CHAPTER 4

ANALYSIS AND DESIGN

4.1. Analysis

When a developer starts building an application, the initial process usually starts with building a system architecture, where in this research activity the system development only uses a local server consisting of several services. The use of a local server aims to save resources and also time for conducting research, as well as to determine the condition of the performance test if it is carried out in local network conditions. Not only that, the use of local servers also aims to save resources used during research activities. Where without having to use a server connected to the internet network, the performance conditions of the two research subjects can be observed.

To find the best performance results from the two research subjects between Rest API and GRPC, the applications that have been created on the local server will also be tested one by one, according to the research methodology that has been previously established.

The testing process is carried out by hitting the two types of Rest API and GRPC protocols that have been programmed on the local server and the hit process is carried out three times, where the first hit is performed 10 times, the second hit is performed 100 times, and the third hit carried out 1000 times, with the observed performance variables are CPU Usage, Memory Usage, and payback time.

4.2. Design

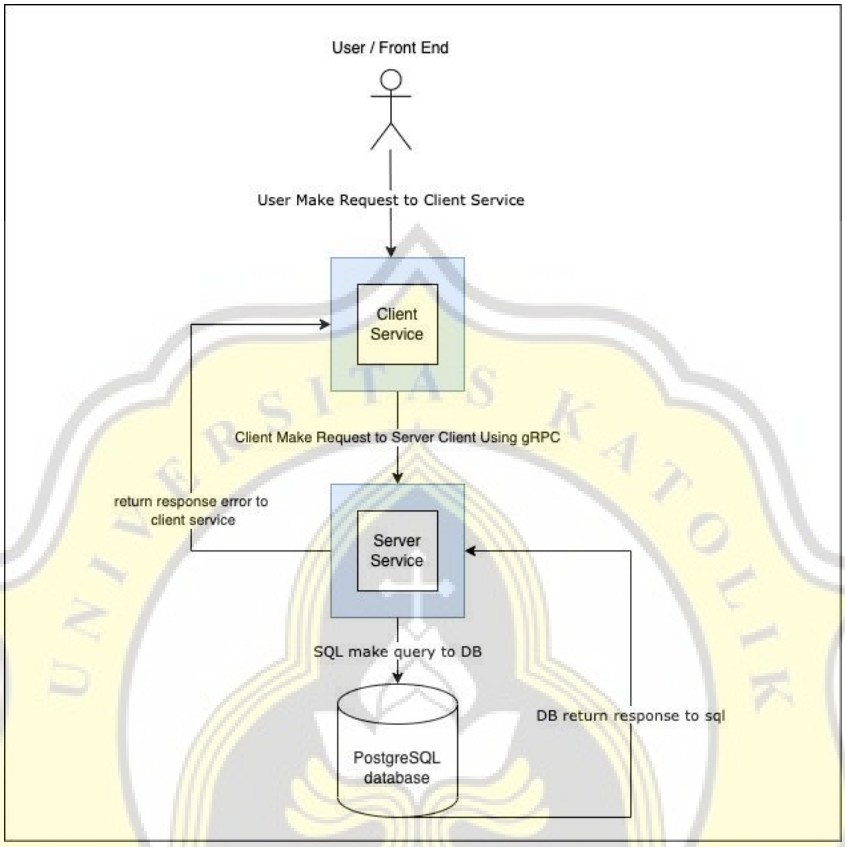

Figure 4.1 User Request to Database Using gRPC Protocol Application

The request database application that uses the RPC protocol is built so that users can communicate to the database using the gRPC Framework, where the application consists of several requests that are built using the Go Programming language. The command sent by the user uses the mainClient which will be read by the server using the mainServer application, where in this section the server will provide a response that will be sent back to the mainClient according to the initial request requested by the user. When the mainClient makes a request to the mainServer, the client will connect to the port that corresponds to the intended request. Not only that, mainClient will also call sqlConnection to open a connection on each service that is needed in the communication process between the client and server as shown in Figure 1.

