Enhanced Quality of Service Parameters Help to Improve Performance of Hybrid Cloud Architecture

Mrs. Snehal A.Narale[1], Dr. P.K.Butey[2]

[1]Head, Dept of Computer Science, DharampethM.P.Deo Memorial Science College, Nagpur, India
[2]Asso.Prof, Head, Dept of Computer Science Kamla Nehru College, Nagpur, India
1 Snehal.narale2012@gmail.com; 2 buteypradeep@yahoo.co.in

Abstract: *Cloud computing is an emerging technology which has been used for business as well as for education purpose. Cloud computing technology has advantages like agility, flexibility, scalability and quality of service. Quality of service parameter plays an important role to improve the performance of the architecture. In cloud computing due to the increasing use of cloud services, the quality of service (QoS) of cloud computing has become an important and essential issue. To improve the performance of the architecture various parameters of quality like availability, response time, processing time and execution time would enhanced. The performance of hybrid cloud is better than public and private cloud because hybrid cloud always gives optimized results. In this research paper performance of the hybrid cloud architecture has been by enhancing QoS parameters. Hybrid cloud is modeled using at least one private and one public or community cloud. To transfer the data or to access some applications in hybrid cloud the important factor which was considered is availability of the DC. If more DC's are available for the users to send a request then availability would be high. If the availability is high then more number of users sent request to access applications and resources from cloud data centre. Availability and response time are the parameter of QoS which was considered in hybrid cloud architecture. Enhancement of this parameter would really assist to improve the architecture of cloud. This research paper focused on QoS parameters like which improve performance of the architecture.*
Keywords: *cloud computing, QoS, hybrid cloud architecture, Availability, Response time*

I.   Introduction

Cloud computing is an emerging technology which has been used for business as well as for education purpose. Cloud computing technology has advantages like agility, flexibility, scalability and quality of service. To design cloud architecture various parameters has been considered to improve the performance of the architecture. Quality of service considered different parameters like availability, linearity, response time, processing time, throughput time and execution time. All these parameters are belonging to real time environment. Performance of cloud architecture has been improved using various parameters of quality of service. Data is access from cloud data center and cloud service providers provides different services to the customers/users as pay per use on basis. Sometime data /applications are transferred from one cloud to another cloud with platform independent.

In cloud computing, cloud service provider offers different services to the user according to their need with the help of service model (IaaS,PaaS and SaaS) and delivery model (private, public, hybrid and community). These model offers abstraction in each layer of cloud architecture. There were three standard service models which have been used in cloud computing architecture defined by NIST as IaaS (Infrastructure as a service), PaaS (Platform as a service) and SaaS(software as service)[1]. Service model provides an abstraction in the layer to form a stack. The working principal of these three models does not relate with each other. They could be working independently on SaaS model. User has been worked on physical machines as per their requirement to access infrastructural information.

In hybrid cloud architecture the cloud is modeled using at least one public and one private or community cloud. The major advantage of hybrid cloud is better availability and response time in optimized way as compared to simple public or private cloud. Hybrid itself means it's a combination of two and here it combines public and private with its characteristics like security of private cloud and accessibility of public cloud. As in private cloud the number of client accessing the service will be less so it will be able to carry out the operations on daily basis. Thus, combines the property of both public and private and forms a hybrid cloud [2].

A. QoS

The demand for highly scalable virtual environment has been increased rapidly. This demand has been provided by cloud computing as per the demand of the user. Customer works in real time environment different

tasks were performed on remote virtualized machine, as they were used virtualized machines, during this case the chance of error occurrence would high due to loss control over these virtual computing nodes during the process of execution. Cloud computing was faced challenges like reliability, timeliness, QoS requirements and Fault Tolerance due to high fault. To evaluate these problems different Fault Tolerance techniques, different QoS metrics and other techniques were used/ implemented. Adoption of these techniques would help to perk up the reliability and availability & other issues of cloud computing [3] environment. QoS parameters will help to improve the performance of hybrid cloud architecture. In this research paper author worked on two important parameter of quality of service which would help to improve the performance of the architecture this has been considered in this research work.

1. Availability
2. Response time

1. Availability

     Availability ensures that when the data has been processed at that time it would check whether the resources are always available or not due to some malicious functions [4]. Availability in hybrid cloud implementation has been depended on the response time of the user bases and the accession time. Accession time is a time in which the customer/user can access the services and resources get back after completing the process and response time is a time required to complete the process. If the response time is less than it can directly affect on availability of the data from cloud data centre.

