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Cloud Based Service Migration with QoS

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Abstract – In the Mobile Computing technology, mobile devices like smart phones and tablets were replaced by personal computers. In the upcoming years, these devices are supposed to be switched between different network providers using vertical handover mechanisms to maintain network connectivity at all time. Due to that mobile devices can access cloud services without interruption while user changes location. Using current model, mobile devices moving from one geographical location to another keep using those services from the local Cloud of their previous network, which tends to move a large volume of data through the Internet over a long distance, which results in more congestion over a network. This degrades the Quality of Service and, the Quality of Experience offered by the services in the Cloud. So, there is a need of another method to manage resources more efficiently, while improving the QoS and QoE of mobile media services. This introduces a new concept of Cloud Based Mobile Service Delivery where services run on localized public Clouds and are able to migrate other public Clouds in different geographical locations depending on service demands and network status. It prevents the Internet network from experiencing more traffic loads and provides resource allocation and management mechanism to service providers for their services. This system also removes ambiguity which occurs at the time of migrating the services and also prevents migration of recently migrated services which reduces congestion.

Index Terms – Computer network management, Communication system, traffic control, QoS, QoE, Cloud Computing.

1. INTRODUCTION

Cloud computing is everywhere. Enterprises are regularly searching for a new and advance method to increase their profits and reduce their costs. Those enterprises need different technologies that let them grow and do not strain them financially. From the existing technologies, Cloud computing has emerged as a promising solution providing on demand access to virtual computing resources, platforms, and applications in a pay-as-you-go manner. Cloud service customers can use what they require and pay only for what they use. As a result of this, Cloud computing has raised the delivery of IT services to a new level that brings the comfort of traditional utilities such as water and electricity to its users. The various characteristics of Cloud computing, such as cost effectiveness, scalability and ease of management, encourages more and more companies and service providers to adapt it and offer their solutions via Cloud computing models. Mobile computing also enhances its popularity. People uses Laptops,palmtops,tablets and other mobile devices to use the services of cloud. When user moves to another location he is still capable of accessing the services of cloud without any interruption that is the idea of mobile computing. As the number of user increases the use of cloud services increases and users are mobile they are still able to access the services of same cloud where he is closer to another cloud. But that nearer cloud doesn't have the same service which is present on localized cloud. So data has to travel over a network to reach to the user. So, couple of data has to travel over a network. It creates the congestion over a network, which results in degrading the quality of services reach at the user. Due to that there is need of some good method which gives solution of this problem. This system is the solution of that problem. This system investigates the idea of migration of cloud services to another cloud as per the location of client to reduce the congestion on a network. This new concept reduces the traffic on network and also provides services with good QoS to the client. At the time of migration it may happen that target cloud decline the service if it is already under the heavy load. In that situation QoS manager again finds the new target cloud. This system becomes successful to minimize the traffic of network and user get the cloud services with good QoS.

2. RELATED WORK

The system invents a of reshaping of the physical footprint of virtual machines within a cloud[8]. It invents a concept towards the lower operational costs for cloud providers and improvement of hosted application performance by taking into account affinities and conflicts between replaced virtual machines. It is achieve by mapping virtual machine footprints. After comparing if similarities found in memory footprint the virtual machines are migrated to the same memory location and content based memory sharing also deployed to get consolidation[9][10][11]. The basic thing is to build control system for cloud which perform footprint reshaping to achieve higher level objectives like low power consumption, high reliability and better performance. It then reduces the cost for cloud providers and creates low cost cloud services for user. MEC (Media Edge Cloud) architecture improves the performance of cloud technology. This architecture also improves QoS and QoE for multimedia applications. To achieve that "cloudlets " of servers running at edge of bigger cloud. So it handles the request closer to the cloud thus it reduces the latency. If requests needs further processing then requests are sent to the inner cloud due to that the "cloudlets" are reserved for QoS based multimedia applications[13]. Using that concept the physical machines closer to the clouds outer boundarywill used to handle QoS sensitive services. As these machines located on outer boundary of cloud the data has to travel less distance within the cloud before sending to the client. It improves QoE for client and reduces network congestion of cloud. All these researches aims only to improve the cloud performance, no one can think about the user mobility. Providing media services to mobile clients becomes popular in future. As per that concept mobility and multimedia contents becomes more popular and high bandwidth data streams will have to travel more distance and reach moving target can create a problem in future. Cloud providers may need to create more clouds to handle the load and reduces the congestion.