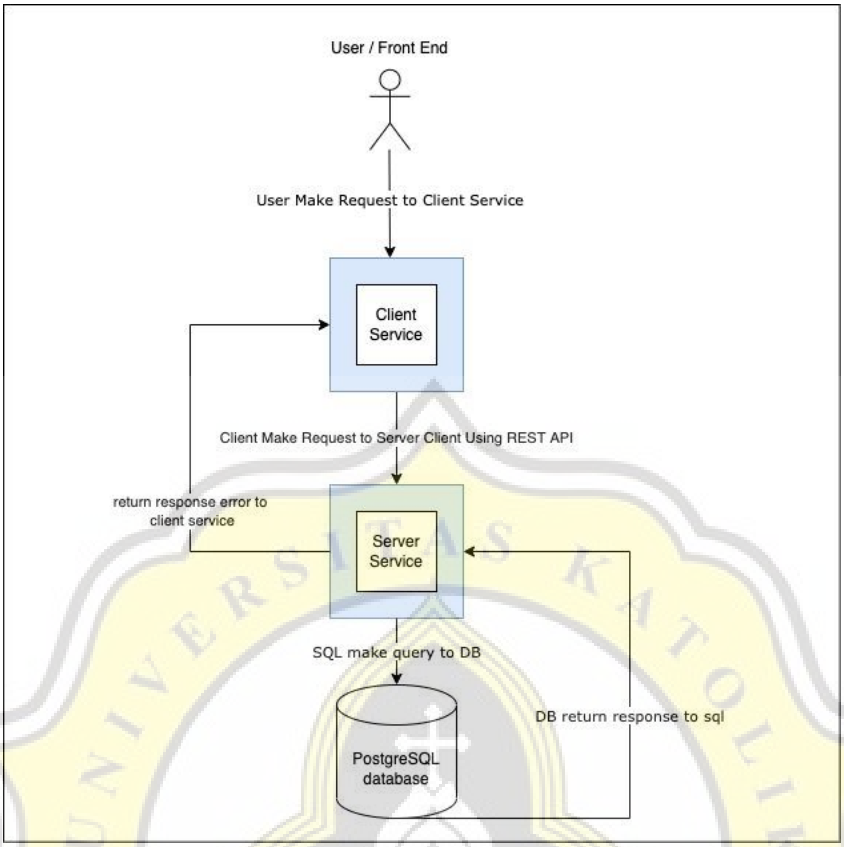

Figure 4.2 User Request to Database Using RestAPI Protocol Application

A database request application that uses the RestAPI protocol is built so that users can communicate to the database directly through the server. The application consists of several requests built using the Go programming language. The command sent by the user uses the mainClient which will be read by the server using the mainServer application. In this section the server will provide a response that will be sent back to the mainClient according to the initial request requested by the user. When the mainClient requests the mainServer, the client will connect to the port that corresponds to the intended request. Not only that, mainClient will also call sqlConnection to open a connection for every service needed in the client and server communication process as shown in Figure 2.

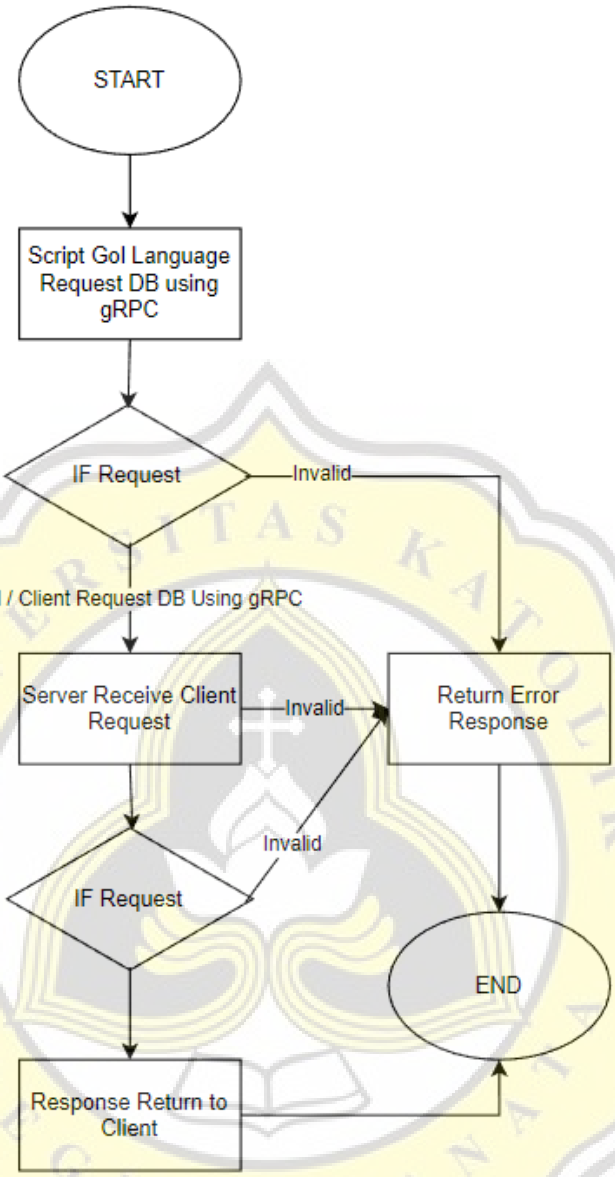

Figure 4.3 Diagram Alir Client Server Menggunakan Protokol gRPC

The gRPC application flowchart begins with the user running the application through a script built using the Go Programming Language, in the form of a request to the database via gRPC. If the process is successfully executed or has a valid value, the request to the user script will be forwarded to the client-server section. Where the server will accept the request using another script application which is also built using the Go programming language. Otherwise, the initial request executed by the user will be returned to the Error function. On the server-side, the script code will respond to the database through a SQL function called from the sqlConnection code script that is used to communicate to the database and receive information that will be passed back to the client output. If the response process given by the server script is valid, then the response data will be returned to the client section, otherwise, the server will be returned to the Error function. From the server, the user will receive a response in the form of information in the form of CPU Usage, Memory Usage, and Response Time as shown in Figure 3.