2. Response Time(RT)

     RT is defined as the amount of time taken between the cloudlet requests sent and response received by cloud consumer. The response time of data center has been affected on the performance of the system. Minimum response time will help to improve the QoS in cloud architecture [8].

     Response time can be defined in terms of throughput time. Minimum response time means the high through put time. More work done in less time period which increases the performance of the system. Less response time is defined as non-functional IaaS parameter of cloud computing architecture.

B. Service Broker Policy

     The six continents in the world were considered as six regions in Cloud Analyst. The user bases and data centres have been geographically scattered over the six regions [9]. Request from a user base need to be routed to a data center, where it can get serviced. The process has been decided the efficiency with respect to response time, data center processing time and cost. Service broker policy plays an important role in achieving these parameters with efficient values[10].

There are three service broker policies which are used in the proposed architecture to check the availability of the data center.

a. CDC
b. ORT
c. RDR with LB

II.   Problem Statement

     In cloud computing due to the increasing use of cloud services, the quality of service (QoS) of cloud computing has become an important and essential issue. QoS is the major factor which has to be considered to check the performance of the architecture. In this research paper performance of the hybrid cloud architecture has been by enhancing QoS parameters. Hybrid cloud is modeled using at least one private and one public or community cloud. To transfer the data or to access some applications in hybrid cloud the important factor which was considered is availability of the DC. Availability, linearity, processing time and response time are parameters of QoS which would help to improve the performance of the architecture. If more DC's are available for the users to sent a request then availability would be high. If the availability is high then more number of users sent request to access applications and resources from cloud data centre. Availability and response time are the parameter of QoS which was considered in hybrid cloud architecture. Enhancement of this parameter would really assist to improve the architecture of cloud. This research paper focused on QoS parameters like which improve performance of the architecture.

III.   Literature Review

     Ashraf Zia, M.N.A. Khan [8] analyzed some of well- known and currently deployed schemes for availability. A lightweight, portable and availability scheme always needed for cloud environment which

enhanced the availability level were discussed in the research. Availability of all included services has important for better quality of services (QoS).

Daisy PremilaBai T, Albert Rabara S, Vimal Jerald A [11] proposed the quality of service architecture for Internet of Things and Cloud Computing uses differentiated services to meet the QoS requirements. The future work is to establish the security architecture for IoT and Cloud and to implement the same in real time scenario.

BehnamBagheriGhavamAbadi, MostafaGhobaeiArani[12] offered a new approach to improve quality of cloud services and reduce rejected requests. The proposed approach was based on resource management and profitability techniques for various types of virtual machines which focuses on the customer requests and offers the best host and VMs to meet their requests.

Bhavani B H1 and H S Guruprasad [13] studied resource provisioning techniques with its advantages and disadvantages. There are many resource provisioning techniques, both static and dynamic each one having its own advantages and also some challenges. These resource provisioning techniques used must meet Quality of Service (QoS) parameters like availability, throughput, response time, security, reliability etc., and thereby avoiding Service Level Agreement (SLA) violation.

JitendraSingh[14] studied response time factor which was one of the major parameter of QoS. This paper discussed the dependency of response time on broker service policy and number of data center. Results obtained revealed that among three broker service policies i.e. closest data center, optimum response time and re-configure dynamically with load; closest data center has the best performance over other broker policies considered. Whereas, to determine the data center performance, when the number of data center were increased the, response time reduced proportionally up to a certain level before reaching to almost constant value. Response time can be substantially reduced by selecting the appropriate type of broker service policy. Consequently, performance of cloud can be improved significantly.

Abdel zahir Abdel maboudac [15] discussed new CC technology that provides services to consumers and businesses. Due to the increasing use of these services, the quality of service (QoS) of cloud computing has become an important and essential issue. Many research issues of QoS have been proposed in approaches of cloud computing area were discussed in this paper.

Osvaldo Adilson de Carvalho Junior, Sarita Mazzini Brusch [16] proposed the architecture which has proved to be consistent carrying out the services required using various scheduling techniques in all its stages. Moreover, it showed the capacity of obtaining and controlling the energy consumption and the ART, an important metric to control the QoS. This paper concluded that the effect of a scheduling policy on ART & minimum energy consumption.