In cloud computing client get services by contacting a physical resources directly and then ask about the service. Clients need to connect to the cloud then they can accesses the services from the cloud. But in this approach client need to know the name of the physical resource which offers the services to the client, so it the problem of redundancy. Some organizations solve this problem by running multiple servers and by using DNS, for load balancing and fail over [13]. This approach needs more cost which is not affordable for small entities which offers a service at lower layer. The ability for clients to request services directly from the network instead of asking for physical resources that offers those services[1]. It opens a doors for future development. Client request a service ID and network infrastructure which is used to find whether the actual service is running and then connect it to the client. This approach is able to running a service in multiple locations and directly client requests to the appropriate instance depending on their location and network status.

3. PORPOSED MODELLING

Now a day's Mobile devices available in various shapes and forms, so the most popular form of this is laptops, even they are not truly portable in the sense that we cannot operate one while on the move due to the size and form factor. It has created a demand for mobile devices and easier to use for someone on the move and away from a power source. Smart phones and tablet PCs complete those requirements and created new trend in mobile computing. Unlike laptops and desktop computers, these mobile devices are made with a long-lasting battery life, a small size and weight, a simple user interface and run basic computing tasks using limited resources such as memory, etc. so at the time of accessing services of one cloud if user changes his location then still he can access the services from previous cloud. To reach to user data has to travel long distance. It results into congestion into the network. To resolve this problem need to populate that service to another cloud which is closer to the user. Congestion problem is solved by this system. But sometimes it may happen that the same service is used by another user then it generates the ambiguity problem. So the proposed system only migrates the object of services instead of migrating the whole service. It doesn't allow the migration of recently migrated services which may causes the congestion over a network. Single cloud providers may not own multiple clouds at different physical location so many cloud providers have their cloud far apart or down to regional scale within a country. So it is possible to solve the problem of service population across the different boundaries of cloud providers. The new concept is introduced where service providers will register their services globally without bounding to specific cloud providers. Services which are globally registered and not bound with specific cloud providers will free to populate or migrate to different cloud depending on QoS and source of service request parameters. It will only possible when cloud providers open their boundaries, so services can move in and out of their cloud. It will change the model of service providers. Service providers will register their services with service level agreement which defines the expected QoS parameters. Cloud providers provide services with best QoS so that it will populate their service and it gives income for them. It is not possible to any big cloud to take all the services due to the network congestion problem. So the services may populate from bigger cloud to smaller cloud to maintain network congestion free and minimize the distance of itself from client.

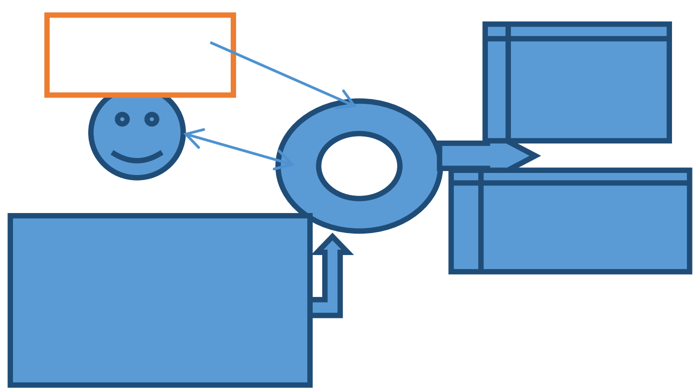


Fig 1: System architecture

After populating services from one cloud to another the receiving cloud can also reject the populating service, if it is already under the heavy load. This population of service process is completely transparent to the user. To achieve all those things there is the need of new service delivery framework and it should be QoS aware and support service population. At the time of migration of any service from one cloud there may be the chance that another user is accessing the same service so after migration of service from current cloud leads to starvation of second client. So to solve this problem we add separate resource pool to each cloud which is used to keep references or object of all populated and non-populated services. Another client can access the populating service without any interruption.