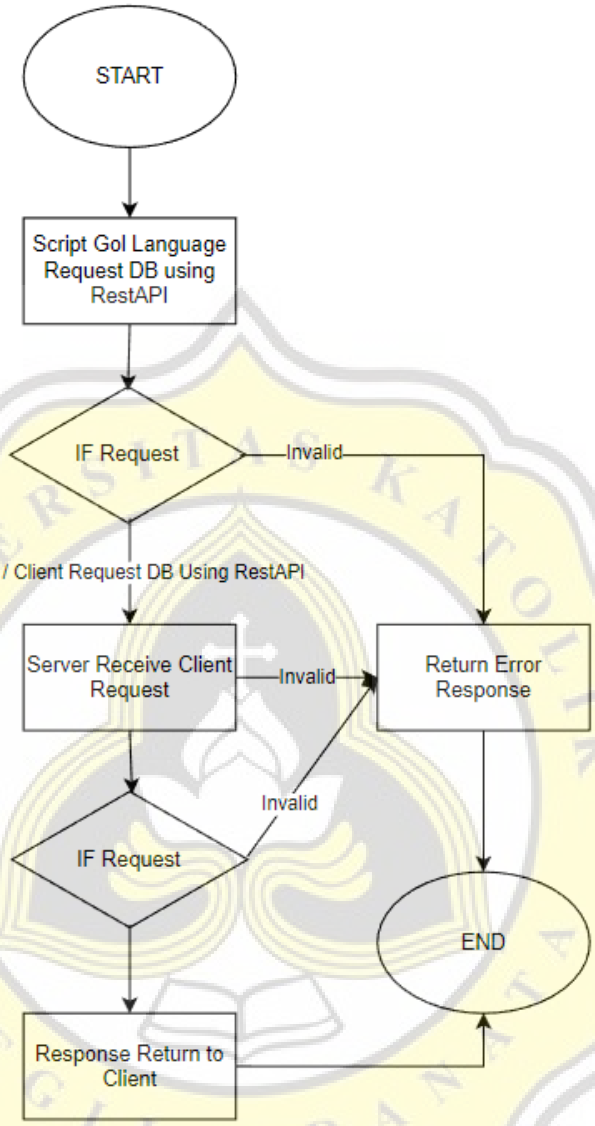

Figure 4.4 Diagram Alir Client Server Menggunakan Protokol RestAPI

RestAPI application flowchart begins with the user running the application through a script built using the Go programming language, in the form of a request to the database via RestAPI. If the process is successfully executed or has a valid value, the request to the user script will be forwarded to the client-server section. Where the server will accept the request using another script application which is also built using the Go programming language. Otherwise, the initial request executed by the user will be returned to the Error function. On the server-side, the script code will respond to the database through a SQL function called from the sqlConnection code script that is used to communicate to the database and receive information that will be passed back to the client output. If the response process given by the server script is valid, then the response data will be returned to the client section, otherwise, the server will be returned to the Error function. From the

server, the user will receive a response in the form of information in the form of CPU Usage, Memory Usage, and Response Time as shown in Figure 4.

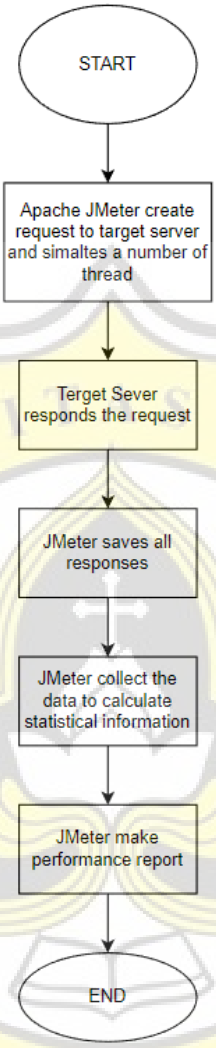

Figure 4.5 Diagram Alir Apache JMeter

To be able to compare the performance results of the two applications that have been made previously, the testing process of the two applications needs to be carried out. Because these two applications are used to test the performance of the HTTP server, a test application in the form of Apache JMeter is used. The Apache JMeter application is an application that is capable of repeatedly hitting the server according to the settings made by the researcher. When Apache JMeter has successfully received the response value from the server, the application will store all the data obtained which can then be used for the calculation process and displayed in the form of report data. The data used in the testing process for both applications that use the gRPC and RestAPI protocols are CPU Usage, Memory Usage, and Response Time.