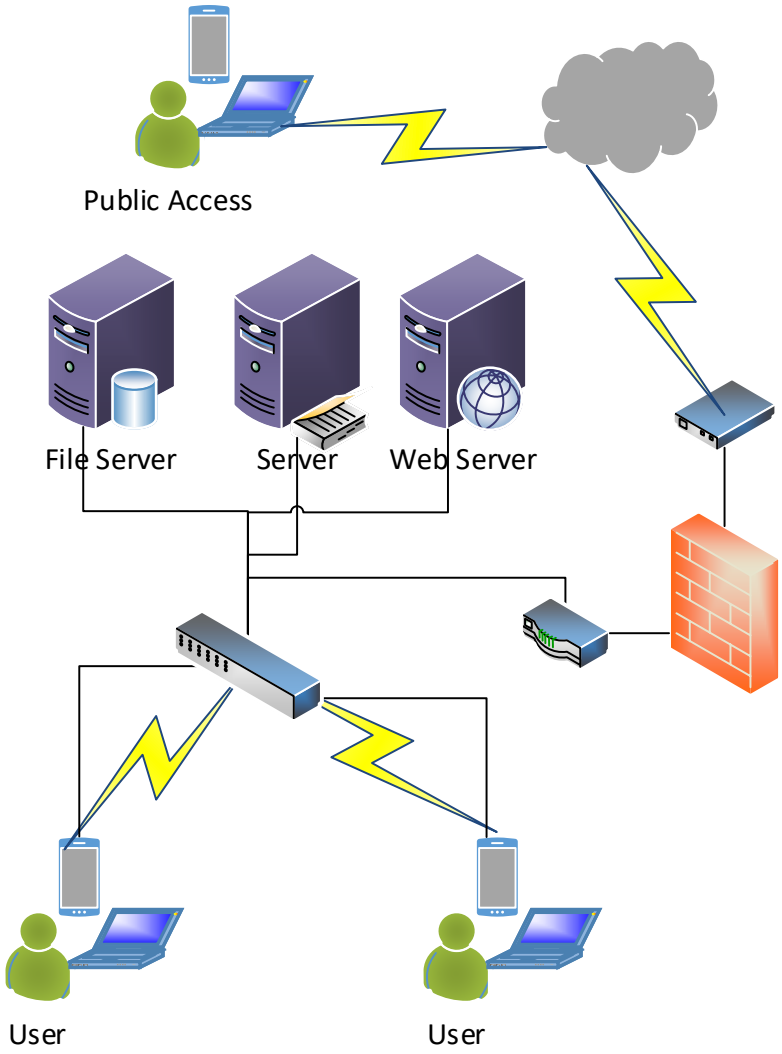


Figure 3. Network architecture design.

Table 2. Development principles of IS/IT.

No	Types	Principles
1	Hardware	1. Supporting the client-server technology; Independent against certain vendors and brands; 2. Capable of adapting to the development of future technology; 3. Based on the business need and purpose of STT Garut.
2	Software	1. Capable of adapting to all the working units; The operating system supports the use of built-in hardware and software applications; 2. Supporting the network; 3. Holding License; 4. Using open-standard concept; Multiplatform (can operate on all platforms); 5. DBMS has to be able to accommodate data transaction needs; 6. Data is made once, not redundant, and must be consistent; 7. Data belong to all members, not only belong any particular organizational units; 8. Data accessing is limited by user's access right; 9. Data is easily maintained and backed up; 10. A programming language can result in an application with GUI nature; 11. Programming language supports the object-oriented development technique; 12. Guarantees of application data security against loss and misuse of data
3	Communication Tools	1. Communication Technology supports client-server communication; 2. The built network must be reliable and internet access must be fast; 3. The Internet is used to support the accessibility of all applications; 4. Communication technology is capable of supporting business functions in the future; 5. Communication mode must be redundant and backing up to each other.

4. Conclusion

The use of TOGAF 9.1 can result in planning in the form of a list of applications and the technology design which appropriate the needs of the organization. The use of TOGAF 9.1 for HRMS divides into 7 functional areas and produces the needed technology architecture design. The architecture designs made are recommended for a private university. Furthermore, for the determination of the list of applications by the functional areas and priorities it builds are defined by the stakeholder agreement of the universities.

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