IV.   Experimental Setup

To check the performance of QoS parameter in hybrid cloud architecture, hybrid cloud is modeled using at least one private and one public or community cloud. The experiment is conducted in cloud analyst which is GUI of cloudsim simulator. Performance of QoS parameters in hybrid cloud in real time environment is quite difficult.Cloud analyst just working as real time environment based on net bean and java. In this research paper the experiment is setup to check the availability and response time which are two major parameters of QoS which has been considered for the evaluation of performance of the architecture. As if these two parameters are enhanced it will affect on performance of hybrid cloud architecture.

In this experiment QoS is enhanced using high availability and minimum response time which would help to improve the performance of the architecture [118].The following QoS parameters would help to improve the performance of the architecture which has given below:
1. Availability
2. Response time

The parameters which are used in the architecture to enhanced QoS of architecture for real time environment to conduct the experiment are as given below:
1. BW of host
2. Number of host and VM
3. Available BW of host
4. Memory of VM
5. BW of VM
6. Image Size
7. Various size of the processor according to the requirement of private and public cloud in modeling hybrid cloud.

Experiment 1:
1. **Availability**

Availability is the first parameter of QoS which has been considered in hybrid architecture to check its performance. In this experiment availability is measured with respect to numberof data centers which has been used in the architecture.

Two use cases were considered to check the availability. The first case was used for less number of DC with less availability and second case was use for more number of data centre with high availability. Availability of the data centre is depends on the accession time and response time.

The availability increases in two ways either increasing the bandwidth of the user bases of the region which have high response time or by providing more data centers to the users to the data controller sent a request for service.

Case1: Data Center Configuration With Less Availability

Hybrid cloud architecture is modeled for real time environment to check the status of performance parameters. Architecture uses 12 user bases (UB) and 7 DC. User bases are belonging to private and public cloud. The UB does not allot any region which was affected on the availability. To increase the availability and reduce response time of the user base region wise, more data centers were added in the cloud. Public cloud is more accessible to the users so the availability of accessing cloud is more. Availability of datacenters for these two user bases was less because no DC allotted to the same region of that UB. Less availability of data center has been affected on the average response time which was less for the specified user bases.

Case2: Data Configuration With More Availability

In this experiment case2 is considered for the evaluation of more availability of data centres. Seven data centres were available to the customers in the cloud. Data centers are added in the Region which does not have any DC. Due to less number of data centre available in the region, response time of user base was more. To increase the availability the proposed architecture provides a solution for more availability by adding more data centre.

Table 1: Comparative Analysis of RWRTUB in EPORTUHC With Respect To Availability

User bases	Case1(less availability in ms)	Case2(more availability in ms)
UB1	50.27	50.09
UB2	50.9	51.21
UB3	**50.18**	49.92
UB4	51.2	51.12
UB5	50.1	50.26
UB6	200.35	**50.95**
UB7	49.94	50.1
UB8	51.05	50.02
UB9	50.06	**51.22**
UB10	50.81	**50.95**
UB11	49.72	**50.24**
UB12	201.05	**51.4**

2. **Response Time**

In this experiment response time is studying with respect to QoS metrics. Minimum response time is the key factor of performance oriented architecture for real time environment. Response time is tremendously reduced by setting following parameters in the hybrid cloud architecture. Two different use cases have been used in this experiment which shows the tremendous downfall of response time with respect to QoS metrics. In order to reduce response time i.e. enhanced QoS parameter following two metric have been considered:
   1. IMAGE SIZE
   2. RAM

To reduce the response time two important QoS metric i.e. image size and RAM (memory of VM) plays a vital role. Image size is nothing but a single VM image size in bytes. The configuration of these metrics parameter is changed in hybrid cloud architecture. Response time is the time which required completing the task with some specified time. This experiment is conducted for the evaluation and analysis of how the image size

parameter will affect response time. As soon as response is minimized it would affect the performance of the architecture. To analyze the effect of QoS metric on hybrid cloud architecture three use cases have been used.

