Implementation of the Web-Based Service Integrity Zone Application at the Faculty of Sports Sciences, State University of Medan

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Abstract. Guidelines for the Development of Integrity Zones Towards Corruption-Free Areas (WBK) and Clean and Serving Bureaucratic Areas (WBBM) are outlined in Public Service and Regulation of the Minister of State Apparatus Empowerment and Bureaucratic Reform of the Republic of Indonesia No. 60 of 2012. This requires excellent service and integrity to the public to be a strategic policy priority to improve the performance of lecturers and staff within the Faculty of Sports Sciences. Supporting this, the role of science and technology is so central for the advancement of services, it is time for research to produce appropriate technology products for the running of a clean bureaucracy through digitalization and applied in the faculty of sports science in clean and fast academic services. The research that will be carried out examines the vision of the State University of Medan, one of which is in terms of fostering an organizational climate and a healthy academic atmosphere. The purpose of this research is to produce a Web-Based Service Integrity Zone Application product, this research is expected to overcome the problems that exist in each department in terms of digitalization-based academic services. This study uses a research and development approach with the Borg and Gall (2003) model which is divided into three stages. The stages of the research are; (1) The pre-development stage involves doing a needs analysis by surveying the degree of equipment that consumers require, preparing instruments, and consulting specialists. (2) The process of creating ZI application products begins with the initial product creation of the manuscript (manual), followed by the design of the product's appearance, small- and large-group trials, phase I and II enhancements, and mass manufacturing. (3) The assessment phase of product deployment and product dissemination. Furthermore, from the implementation of this research, the improvement in academic services that has been carried out for students has received a good response for them, especially good and fast administrative services by students. The indicators of service improvement achieved include services related to student research, lecture guidance and thesis, as well as all student needs related to correspondence in completing learning which the total percentage of the whole increased by an average of 32% which this research greatly helped students in the Faculty of Sports Science, State University of Medan.

Keywords: Integrity Zone, Academic Services, Application.

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1 Introduction

We must change how we think about science in light of developments in the digital age. The third generation of web-based internet services is known as Web 3.0. The World Wide Web's creator, Tim Berbers-Lee, presented the idea of Web 3.0. Semantic web and Web services are the main elements of Web 3.0 [1]. Web 3.0 decentralizes search services, social media, and chat applications that rely on one function or service on a web service architecture [2][3], which contains REST API, specifically, using the HTTP protocol that uses JSON as a data exchange format [4].

The Unimed Faculty of Sports Science Assessment Application was initially still using manual in terms of development in the integrity zone [5]. However, regarding the demands of high interoperability, the development of this application was carried out again using web service technology [6]. The goal is that the faculty of sports science can input values and other things using a web platform based on web services, so that the faculty leadership can monitor developments related to the integrity of the integrity zone using the client web service application.

Web Service Implementation Methodology is a method of developing web service software that uses a systematic approach to web service development [7]. In contrast to conventional client/server systems, such browser/web server systems, web services are not meant for direct user use. Web services, on the other hand, are a component of the business logic, which provides a programmatic interface that allows developers to design new application systems.

Application development requires a system development method that is specifically designed for web service-based applications. Common system development methods such as Waterfall, Agile, Scrum, RAD, Prototype have not accommodated system development specifically for web service-based applications. Therefore, a specific web service development method is needed.

2 Method

By utilizing agile software development methodologies and expanding them by specifying particular web service roles and activities as well as the associated work products generated during the process, web service implementation methodology establishes a methodical approach to web service development.

2.1 Web Service Implementation Livecycle

The phases for creating web services, from requirements to the deployment stage, are referred to as the web service implementation life cycle. The following stages are commonly included in the web service implementation life cycle.

The transitions in these six phases are typically incremental and iterative in character, and they need to be quick enough to adapt to changes in circumstances where the scope cannot be entirely decided beforehand.

Fig. 1. Web Service Implementation Lifecycle (source: Web Service Implementation Methodology)

Here is an explanation of the phases of the web service implementation life cycle:

a. Requirement Phase

Understanding business objectives and converting them into web service requirements in terms of features, functional and non-functional requirements, and limitations is the goal of this requirements phase.

b. Analysis Phase

The web service requirements are further honed and converted into a conceptual model that the technical development team can comprehend in this second stage. To specify the high-level structure and determine the web service's interfaces, architectural study can also be carried out during this stage.

c. Design Phase

The web service's detailed design is completed during this design phase. The web service interface contract that was established during the analysis phase needs to be defined by the web service designers during this phase. The components and data types that match the kind of interaction between the web service and the client must be specified in the web service interface description.

d. Coding Phase

Implementing a web service is the aim of the coding and debugging phase, which is essentially quite similar to the coding and debugging phase in component-based software.

e. Testing Phase

To make sure the web service can handle the maximum demand as outlined in the non-functional criteria, performance testing must be carried out in addition to functional accuracy and completeness testing.

f. Deployment Phase

Ensuring proper usage of the web service is the goal of the deployment phase. The testing phase is followed by this phase. Deploying web services is done on a particular platform. The web service's end objective is to identify the service's usage and modify its configuration and identification. The developer's primary responsibility is to make sure the web service has been properly configured and maintained and to conduct post-deployment testing to confirm that it is in fact operational.