Above figure 1 shows a system architecture smart phones and users are the clients who accessed the services of cloud. Those are mobile clients so if they move from one location to another then there is the need to populate the services to another location. So the engine gives the recommendations depending on the QoS parameters. Another cloud decides whether to receive or not the populated services.

4. RESULTS AND DISCUSSIONS

The following figure 2 shows the system model of this system. It shows that how the user changes his location and then how the service is migrated to another cloud which is closer to the user. The migration decision is taken by search engine. So to take that decision and to manage whole cloud engine or master node contains various components. Those are network manager, connection state, QoS manager, data storage, service manager,STAR,GSPA.

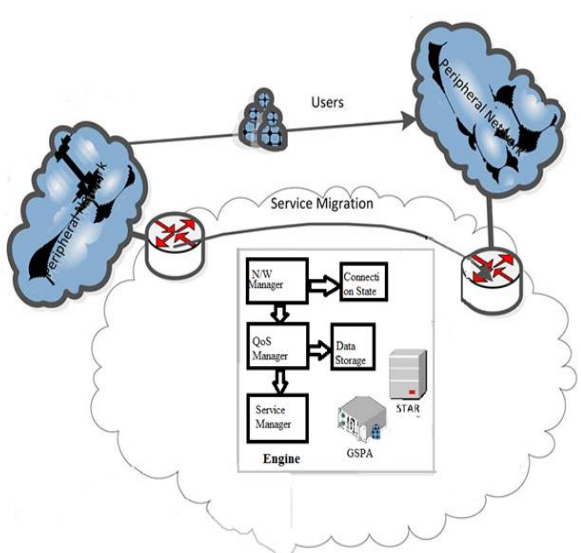


Fig 2: System model

1. Network manager:

The network manager is used to manage the network connections, connection of client and services by using connection state. It deals with how services are registered on cloud. When a service provider wishes to publish a service, they have to define security and QoS parameters. Whenever any user wants to publish his service on cloud, he has to take permission from cloud. At that time the service SLA is matched with the SSLA of cloud if those are matched then the service is get published on cloud. SLA of service is decided by the user itself and SSLA of cloud is decided by cloud It is used to gather data about the network status and the location the users. Any QoS events recorded by this are given to the QoS manager to decide if a service needs to move. The network manager is also responsible for the network handover between clients and services after a service moves. This information is given to this layer by QOS manager and is then passed on to the clients in order to initiate connections to the new Cloud where another instance of the service is running.

2. QoS Manager:

It is used to find the target cloud. When there is need to migrate the service this QoS manager needs to find the target cloud. To migrate the service to target cloud must have to accept the service by checking the capacity of cloud. If cloud is already under the heavy load it may decline the service. If the SLA and SSLA requirements of cloud and service are met then the target cloud accept the service otherwise the service get declined by target cloud. In that case again QoS manager has to find the other cloud closer to user for migration of service. QoS manager is also responsible of preventing migration of recently migrated service because when user changes his location QoS of service accessed by user is degrades and congestion increases over a network so the service is migrated to other cloud but if again user changes the location at the time of accessing the same service then the same service is again migrated within a short period of time. It increases the congestion over a network. So there is need to avoid the migration of recently migrated service. QoS manager finds the when the service is last time migrated and then it starts the migration process. It again increases the performance of service. It also contains the STAR and GSPA components.

(a) STAR:

It is service tracking and repository. It will connect service subscribers to the correct instance of a service. STAR keeps a record of Service IDs and in which Clouds their instances are running and also uses input by the QoS Tracking. Using this information, STAR will make a decision on which Cloud is better suited to service a client request based on the location of the client. STAR can look up routing tables in order to identify which Cloud is closer to a user. A choice is always given to a service to reject the new client and forward them to another Cloud if possible. The STAR works similarly to the DNS system since it is essentially the same type of service albeit with some extra parameters. Once a Cloud ID is found, then the ID is resolved into the IP addresses of the Cloud controllers that the client can contact to access the service.

