Implementation of Web Services for Data Integration to Improve Performance in The Processing Loan Approval

Abstract: This research is to compare the performance of Loan Approval System Web Services using SOAP Web Service and REST Web Service. There are 3 parameters that will be used in this study based on Quality of Services parameter, throughput, response time and latency. There are 4 different services will be tested to get the result of quality of services, Installment Services, Customer Services, Blacklist Customer Services and Account Services. The result of analysis showed that there was significant difference in the Quality of Services between Loan Approval System Web Services using SOAP Web Service and REST Web Service. The results can be concluded that REST Web service is more appropriate to be used in the integration between Loan Approval System and Core system.

Keywords: SOAP Web Service, REST Web Service, Quality of Services

1 Introduction

In recent years business of credit application to be one of the promising business in Indonesia. This is caused by the high demand of people who want to get money by applying for a loan to finance company or bank. Then some companies or banks to adopted or created a system to accelerate the flow of business for credit application, all credit decisions could be accelerated by the credit application system.

Many companies and banks develop other services and application to continue to grow along with the growth of the banking or the company generally. For the growth of a system, the system must be interconnected by a variety of platforms so that the interaction between the system speed up a business process.

Previous credit application business processes that exist, at the time of disbursement of the Loan Approval System for Core System is still manually inputed by the user, it makes the speed of loan processing become slow. So the business flow of a loan application would change by filling the application form of credit application, and the user of data entry level will input the data in the system of credit approval, and the process for the value of the feasibility of credit, and will appear recommendation of a system that will help the users of credit approval level to provide a decision whether the application will be accepted or rejected, having accepted the division of credit approval will directly transfer data to the Core System through web services, so the stage input manually by the user is removed into a direct transfer, it will minimize the difference between the antecedent of data in Loan Approval System and Core System.

Sample case, under consideration to develop web services to integrate data between Loan Approval System and Core System are:

1. The occurrence of user input twice between loan approval system with the core system.
2. Maintenance parameters of individual mutual inter-system, such as the calculation of installments, if there is no integration to the core system, the calculation is done in two systems, and in the event of changes in interest rates, changes not only in the core system, but also loan approval system and other applications that require the payment amount.
3. Reduce the workload on the user if the customer who borrow are existing customers who have been borrowed, so that customer’s data does not need to be inputted again.

One technology that can integrate into all platforms is by using web services technology.
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Example: online banking account balances, complex processes running CRM (customer relationship management) or enterprise resource planning (ERP) systems [1].

Web services allow different systems to communicate with each other using messages. Because the system allows to vary, so the need for interoperability arises [2].

In developing techniques to improve the performance of web services, it is important to understand and reduce the causes of delay in response time [3].

Web services technology is also composed of two types, namely SOAP Web Services and REST Web Service.

SOAP (Simple Object Access Protocol) is a protocol for interaction between systems that will transact data or information. SOAP is created by using the HTTP protocol. Because the HTTP protocol is supported by all browsers and servers, SOAP can communicate with various applications despite different operating systems, technologies, and programming languages.

SOAP design makes it suitable for various messaging and integration implementation. So as to make SOAP popularity grow [4].

The Representational State Transfer (REST) is an abstraction of architectural elements in a distributed hypermedia system.

Perry and Wolf distinguish three classes of architectural elements: processing elements (aliases, components), data elements, and connecting elements (aka, connectors) [5–7].

The basic principle of REST design establishes one-to-one mapping between create, read, update, and delete (CRUD) operations and HTTP methods. Based on the following mapping:

- To create a resource on the server using the POST method.
- To get the resource using the GET method.
- To change the resource using the PUT method.
- To delete a resource using the DELETE method [8].

Each web service also has its advantages and disadvantages.

With the development of web services, it can also be made the development of satellite applications connected to the company’s core system.

There are several approaches, SOAP and REST methods to assist in the creation of the web services.

This paper will measure the performance of both methods to perform a series of simulations to develop a web services with both methods and then measuring the performance of both methods.

The benefits of this research are:

- Increase the speed of the data transmission process.
- Improve user experience through better program.

2 Material and methods

This research which started by analyse the problem that occurs in company and getting the results, we would have done the research.

After getting the problem and reviewing the literature to gain an understanding of the problem analysis’ results. After understanding the problem, and designing the model of application to simulate and do a research, and do it again with different methods.

The simulation’s results of the application will be tested by the method of t-test result data of the simulation.

The results will be tested using Two independent samples t-test, since there are two independent variables that will be compared to the average yield by several dependents variables.

T-test is used to test the difference between means. The two-sample t-test is used to test whether the sample mean of one continuous variable differs between the two distinct groups [9].

The results of t-test used to determine hypotheses of the study.

Data collection methods used is to take samples from some of the functions that will make requests to the Web Services.

