

# Enhancement of Highly Available Web Services for Mission Critical Applications using Network Switch

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*Abstract*---As the web services are gaining more and more popular, most of the organizations are interested to deploy their mission critical applications using web services. The basic and most challenging issue with web services for a mission critical applications are security and reliability. Whenever the user requests the service the mediator between user and web service should handover the request to the appropriate web server. The mediator plays a crucial role in transferring the request and response from both user and web server. In this approach we propose switch as a mediator than gateway and hub. As a passive device the hub transfers the user request to all the connected systems which leads to security issues by passing the request to several hops before it is fulfilled and this may not be acceptable to the requestor. In our approach the switch is associated with some software which makes it an active device and it transfer request to the appropriate web server by continuously monitoring the available and active web servers. This approach will also leads to less waiting time of the user for the specified request.

## I. INTRODUCTION

The basic aim of this paper is to improve the availability of web services for mission critical applications. The mission critical applications are the applications which lead to a major impact up on the company's day to day transactions when any minor problems occurred in the application when they are running. Mission critical applications are time specific which are to be completed in the given time. If it fails to complete the task in the desired time it leads to a great loss to the companies using those mission critical applications. The web services for the mission critical applications should be available for 24/7. These web services must guarantee their availability even when there is database failures or network failures etc.

This paper discuss some few issues regarding the improvement of web services availability used in mission critical applications. Some of the drawbacks with the existing techniques are overcome using current techniques. The security and reliability are maintained all the time for the web services which are used for mission critical applications.

### A. Increase of availability

The availability of web services can be maintained in several ways. Some of the ways are web service replication. The web service replication is used over a wide area network. In web service replication the web services holding the mission critical applications are replicated to several sites. When the client made a request it is broadcasted to several sites where the web service resides and waits for response from any of the sites holding web services. Whenever multiple responses are obtained the responses are

filtered and faulty responses are identified and faultless responses are returned to the client. The web services residing on various sites are communicated using the SOAP messaging technique. Load balancing is the other solution for increase of web service availability.

Increasing the availability of web services for a mission critical applications are somewhat critical. The web service may not be available all the time for several reasons like database down or web server down. Availability means the web service is available to the user all the time. Redundancy technique is used to make the web service highly available in which duplicate copy of the service maintained across several sites which will be useful as backup whenever the current web service not running properly. In these cases the load of the malfunctioned web service is balanced by sharing the load across several copies which we call as load balancing.

### B. Issues with transport protocols

The web service that are providing the services stick to a particular protocol. The information about the protocols that is being used for web service are specified in separate XML file called WSDL. It provides description about the web services like how to use the web service, what are the technologies used to develop the web service and the details about the service provider. When the web service is unable to provide the service or transfer the information with their protocol then the service goes to unavailable state. In order to overcome this issue one can go with multiple transport protocols like FTP, SMTP etc. without sticking to a single protocol. This leads to the web service highly available even in case of protocol failure.

```
<wsdl: binding name="NMtoken" type="qname">
<soap:bindingstyle="document"
protocol="http://www.w3.org/2001/http">
</wsdl: binding>
```

In the above code there exists only one protocol which leads to an unavailability of web services in case of failure. The advances version to the above code is specified below which makes use of multiple protocols which will be useful in case of failure. The web service migrate to protocol2 when any failure arises with protocol1.

```
<wsdl: binding name="NMtoken" type="qname">
<soap:bindingstyle="document"
protocol1="http://www.w3.org/2001/http"
protocol2="http://www.w3.org/2001/smtp">
</wsdl: binding>
```

## II. EXISTING APPROACH

There are few conventional approaches to improve the availability of web services for the mission critical applications. Enterprise gateway and network hub are one among them. Whatever the request the client sends it passes

through the gateway in the enterprise where the web service resides. The gateway then transfer the request sent by client to the available web service. The gateway come to know the availability of web service either by sending a message to the any one of the web service and waits for the response, as the response is positive it sends the request to that web service. As the response is negative it opts for another based upon the client acceptance or the other way is the service provider sends its status to the gateway periodically. Finally the gateway sends the response of the web service back to the client. In network hub, as it is a passive device the request received from client is sent to all the enterprises holding the web services because as a passive device it do not know what to do with the request sent by the client. Whenever multiple responses are received from various web services all the responses are analyzed and most appropriate response is identified and sends the appropriate response back to client up on the request. The below figure shows the activities performed by network hub whenever it receives the request from client.

