

REST BASED PING FOR TESTING BANDWIDTH AND LATENCY

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Abstract: - This paper deals with a methodology of Using Restful Web services to Ping a server and check the latency and Bandwidth to reach the server. In any network communication, failure detection is an important feature. To ensure the proper working of the nodes at all the times, and especially in application of healthcare department, the proper working of the server and the network is important. The well-known way “ping” tests the ability to respond to the ping. It touches the base OS and parts of IP stack and Physical links. That’s all and everything else may be down. To overcome this problem, instead of using Ping, we provide an approach to detect the status of the server by using Restful web services. Here we will be testing the Latency and Bandwidth, as they are the important failure detectors.

Web services are the Application Programming Interfaces (API) that are used to exchange the data. These are accessed through Hypertext Transfer Protocol (HTTP) to execute on a remote system hosting the requested services. Restful web service is a growing technology and an easy way for client server communication. So, this paper presents an easy approach to test the remote servers

Keywords: Web service; Rest; Latency; Bandwidth

I. INTRODUCTION

A web service is service oriented architecture which allows communication between two applications which are the service provider and the service consumer. The web service is a virtual component which can be accessed through multiple formats and multiple protocols. It is implemented majorly in two ways, one is SOAP that is Simple Object Access Protocol and the other is REST which is Representational State Transfer.

Restful Web services are the web services which use the REST architecture or principles to exchange or communicate information between two applications. Rest defines a set of principles which are to be followed when designing a service for communication between the two applications. If these principles are applied during designing the service, then it is called as Restful web service. Rest uses the common methods of Http i.e. Get, Post, Put, Delete, etc.

The advantage of using Rest compared to SOAP is that, Rest is simple architecture compared to SOAP. In SOAP, the body of the xml file is predefined and the same design has to be maintained. Also it consists of multiple lines, whereas in REST there is no particular design which must be followed. The user can design as required by using http. A single line call is enough to make a request in REST, unlike SOAP which contains multiple lines request.

Also rest can make use of the Http status codes to confirm the success or failure of a request. Considering these advantages of REST, we decided to make use of this service to Ping instead of using the actual Ping command, to test the remote server for its reachability and availability and further calculate Latency and Bandwidth.

II. Analysis

Problem Statement

Few common attacks in the network are Distributed Denial of Service and Denial of Service attacks. The packets which are used to cause these attacks are ICMP and UDP packets. To cause these attacks, the ICMP and UDP packets are flooded into the subnet. AS a result of this there is huge traffic in the switch and the router in that particular subnet, which in turn results in the more usage of CPU which slows the packets flowing through them to run slowly and it may also affect other subnets which do not have well defined compromised machines. In order to overcome this problem systems uses the packet shapers, which reduce the bandwidth available for ICMP and UDP packets. And since the Ping command also uses these packets, face the problem of reduced bandwidth and hence the results indicated by them cannot be considered to be true. The other problem with the

ping is that it does not work for remote machines or remote hosts. It will show the servers to be unavailable. Considering these limitations of “ping”, we can say that ping is not a better approach to test the latency and bandwidth, and especially in case of remote servers. An alternative for the usage of ping is to test the server by making a rest call, by using a timer and checking the rest status to check whether the call is successful.

Approach

The Problems faced by using the Ping command can simply be solved by using the Restful web services. We just need to send any simple request to the server using web service, and then check the status of the request. There are different Status codes for Rest. For example, if the status code is CONTINUE (100), then it means that the client should continue with its request. This response is also used to inform the client that initial response has been received and has not been rejected, so the client can continue to send the remainder of the request. And if the request has been completed, this response will be ignored and the server will be sending a final response, once the request is completed.

Similar to this status code, there are many different status codes, which indicate the status of the request sent or any Meta information related to the request.