(b) GSPA:

It is global service population authority. Global Service Population Authority (GSPA) used to makes decisions on when to populate a Cloud based on all the factors given by the above mentioned part. The instruction to move a service will be given after the target Cloud has agreed with the SSLA of the service then the GSPA update STAR records with new instances of services. Using this method the decision is leave for individual Clouds to negotiate service migrations instead of receiving instructions from a global mechanism. This allows for a more self-managed design but lacks the central management capability of the GSPA.

3. Service manager:

It is used to migrate the service to another cloud. To populate a service to Cloud we must first make sure that the target Cloud can accept the service. Service manager takes that decision by communicating with QoS manager. QOS manager reports to the service manager that whether or not they can meet client SLA and overall SSLA requirements in their present state and then based on that, a decision is made by service manager whether or not to move a service. It therefore acts as a middleware between the service and the Cloud. At time of migrating services, resources are allocated and a service handover is performed between the new and previous Clouds. Once the service has moved, it is also responsible for initiating a network level handover for the subscribed clients. It only migrates the object of service to other cloud which removes the ambiguity. so in that way the service is populated from one cloud to another cloud to decreases the congestion over a network.

Algorithm:

1. Start.

2. Start node and QoS manager.

3. User connects to the cloud after successful login.

4. Client sends service request to cloud.

5. Cloud registers the request and finds appropriate

Cloud-id.

6. Connection is established between cloud and client.

7. GSPA checks QoS of service regularly.

8. If QoS drops below threshold value then GSPA

Sends the Migration signal to QoS manager.

9. QoS manager migrate the service to the target

cloud after checking the recommendations of

STAR and GSPA.

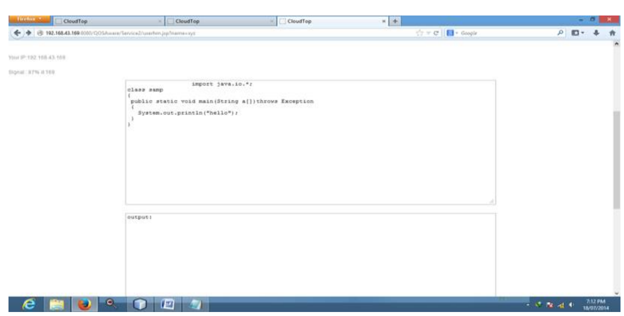
10.Stop.

This system implemented which solves the problem of congesion of network by migrating the service from one cloud to another as user changes his location. To implement this system there is need of various modules those are:

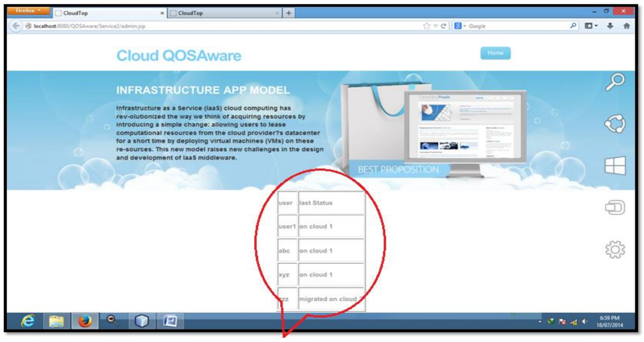
1. cloud1
2. cloud2
3. Client
4. QoS Manager

Client application (login page)