2.2 Application System Analysis

a. System Requirements Analysis

System analysis is to identify system needs and data process flow that is running. The main process of the student academic service system is the service process for students. The first stage of inputting grades is the admin inputting master data, namely student data, lecturer data, class data, academic year data, academic advisor data into the system. At the master data input stage, incorrect data input is not tolerated because it will affect the value input data process. The second stage is the lecturer inputting value data according to the courses he teaches. The third stage is the lecturer entering data on attitude values, skills, other values, and student absences. The fourth stage is the student value ledger which can be seen by the vice dean of academic affairs user. Figure 2 explains the main process of the student service mechanism up to the leadership in the faculty.

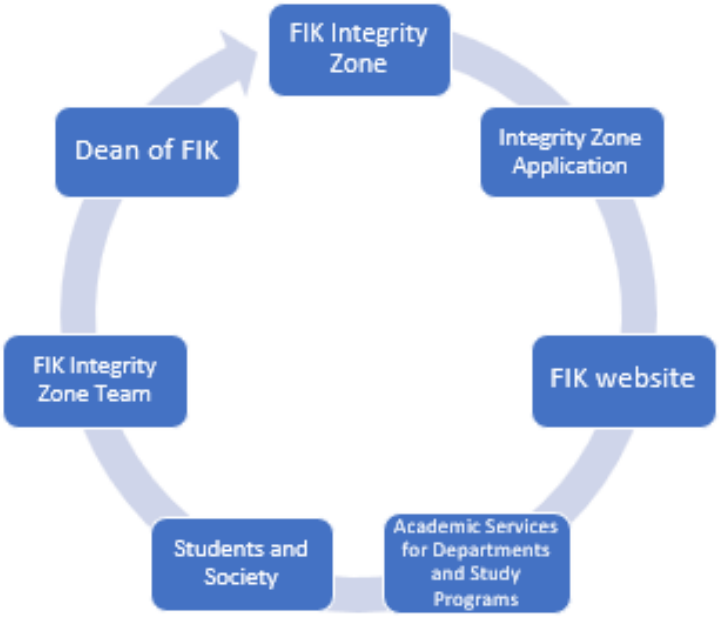

Fig. 2. Service Integrity Zone application work process

3 Findings and Discussion

a. Use Case Diagram

The link between actors and the system is depicted in a use case diagram [8]. Use case diagrams can explain how a system to be developed interacts with one or more actors. In addition to displaying an interaction between actors and the system, use case diagrams may be used to determine the functions of a system. The communication between actors and the current system is then explained by the component. Figure 3 is the interaction between actors and the system.

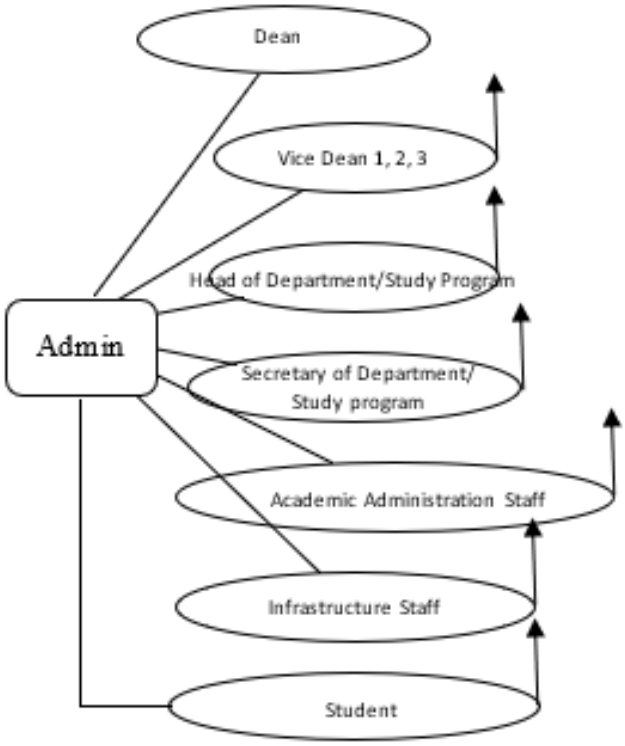

Fig. 3. Use Case Diagram of Service Integrity Zone Application

b. Analysis Phase

In this analysis phase, the architecture of the web service to be built will be determined, the platform to be used will be selected, the candidate web service will be determined, and the details of the web service will be determined.