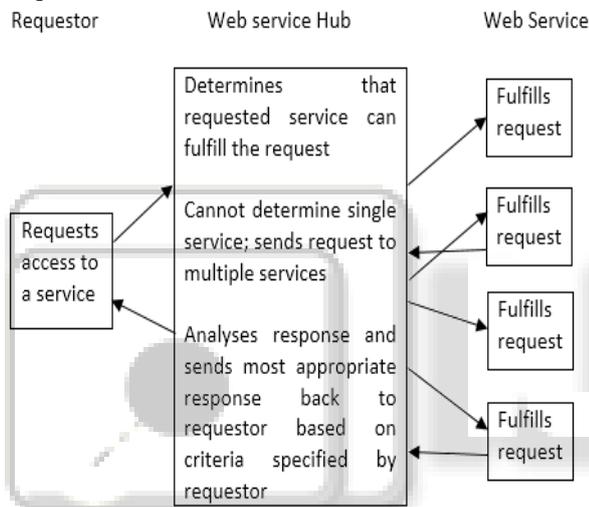


Fig. 1: Existing Approach

The hub needs to analyze the responses received from various web services because whenever it receives the request from client it sends it to all the available web services without identifying whether the available web service is related to that request or not. So among the various responses from related and unrelated web services the appropriate response is identified and sent back to client. This leads to various shortcomings like client waiting time for response increases because of web service hub performing overhead task in analyzing the responses from various related and unrelated web services. As a passive device the hub transfers the user request to all the connected systems which leads to security issues by passing the request to several hops before it is fulfilled and this may not be acceptable to the requestor.

### III. LITERATURE SURVEY

The importance of mission critical applications are identified and found their necessity to available in web 24/7 for providing services based on the clients request. There are few papers discussed regarding the mission critical applications availability but we found some drawbacks regarding security issues, time delay in transferring the

response based on the request send by user. We do not restrict the working of web service to provide services using unique protocol we made web service utilizing multiple protocols. This leads to the overcoming of shortcomings like single protocol failure. Whenever the failure occurs for a protocol utilizing by the web service the web service migrates to the utilizing of some other protocol. For achieving the security related issues XML based files like SOAP, UDDI etc. can be used. The web services should be autonomic and they should configure and manage themselves by diagnosing faults that are occurred during the providing of a service. The performance of the web service can be improved by replicating the web service to various sites which avoids single point failure. The other approach is to implement the mission critical applications in the clustered manner.

In order to make the web services highly available, multithreading applications can be used for implementation of web services. When client working with web service there is a great possibility of a web service that it may not respond properly due to several facts. These facts include hardware or software failure, network failure like host unreachable, packets loss, congestion problems, corrupted packets etc. By using multithreading approach one can overcome these drawbacks. In order to make the communication between the various threads SOAP messages are used among them.

### IV. PROPOSED APPROACH

In our proposed approach we replace the network device hub with switch for acting as an interface between requestor and web service. The drawbacks associated with network hub are overcomes using network switch. The switch is associated with some software which makes it an active device rather than passive device like network hub and it transfer request to the appropriate web server by continuously monitoring the available and active web servers.