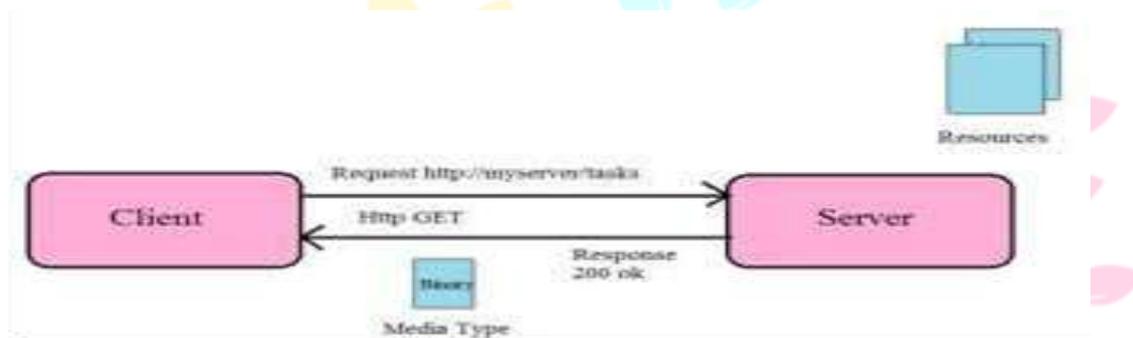


Fig1. Request response in REST

The above fig1. Shows the basic communication between client and server using rest, where a client sends a request to the server by a URI, which indicates the resource about which the information is needed. The server queries the request and access the resource queried and sends back the data to the client. The Communication between client and server may be in different formats. The most common type of media is xml and json. In this paper we will be using another type of media that is Binary format. The fig 2 below shows the flow for the request used.

The Ping to the server is the start of the network test process. When we ping the server, the server IP address is converted to an URI and then an accessor is created to access the server. The request to be sent is then serialized and the request is made to the server. Once the server responds to the request, the data is converted back by de-serializing the Binary data. The response from the server is obtained and the status is measured by comparing it with different status codes.

In this paper we use the below mentioned process for checking the availability and working of the server and then in turn calculate the latency and bandwidth.

Here we use the serialization process. Serialization is something which allows to convert an object or a class into a series of bits of binary. From the client side, we create an object of the type Transfer test, to transfer the data to the server. Before directly transferring the data, we serialize it and convert to the binary format, so that it can be sent through a wired or wireless transport medium. Once the serialized object is sent, at the server side, the object is de-serialized back and then the request is processed and the object with data is converted to binary by serializing it and sent to the client. This is again De serialized at the client side.

The Usage of the above mentioned method and calculating the latency is done in the implementation part of the paper.

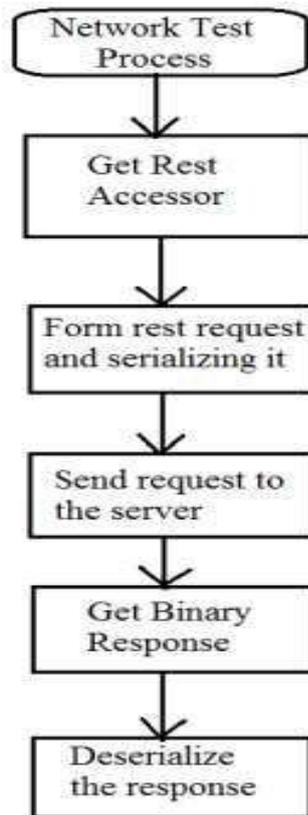


Fig2. Use of Rest to access data

III. Implementation

We have implemented this methodology to test the remote server, by retrieving the latency and bandwidth during testing. The implementation consists of two different parts, one is testing the Latency and the other is testing the Bandwidth.

Test Latency

Latency is the delay between the start of a request and the response for that request. In simple words it is the round trip time used to reach the server and get back the response from the server. According to the definition of Latency, it can be said as the time difference between the stimulation and response. So, we can use this method as follows:

1. Start the Timer
2. Ping the server
3. Stop the Timer.

Latency= Time Elapsed (Stop Time -Start Time) Serialize

So, here we use this simple method to get the latency, simply, we can start a timer before sending the request, and then make a request to the server and then turn off the timer. Here latency can be obtained by calculating the time difference between the start and stop of the timer. But it is important to check whether the request we made has reached the server, so we make a rest call in the request, and check the status of the rest. If the Status is as expected, then we can further continue with calculating the Latency and comparing it with the expected value, to know whether the server is reachable with less latency.

The Latency must be as low as possible. The flow diagram for calculating Latency is as below.

