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Implementation of RESTful Web Service as Employee Data Integration on Oracle Database Technology and MariaDB

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Abstract

Computer computer-based information systems at an institution are often built in stages and separately. Data integration between subsystems is not well connected. The results in differences in the data structures or the number of records between one subsystem and another so that the data presented is not aligned. This study aims to design and implement a RESTful Web Service so that other information subsystems can use employee data from the Management Information System. The four stages in this research are observing the information system currently running, analyzing the data integration needs, designing and coding the RESTful Web Service API, implementing and testing the response time.

Keywords: Web services, Integration, Oracle, MariaDB

Abstrak

Sistem informasi berbasis komputer komputer pada suatu institusi seringkali dibangun secara bertahap dan terpisah. Integrasi data antar subsistem belum terjalin dengan baik. Akibatnya terjadi perbedaan struktur data atau jumlah record antara subsistem yang satu dengan subsistem yang lain sehingga data yang disajikan tidak selaras. Penelitian ini bertujuan untuk merancang dan mengimplementasikan RESTful Web Service agar subsistem informasi lainnya dapat menggunakan data pegawai dari Sistem Informasi Manajemen. Empat tahapan dalam penelitian ini adalah mengamati sistem informasi yang sedang berjalan, menganalisis kebutuhan integrasi data, merancang dan mengkodekan RESTful Web Service API, mengimplementasikan dan menguji waktu respons.

Kata-kata kunci: *Layanan Web, Integrasi, Oracle, MariaDB*

1. Introduction

A computer-based information system is one of the means that support an organization's business activities, such as a university [1]. Information systems at a university are often designed separately from one subsystem, resulting in misalignment of master data such as employee data [2].

A good information system must adapt to changing needs that are currently developing rapidly and dynamically [3]. Information and Communication Technology represents business intelligence in universities [4] oriented to each service process's accuracy, accuracy, and security. One of the business intelligence implementations in a university is an integrated information system [5].

Management Information System (SIM) at a university cannot be separated from the need for information and data. Standard Operating Procedure Information System (SIPOS) is a system that requires employee data in its business processes. Integrating employee data between SIM and SIPOS will make Information Systems at a university easier to share data information [6] and improve productivity and communication between systems [7].

Web service is one solution that can be used to realize data integration between systems, especially within the scope of Higher Education [8]. Web services are liaisons between systems to unify and collect data [9].

Research related to the use of web services within the scope of Higher Education has been carried out several times. Rizal, in 2019 has researched by integrating Academic Information Systems and Libraries [9]. Andriyanto, in 2016 conducted research using RESTFul as a web service engine on the integration between the Integrated Field Work Practice Information System [10]. And Satoto, in 2014, research with a web service as a means of integrating personnel data at Diponegoro University [11].

Based on the explanation in the previous paragraph, from the three previous studies, the entire application of web services was carried out for data integration with the same type of database, namely MySQL. It became the basis for designing a personnel data integration with RESTful Web Service between Oracle and MariaDB databases. The trial of the integration process will be carried out using Postman to determine the response time of the communication between the servers.

2. Method

The R on the application of Restful Web Service as an Integration of Personnel Data on Oracle and MariaDB Database Technology are:

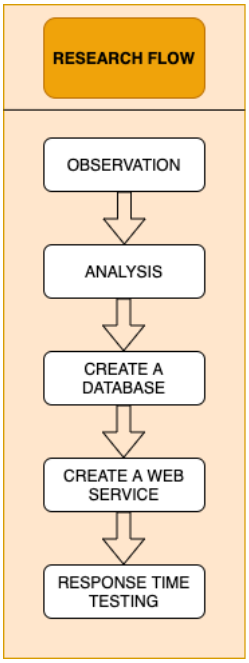

Figure 1. Research Stage

a. Observation

Observations were made on the Management Information System (SIM) using the PHP Native programming language with a custom framework and the Oracle database.

b. Analysis

Analyze the concepts and methods that will be used in Restful Web Service. This data analysis is carried out by looking for literacy related to the implementation of Restful Web Service in Education.

c. Create Database

The database in this study will be created using MariaDB to store employee data samples. Sample data will be fetched from an Oracle-based SIM server using Restful Web Service [12].

d. Create a Web Service

Researchers will create a simple Restful Web Service at this stage. Restful Web Service is designed so that a subsystem can exchange employee data between servers [13].

e. Test Response Time

Testing of Response Time is carried out after the Web Service can run properly. Testing will be carried out with the Postman application while data exchange is in progress.