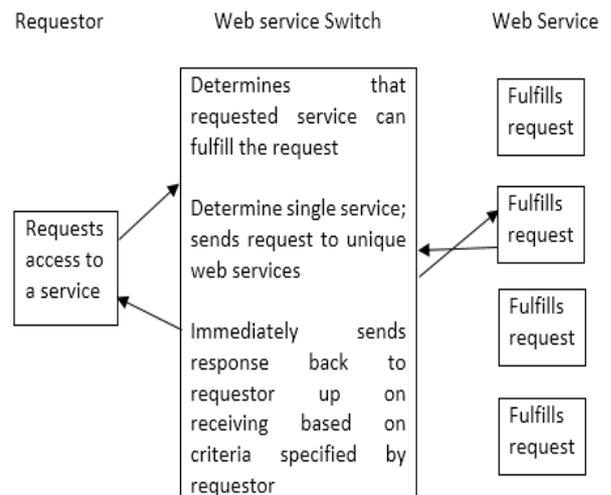


Fig. 2: Proposed Approach

The switch transfer the request to only appropriate web server rather than all the connected web servers which results in receiving unique response from web server and this makes less waiting time of client waiting for response.

The following figure shows the activities performed by network switch when it receives the request from client.

As an active device the switch transfers the user request to only one connected system which does not lead to any security issues which is acceptable to the requestor. Compared to hub and gateway the performance of switch is better.

#### A. Security and reliability

Organizations cannot deploy their mission critical applications in the web service unless they achieve security and reliability. So achieving security and reliability for the web services holding mission critical applications is a crucial task which decides the performance of the web service. High degree of reliability and security is needed while exchanging the messages between requestor and high available web services for mission critical applications. As network switch is an active device it achieves security by not transferring the request to several hops. Whenever the request arrives to the switch it immediately look into the routing table to identify the nearest router address to transfer the request to the destination web service.

### V. CONCLUSION

The mission critical applications require highly available web services for their continuous service provider. The web services are made highly available with the help of network switch. The separate architecture for highly available web services which are incorporated with network switch was shown in this paper.

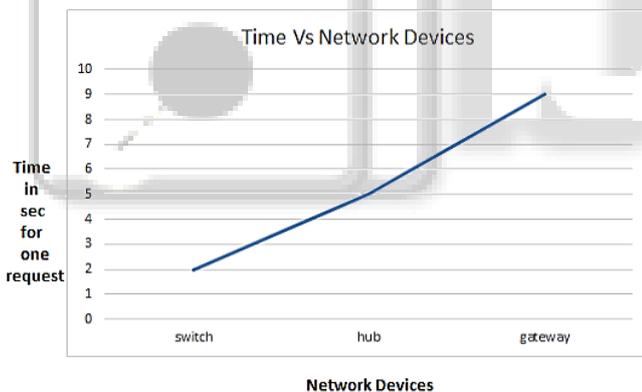


Fig. 3: Graph of Network Devices

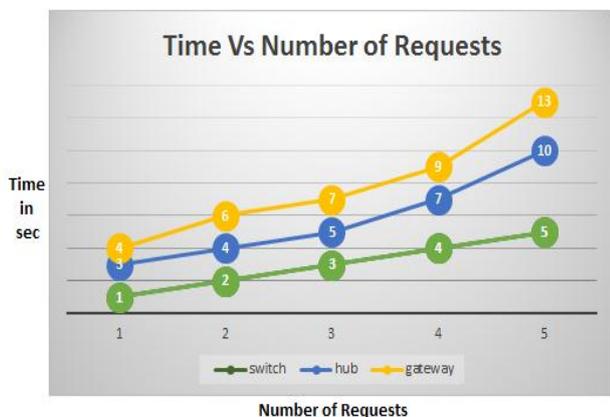


Fig. 4: Request handling results

The issues with the single transport protocols were discussed in this paper and along with that how the problems are resolved using multiple transport protocol are shown by writing a separate XML file for the various protocols. None of the web service provide guarantee about the no failure during providing its services. The better approach is the web service should migrate its request to some other web service which is currently working. The performance based on time between various network devices for each request is shown below.

When compared with network switch the performance of network hub and gateway are degraded. Similarly performance graph for time vs. number of requests is shown below. The performance of hub and gateway is degraded as the number of requests increases.

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