Web service candidates are objects that will be used as web services. Web service candidates that will be built are determined based on the functional needs of the web service that have been previously determined at the analysis stage.

Identify web service interface

Web service interface identification serves to determine the interface of the web service to be built. This stage is done by determining the HTTP Method used based on the operations performed by the service. Table 2 below describes the identification of the web service interface.

c. Design Phase

At the design stage, the Web service design step is carried out by designing the web service interface from the client side. d. Coding Phase

Before configuring REST Server authentication, it is necessary to configure the endopoint which is part of the RESTful API. The pseudocode in Figure 3 below is the endpoint of the GET method.

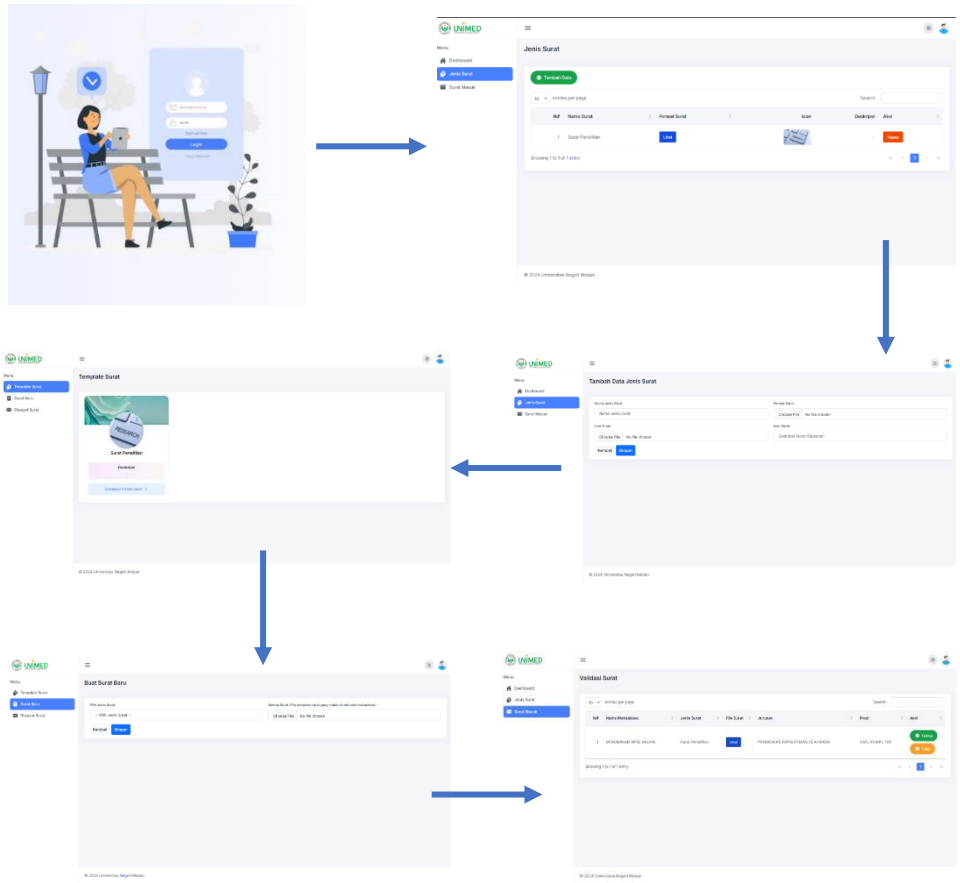

Fig. 4. Pseudocode Usage of Service Application

d. Testing Phase

The first step of the testing phase is the REST Server authentication phase. Using three authentication phases, namely authentication with keys, authentication with limit access and third authentication with login.

Testing request method POST, the main purpose of this test process is to get a response from the server whether the request method post has returned data in JSON form or not. To get a JSON response from the rest server request is done in the body section x-www-form-urlencoded and fill in the requested key and value.

Testing Request method GET, used to get or retrieve all or part of the data based on a certain key. The response from the rest server is in JSON. Specifically for the GET method request, it is done in the param, not in the body in the Post man application.

Testing the PUT method request, The purpose of the PUT method request is to change data the same as the SQL UPDATE command.

4 Conclusion

The method used in system development uses Web Service Implementation Methodology (WSIM) where in its use it can provide good results carried out on the implementation of the service integrity zone assessment web service in the sports science faculty environment. Furthermore, by developing this service integrity zone application where students can more easily access a need for service improvement in the learning process. Additionally, a review will be conducted during the creation of this service integrity zone product in order to enhance the application's quality by including many services associated with the integrity zone's deployment at Medan State University's Faculty of Sports Science.

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