3. Results and Discussion

The following are the results of the Restful Web Service design carried out:

a. Topology

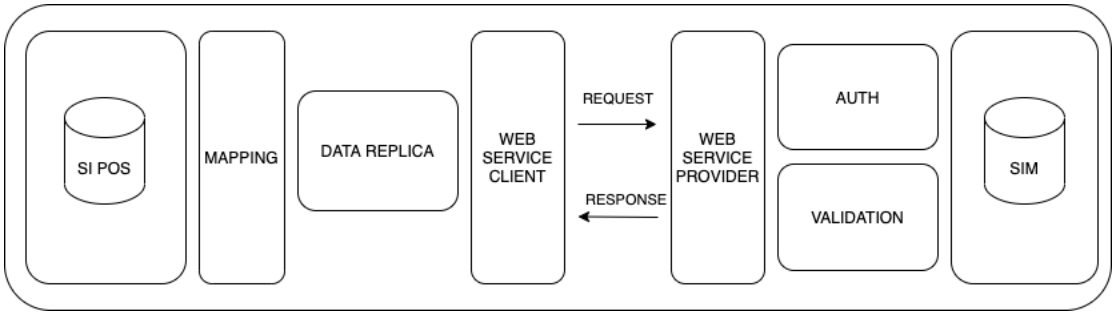

Figure 2. System Flow

The data exchange process can be seen in Figure 1. There are two types of servers: The Management Information System (SIM) server and the Standard Operating Procedure Information System (SIPOS) server. The mapping process will first carry out data processing from the SIM server. Mapping is done to determine where the data will be sent. After that, the data will be decoded and then sent to the web service. The client will then request the service provider.

Furthermore, the encoding process will be carried out by authenticating whether the information sent is appropriate. The SIPOS server will receive the data if the data sent is correct. The SIPOS server will respond by validating and decoding the data.

b. Mapping Table

Table 1. Mapping

No	Field	Note:	Mapping to SIPOS	Table	Field
1	nomor	nomor. web service	Database SIM	Tb_pegawai	nomor
2	nip	nip. web service		Tb_pegawai	nip
3	nama	nama. web service		Tb_pegawai	nama
4	sex	sex. web service		Tb_pegawai	sex
5	notelp	notelp. web service		Tb_pegawai	notelp
6	tmplahir	tmplahir. web service		Tb_pegawai	tmplahir
7	tgl_lahir_pgw	tgl_lahir_pgw. web service		Tb_pegawai	tgl_lahir_pgw

Mapping tables between two systems is described in **table 1**. As shown in Table 1, a sample of data was taken from the employee table on the SIM server to facilitate access to the database. The data sample is taken by selecting the fields on the SIM server according to the needs of the SIPOS server.

c. REST web service process

Representational State Transfer (REST) is architectural modeling of communication methods using the HTTP protocol. REST results are in **Figure 3.**

Figure 3. REST Test

d. POST and GET

The designed restful web service has two functions, namely POST and GET. The following is an overview of the POST and GET processes:

POST serves to add data on the SIM server and SIPOS server. The data that can be added is limited to only six fields, namely: nip, nm_pegawai, jk, no_tel, tmpt_lahir, tgl_lahir. POST is done on the SIPOS server, and the data will also be automatically added to the SIM server. The added data can be viewed on the SIPOS server by clicking the GET button.

