IOSR Journal of Computer Engineering (IOSR-JCE)
e-ISSN: 2278-0661,p-ISSN: 2278-8727, Volume 17, Issue 2, Ver. II (Mar – Apr. 2015), PP 18-21
www.iosrjournals.org

Bandwidth Management on Cloud Computing Network

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Abstract: *To be able to manage the available bandwidth and distribute it among the Cloud Applications users effectively is a very critical issue to avoid network congestion and network resources abuse. In this paper we will explore a mechanism that enables us to distribute the bandwidth more effectively and in a smart way on cloud service for CBS Company. The Cloud Application users were divided into three distinctive groups of network consumption capacity, each capacity is determined as per actual work done and the bandwidth is determined accordingly. We monitored the network performance for all the three groups, to make sure of the quality of the network service. The results showed that we had succeeded through our mechanism to manage the bandwidth in an ideal way that granted to us the maximum usage of the cloud service.*

Key work: *Bandwidth, Cloud computing, Response time, Network traffic, Monitoring*

I. Introduction:

Nowadays, Cloud computing is so widely spread among businesses and most of the companies are interested to take benefit of the cloud computing to minimize the capital investment and the ongoing running expenses for their automation. Cloud computing brought in a wide spectrum of applications within the financial reach of almost any company irrespective of its size. The problem with the cloud is the access to the cloud through a network connection, because cloud is always on remote data Centers. Getting enough bandwidth to access the cloud could be very expensive to avoid network congestion and slowness. If the cloud application is optimized for the use on the cloud then the application will not be an obstacle for the high number of user connecting to the cloud.[2]

In this paper , we managed to divide the limited bandwidth of the network accessing the cloud among the different users as per each user group needs for traffic on the network to discharge his routine daily work.

We have carried out three simulations on three networks with different traffic capacity on average on a specific database application. We divided the users into three groups in accordance with their actual data need and we assigned the relevant bandwidth to each of them. We monitored and analyzed the network performance through measuring its metrics:

Throughput, Response time and utilization, and we compared the metrics to make sure that our criteria had rendered the expected results of equitable division of the bandwidth among the different networks simulated.

Cloud computing defines as a model that helps enable ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models we show theirs on figure below. [1] [3]

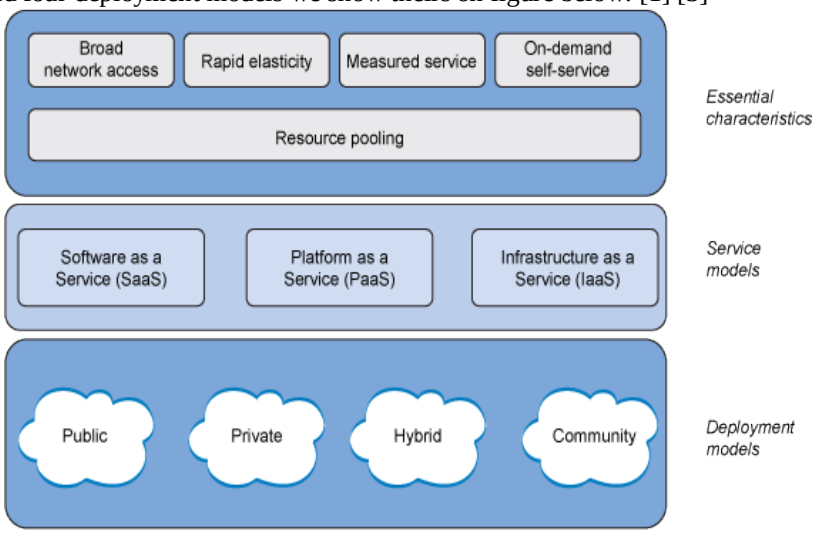

Figure 1:cloud models,service models and characteristics models

To optimize bandwidth for users

In this case we are using Opnet simulation software for measuring performance of network such as throughput, response time and utilization to discover potential bandwidth bottlenecks before permanently putting applications and data into the cloud. It's no longer about delivering an application that is great; it's about whether that application can survive in the wild. You have to examine the maximum use of the cloud-based application and network. [2]

Problem statement:

CBS is a company and want to save cost bandwidth and enhancement has applications resource by applying cloud computing service. We have multiple users in CBS we need to know how to manage bandwidth for the users by applying optimization techniques and monitoring our network.