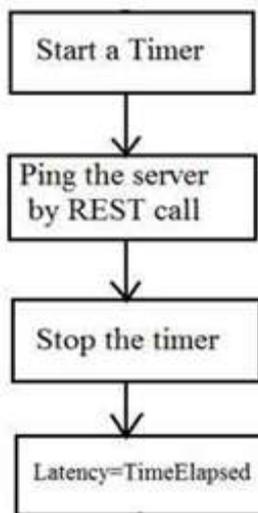


Fig 3. Flow diagram for testing Latency

Test Bandwidth

In Networks, bandwidth can be measured as the amount of the data that can be transferred from one point to another within a given period of time. It can be simply said as data transfer rate measured in bits per second (bps).

Bandwidth calculation is not an easy metric. Usually, the bandwidth calculation depends on different factors depending on topology. There is a general formula to calculate the bandwidth, which is as follows:

$$\text{Bandwidth} = \text{Bytes} / \text{Time taken}$$

A simple method to calculate the bandwidth between the two peer devices in a home network is:

1. Connect the two computers through the Ethernet using a cross-over cable.
2. Transfer a test data of any size, let us say 100MB file.
3. Note down the time taken to transfer the data, let us assume it took 10sec to transfer 100MB
4. Calculate the bandwidth using the above formula as $100\text{MB}/10\text{sec}=10\text{MB}/\text{sec}$

So, it means that we have a 10MB connection.

Now we can apply the same logic. But, since our endpoints to be connected are not in local network, Ethernet connection doesn't work. We use the Restful service to transfer the test data in our work.

It can be explained by the below diagram

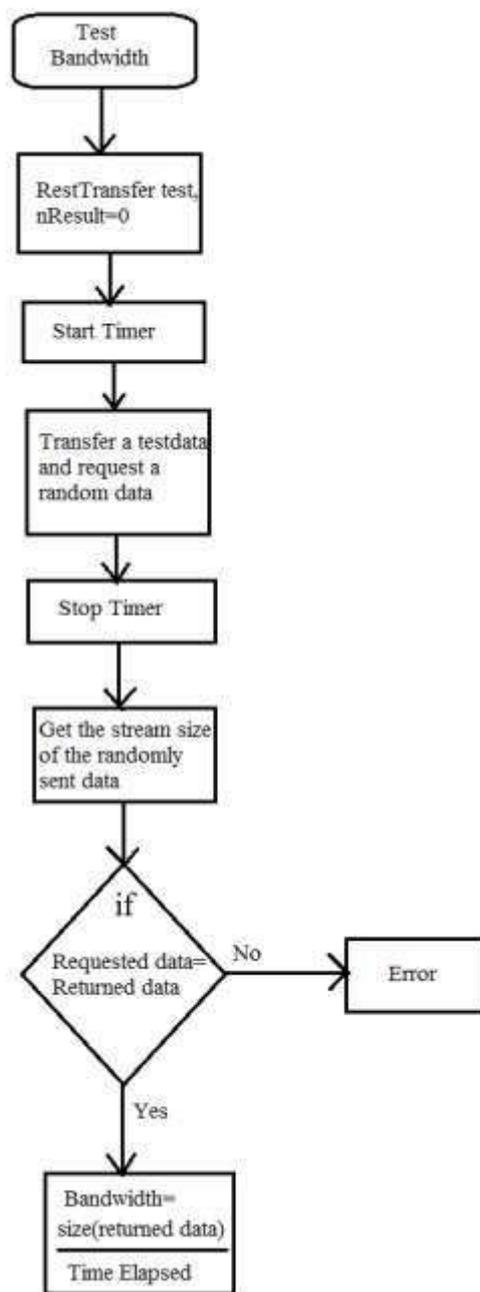


Fig 4. Flow diagram for testing Bandwidth

IV. Results and Conclusions

The Outcome of the implementation enables the testing of Latency and Bandwidth with full reliability and it also allows testing remote servers which was not possible with ping.

Representational State Transfer is a growing technology that uses the various techniques of software architectural style. It provides an enhancement of the web services in data exchange. So by using the Restful web services, we were able to check the Latency and Bandwidth of the Network to reach our server. This paper presents a discussion on how the Restful web service can be used to test the latency and bandwidth to reach a remote server. Restful Web services are simple and easy to use and produce the required results. Also, it provides good platform for future work on web services.

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