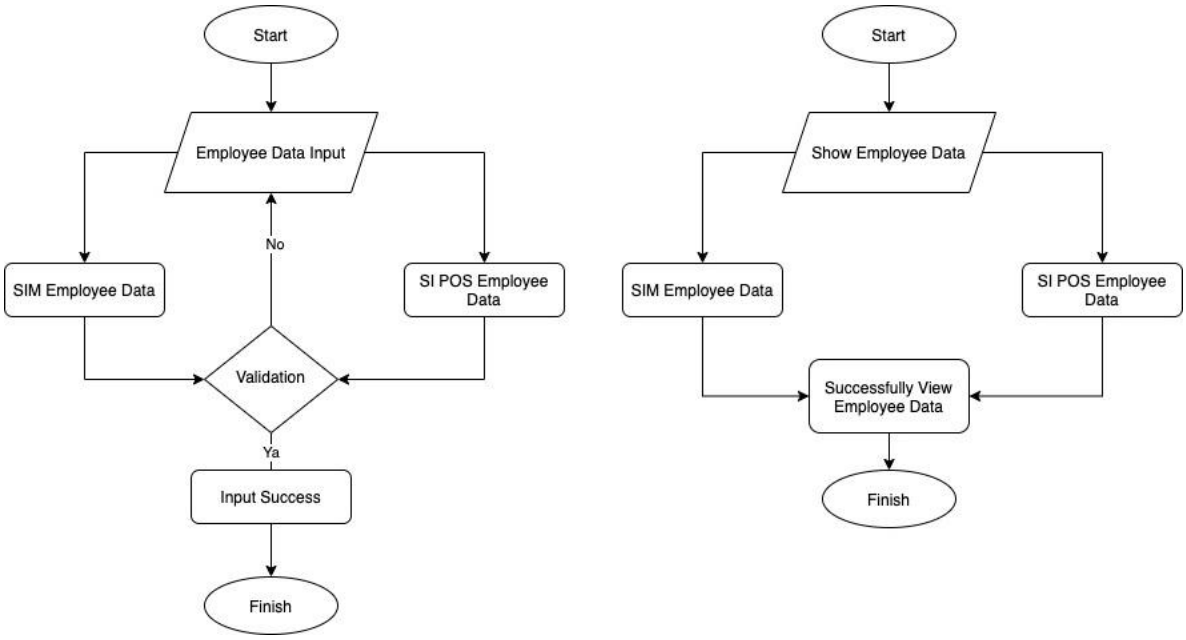

Figure 4. GET and POST Flowchart

As seen in **figure 5** below, data from the POS SI Server can be synchronized with the SIM server by pressing the "Tambah Data" button. After filling and storing, the data will be stored on the POS SI Server and synchronized into the SIM Server with the domain address **http://restapi.protic.web.id/pegawai.php.**

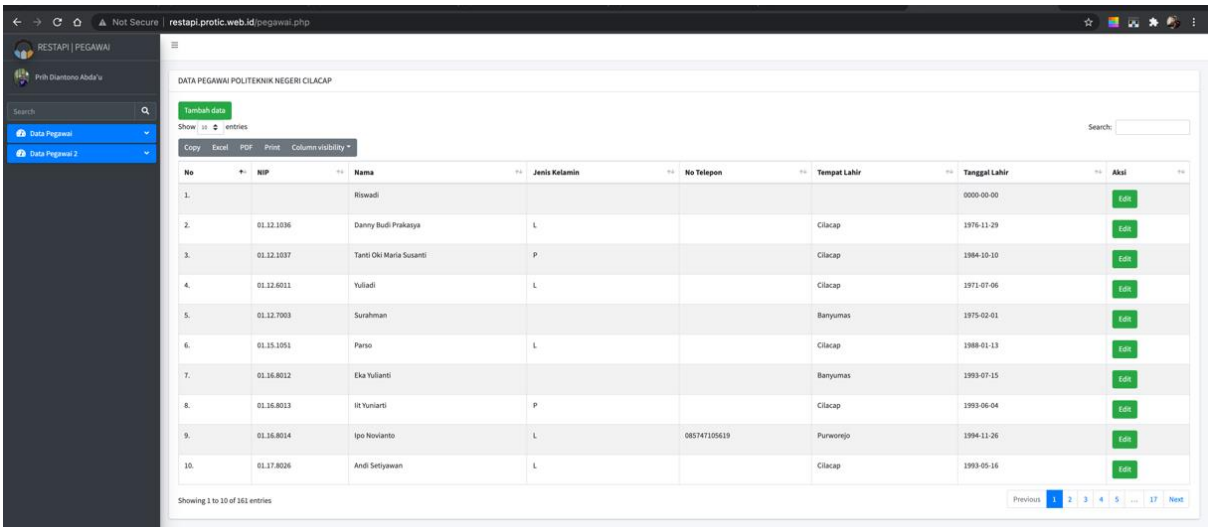

Figure 5. POST API Page

As seen in **figure 6** below, data from the SIM Server can be synchronized by pressing the "Tarik Data" button. Then the SIM server will store data on the SI POS server with a domain address **http://restapi.protic.web.id/index.php.**