Here is a service that will be simulated for the research:

- Account Service
- Blacklist Customer Service
- Customer Service
- Installment Service

| Table 1: Throughput Mean Result |
|-------------------------------|
| WsMethod        | N  | Mean  |
|-----------------|----|-------|
| accServiceThroughput | REST | 300 | 75.8807 |
|                  | SOAP | 300 | 64.7623 |
| custServiceThroughput | REST | 300 | 53.6723 |
|                  | SOAP | 300 | 48.5773 |
| blackCustThroughput | REST | 300 | 52.5910 |
|                  | SOAP | 300 | 51.0103 |
| InstThroughput   | REST | 300 | 129.6118 |
|                  | SOAP | 300 | 110.7730 |
From each of these functions will get different throughput, response time, and latency. The results of a request to the web services will be gathered and the data will be processed into IBM SPSS Statistics software for the results obtained from the data.

Request client to the web services will be simulated using Apache software JMeter for statistical information from the web service response.

The authors used a technique Test Independent Sample T-Test, to get mean result of two different groups then compared, in this study the group that Method Web Services SOAP and Methods for Web Services REST with the variable to be measured and compared, throughput, response time, latency of each of the two methods of web Services.

For testing Independent Sample T-Test, there are continuous variables, throughput, response time, latency of two different groups SOAP Web Services and REST Web Services.

To calculate the mean of the two groups of data, researchers used software IBM SPSS Statistics, the data that entered into the software will then be in a test statistic to get results from these data.

After analyzing the data, it will get the results in the form of a hypothesis. There are three hypotheses that will be achieved from this research are:

1. \( H_0 = \) No difference in performance in terms of throughput of the average test on both methods
   \( H_1 = \) There is a difference in performance in terms of throughput of the average test on both methods.

2. \( H_0 = \) No difference in performance in terms of response time of the average test on both methods
   \( H_1 = \) There is a difference in performance in terms of response time of the average test on both methods.

3. \( H_0 = \) No difference in performance in terms of latency of the average test on both methods
   \( H_1 = \) The difference in performance in terms of latency of the average test on both methods.

3 Result and discussion

Scenario testing of web service methods is divided into two:

1. Testing Method by request web services using Apache JMeter with different sample to each service, 300 samples will be on a request to each of the service.

2. Further methods that sample that is already in a request to each of the service will try the request again with the same sample to the different methods. Example: sample 1 will request the Account Service with SOAP method, then the request will be returned by the same method and the same service but with a different method, namely the method REST.

3. After getting the simulation result from Apache JMeter, then the result will be processed its data using
Table 4: Response Time T-Test Result

| Service                  | t-test for Equality of Means | Sig. (2-tailed) |
|--------------------------|-----------------------------|-----------------|
| accServiceRespTime       | Equal variances assumed     | .000            |
|                          | Equal variances not assumed | .000            |
| custServiceRespTime      | Equal variances assumed     | .000            |
|                          | Equal variances not assumed | .000            |
| blackCustRespTime        | Equal variances assumed     | .634            |
|                          | Equal variances not assumed | .634            |
| InstRespTime             | Equal variances assumed     | .000            |
|                          | Equal variances not assumed | .000            |

IBM SPSS Statistics to get statistic test by using independent t-test.

Table 1 shows that from the calculation of the average of each service that the service that uses REST is greater value than the service using SOAP; in the throughput parameter the greater the value the better the throughput.

From the results of the test showed that the independent t-test, taking from the Sig. (2-tailed) found that in account service, customer service, blacklist customer service and installment blacklist service its value was <0.05 then H0 rejected and Ha accepted.

Table 3 shows that from the average calculation of each service that the service using REST is smaller than the service using SOAP, in the response time parameter the smaller the value the better the response time

From the results obtained that from the independent test t-test, taking from the value of Sig. (2-tailed) found that on account service, customer service and service installment value is <0.05 then hypothesis H0 rejected and Ha accepted.

4 Conclusions

Based on the research that has been done by design and simulate a variety of service that uses SOAP Web Services with REST Web Service, it can be concluded that:

1. It can be concluded that there is a difference from the second web service methods to measure Quality of Service consisting of: throughput, response time and latency.
2. It can be concluded that the Rest Web Service is superior in Quality of Service of the SOAP Web Service in conducting the service request from the client system to the core system.

Based on the observations that have been made, it can be said that the Web Service using REST Web Service is more suitable for use by developers in doing development.
Table 6: Latency T-Test Result

|                              | t-test for Equality of Means |
|------------------------------|------------------------------|
| accServiceLatency            | Sig. (2-tailed)              |
| Equal variances assumed      | .000                         |
| Equal variances not assumed  | .000                         |
| custServiceLatency           | Equal variances assumed      |
| Equal variances not assumed  | .000                         |
| blackCustLatency             | Equal variances assumed      |
| Equal variances not assumed  | .756                         |
| InstLatency                  | Equal variances assumed      |
| Equal variances not assumed  | .756                         |
|                             | Equal variances not assumed  |
|                             | .000                         |

Web Service because it has capabilities that are superior to the SOAP Web Service of the Quality of Service: throughput, response time and latency [10].

Some suggestions that can be developed in this study are:

Testing should be done on the server and a web server or database that is not virtualization, so it can produce maximum performance.

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