II. Case study:

CBS Company

If your employees and your users can't access data fast enough, then the cloud will be nothing more than a pipe dream. In CBS case, that meant re-architecting the network to distribute databases so data is quickly reachable and data centers remain in synchronization.

The Proposed Solution:

By Appling some techniques helpful the administrator makes the network more efficient suchas:

- Good apply polices to distribute bandwidth over users
- Monitoring network for traffic

The adoption of cloud-based computing and applications promises to improve the agility, efficiency, and cost effectiveness of IT operations required to provision, scale, and deliver applications to the enterprise. However, as with other new technology trends, delivering applications from the cloud to the remote sites creates additional challenges in application performance, availability, and security.[4]

III. Simulation analysis:

In a cloud, the bandwidth sharing between the huge numbers of user is a critical factor for the success of deployment of any application on the cloud. To maximize the usage of the limited band width available to the cloud, we suggest division of the band width equitably among the different users according to their data capacity passing through the network to/from the cloud. In this context we divided the users on the cloud to three categories according to their priority on the cloud:

1. Administrators
2. User with additional task to do
3. Normal users who do routine work

Accordingly, we simulated the network distribution to distribute the band width to user categories and assigning different capacities to each of them, hence we assigned 1000BaseT to Category 1 due to the importance of their work and the high priority they need to manage the whole cloud and the activity running on it. Second Category we assigned them 100 BaseT due to their continuous work all through the day and sending reports and returns to their managers. Category 3 we assigned them 10 BaseT to enable them run their routine duty which does not need high capacity of data. Thus we succeeded to manage the available band width and distribute it smartly between the different categories of user according to their actual monitored capacity in such away to maximize the throughput of every user on the cloud.

IV. Results:

CBS is a company how need to make use of cloud computing applications, but they are concerned about the network bandwidth and its cost and the different classes of users whose data usage is different and as well their need to have a responsive application . Thus they are looking for a network management solution that allocate the right bandwidth to each user as per his data capacity demand in uploading and downloading and mean while the application remain equitable responsive without a noticed delay.

The experiment setup for their network as decided by our solution satisfied all their need and gave the relevant network bandwidth to each users group.

Our findings are as follows:

- The throughput was found lesser in the 1000 BaseT network that has large capacity, but increase a little bit in case of the 100 BaseT network. The highest bandwidth was enjoyed by the 10 BaseT network. This implies that everyone is taking the relevant bandwidth as dictated by his work nature.

- The response Time was uniform and stable for 1000BaseT network and this granted to them fast access to the service whenever they want waste network the response was not so stable and even worse for the 10 BaseT network.
- It's noticeable from the experiment outcomes that we had utilized the limited bandwidth very effectively especially for 1000 BaseT users.

In conclusion we managed to use the limited bandwidth effectively and divide it up between the users in such a way that preserve the network resources and utilize its resource as on demand.

Outputs:

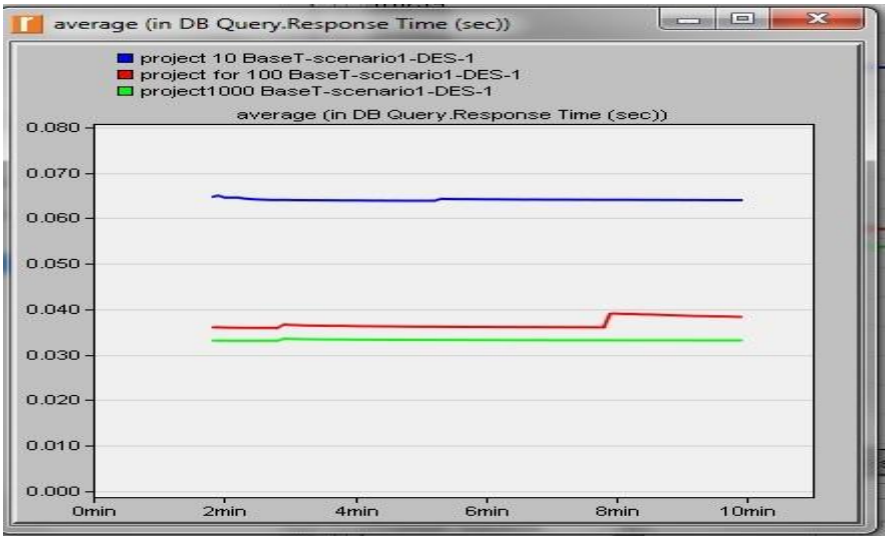

Figure2: Response Time

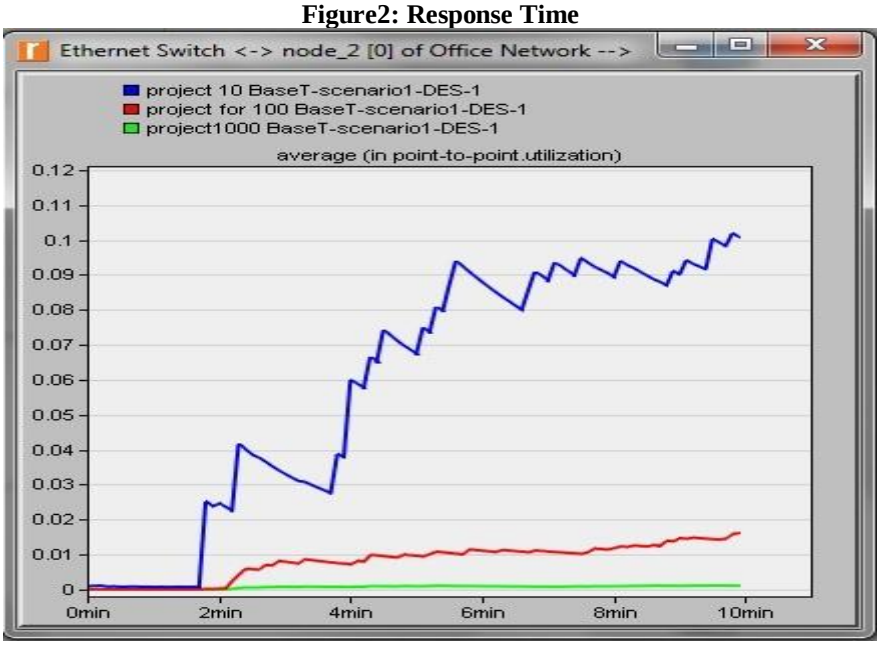

Figure3: Utilization

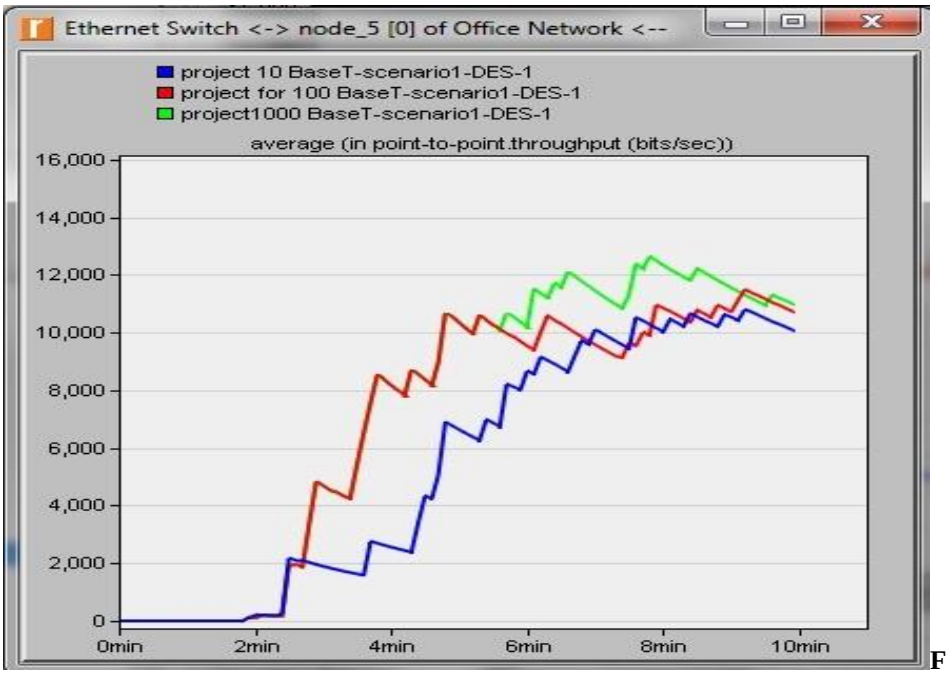

Figure4: Throughput

V. Conclusion:

From the results we've gathered, with our effort to distribute the bandwidth according to user priorities and actual demand of data transfer to-from the cloud we had maximized the utilization of the available band width smartly and efficiently. The Output achieved a good result to manage bandwidth on network ,and users should have only used the capacity they need from the resources of the network.

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