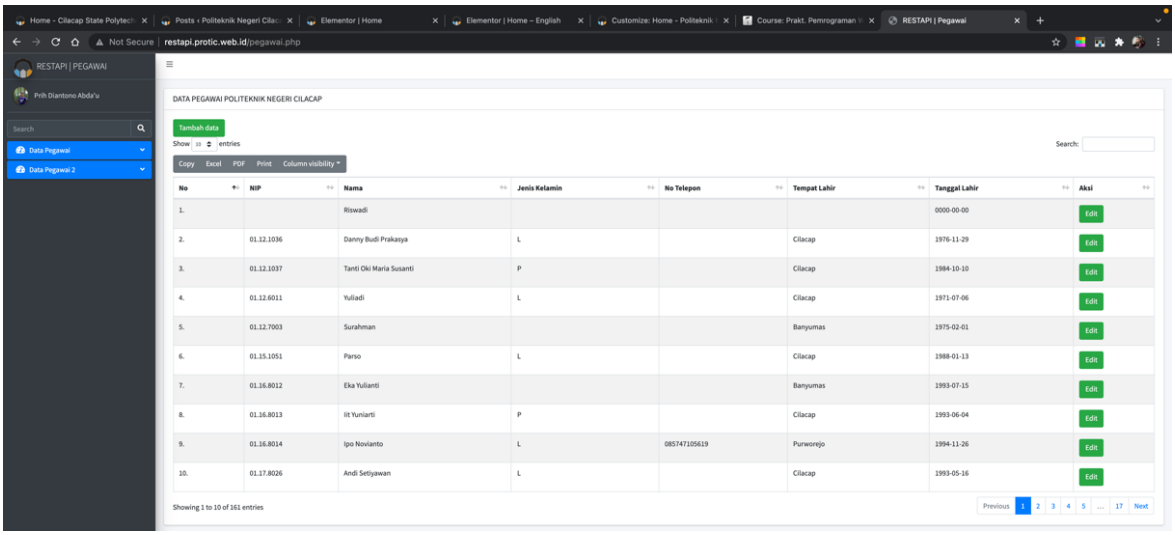

Figure 6. GET API Page

e. Test Respone Time

Response time testing uses the GET data method while pulling data from the SIM. The following are the results of the response time testing, which can be seen in **table 2.**

Table 2. GET SIM Database

	Amount of data	Response Time (ms)	Size (KB)
1	1	65	0.33
2	20	72	6.6
3	35	81	11.55
4	65	95	21.45
5	90	107	29.7
6	115	202	37.95
7	135	301	44.55
8	161	408	53.13

Based on the response time testing conducted, as seen in figure 7, it can conclude that the amount of data is directly proportional to the response time. The greater the synchronized data, the higher the resulting response time.

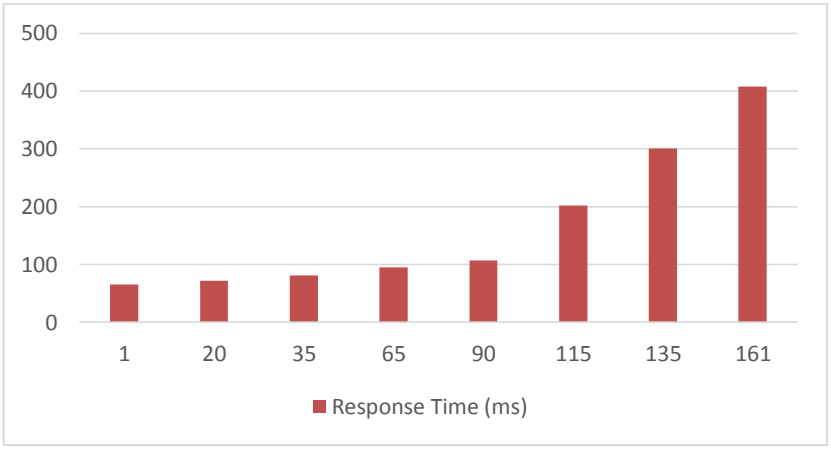

Figure 7. Response time chart

4. Conclusion

The industrial revolution era 4.0 brought major changes to the development of technology and communication, especially in need for information systems as part of Business Intelligent. One of the implementations of an Information System based on Business Intelligent uses web services as a medium for integration between systems at a university. REST application on a web service has advantages and offers convenience due to its multi-platform nature.

This study tested and simulated the application of RESTFul web service on a Management Information System in a university by integrating systems with different database platforms. Based on the test results, the data obtained between servers can communicate. The functions used in system testing are POST and GET. The GET test results on samples 1-161 produced a different response time but were insignificant. Based on the test results contained in the graphic image of the response time test, it can conclude that the amount of data is directly proportional to the response time.

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