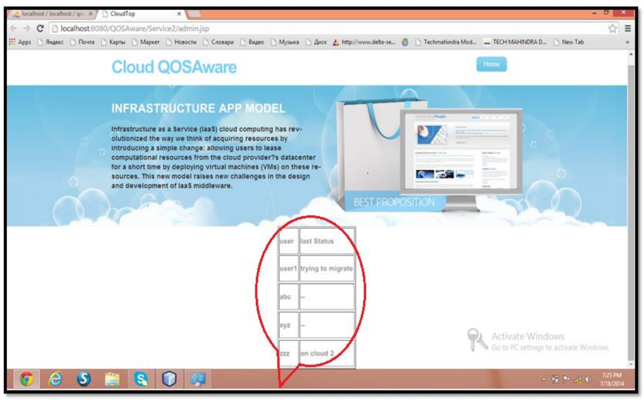
Client application(after login)



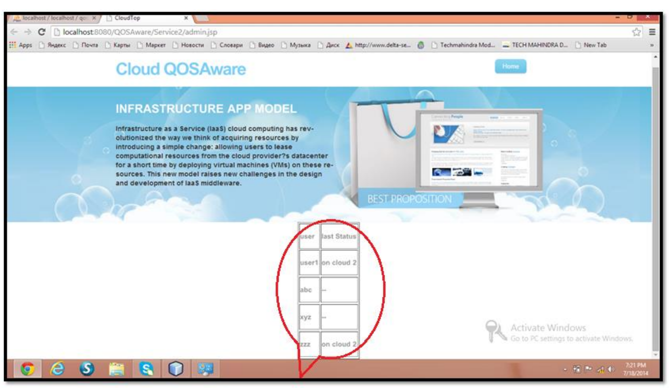
Cloud1 master node before migration



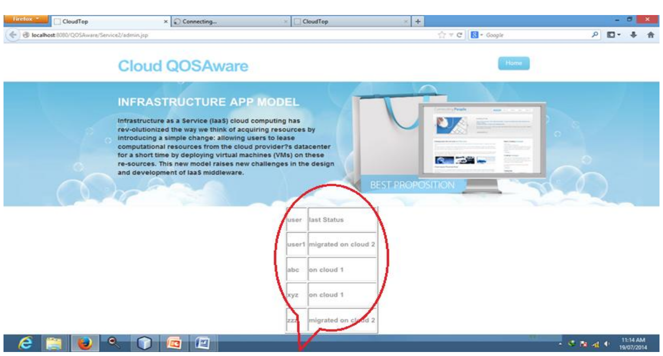
Cloud1 at the time of migration:



Cloud2 after migration:



Cloud1 after migration:



The above graph shows the time required to migrate the number of services. So as seen time required to migrate the number of services in existing system is larger than the proposed system. This system successfully migrate the system in less computational cost and time.

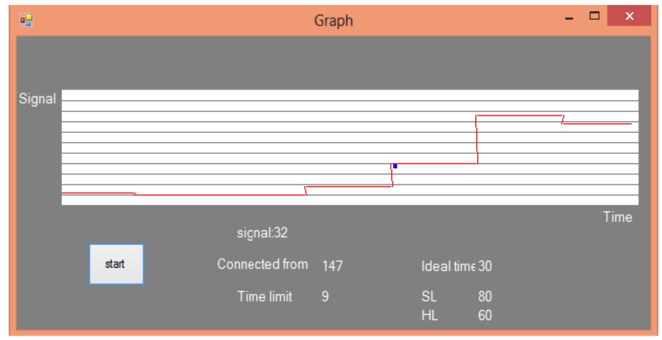


Fig: QoS Degradation Graph shown above.

5. CONCLUSION

This system have presented the challenges arises due to the user mobility in networks. This new system provides the solution to overcome these challenges. This system allows user to access the services of cloud with better QoS while moving from one location to other without affecting the service quality. Previous models of service delivery were inefficient and were not scale to cover all the needs of mobile users. The current model is efficient to provide better management of resources and good service to the clients. the current system solves the problem of ambiguity which arises at the time of migration of service from one cloud to another. To further develop the framework, currently working on a method that calculates the rate of increase of latency as a user moves while streaming a video. The System also investigates how the number of clients can influence the decision making. It proposed public cloud service which is based on Quality of service; this is calculated users geo locations and provides a service to maintain good service delivery. The system also prevents migration of recently migrated service which reduces the traffic.

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