Table 2: Effect of Image Size and Ram on Response Time in Hybrid Cloud Architecture

IMAGE SIZE	RAM (MEMORY OF VM) in mb
125000	2000
250000	5000

Table 3: Effect of Hybrid Cloud Architecture on Art

Use cases	ART(ms)
Case1	75.74
Case2	50.97
Case3	50.91

In this experiment the QoS parameter has been enhanced as one by one metrics of quality of service are added in the setup of the hybrid cloud architecture.

V.   Result And Discussion
Performance evaluation of hybrid cloud architecture with respect to enhancement of qos parameters
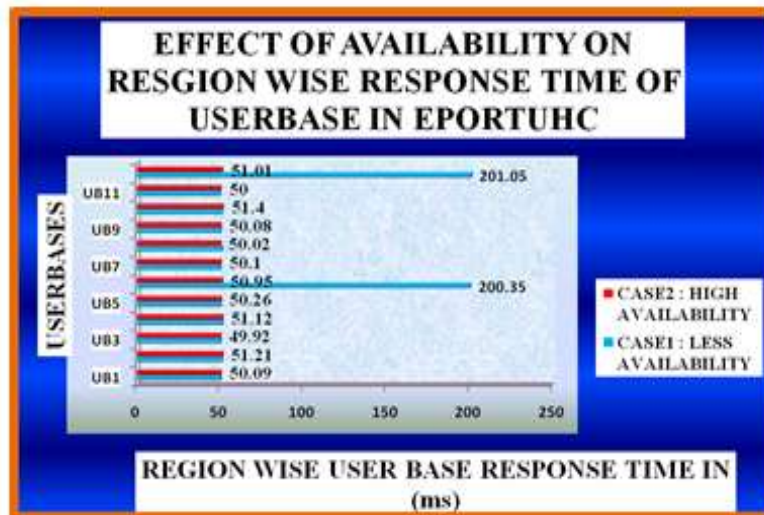
Graph 1 : Effect Of Availability On Region Wise Response Time Of User Base In HCA

Availability

In the proposed architecture quality of service was enhanced by improving major QoS parameters availability and response time. Graph 1 shows the effect of hybrid cloud architecture on quality of the service parameters. Availability is the first parameter which has been studied in this experiment using two different cases with respect to region wise response time of user base. From the graph 1 it has been observed that region wise response time of UB12 & UB6 was high i.e. **201.05 ms** and **200.35 ms** respectively as no one data centre is allocated to the same region of these user bases. When more data centers are available for the user bases the response time of the user base region wise was drastically reduced i.e. **51.01ms** and **50.95ms** respectively for UB12 and UB6 as shown in case2.

Observations:
- ❖ In the experiment availability discussed in terms of RWRT of user bases according to their region.
- ❖ If more data centers are available to the users to send request for the allocation of data centres the availability would be increased in terms of RWRT of user bases.
- ❖ Enhanced proposed architecture by providing more availability.

Response Time
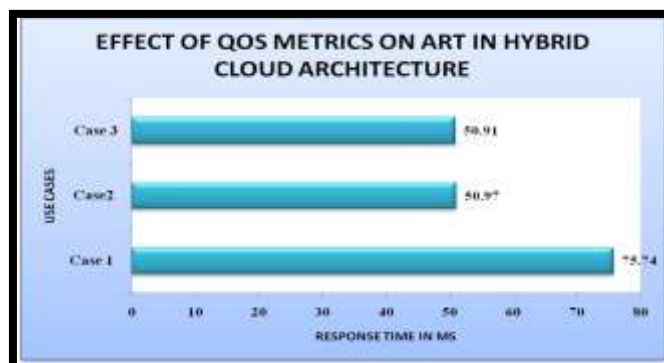
Graph 2: Effect of QoS Metrics on Average Response Time in HCA Architecture

In this experiment response time was reduced significantly from case1 to case3.There are various QoS metrics which affects on the response time in the hybrid cloud architecture. To increase the performance of the architecture QoS metrics i.e. RAM (memory of VM), image size and multicore processor plays an important role.

IV.   Conclusion

Quality of service plays a major role to enhanced performance of cloud architecture. There are various parameters of QoS which would help to improve the performance. In this research result shows how the enhanced QoS parameters like availability and response time would affect on the performance of hybrid cloud architecture. Future scope of the research is to study and compare the results other quality of service parameters like linearity, processing time and seek time/execution time. In this research paper experiments are setup in cloud analyst GUI of cloud sim using net beans and java. Working of all these parameters for real time environment will be the future scope of the study.

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