International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 2 Issue 8
August 2015

A Survey Paper on Traffic Management in Cloud Computing

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Abstract:
Cloud computing is all about carrying out processing in other's system. There are various vendors who provide cloud computing services. The basic criteria that should be met in order to access cloud computing services is a need for steady internet connection. As everything is done online the traffic across the internet is to be managed efficiently so that the transmission delay can be minimized and better quality of service can be given to the customers. The network should not be too congested at any moment of time. Hence the traffic management becomes very important factor for better performance of the cloud computing network.

Keywords: data traffic, cloud computing, traffic management, QoS, DNS, CNMM, VPN, Verisign traffic management service, Microsoft azure traffic manager.

1. Introduction

Cloud computing is defined as a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications. The term 'cloud 'is used as a metaphor to internet [1]. Cloud computing provides computing resources on demand. In a business there will situations where in certain time of the day the use of the system is high and some other time usage of the system will be low. In that case the system should be dynamically scalable. The cloud enables this ability of dynamic scalability.

Systems deployed on cloud can use more computing resources such as storage, servers more at the peak time. When the usage becomes more there will be congestion in the network. The people when think of the cloud has a notion that it is fast. So there should be some way to manage the traffic across the cloud network efficiently without causing much trouble to the customers. This is called traffic management.

The performance of a cloud computing platform can be evaluated based on two parameters: computation based measurements and network based measurements. The computation based measurements cover the storage, process cycles and language engine performance. These measurements can be made at the server level, hence taken care of by the service providers. The network based measurements include through put, round trip time, data loss and other quality of service (QoS) [2].

A set of policies and mechanisms that are useful to manage the service requests over the network can be termed as data traffic management. It is needed to provide QoS to customers. The data traffic across the network should be monitored in order that the network works efficiently.

Traffic management in cloud network is a not heavily explored research topic. This is a survey paper that gives a brief idea about the existing techniques for traffic management.

The paper is organized in the following manner:

2. Need for traffic management
3. Challenges in traffic management
4. Existing techniques
5. Impact on the cloud
6. Conclusion
7. References

2. Need for traffic management

Cloud computing platforms allow the users to transmit, store and retrieve a large amount of data from a remote system. It is possible that certain time the traffic over the network may be high. For example, we can think of announcement of university of results. In this case since many people access the server at the same time, there is a possibility of server crash or server will not be accessible. In the cloud computing scenario this should not be allowed to happen. For this purpose the service providers must be ready to handle such situations. Hence traffic management plays a key role. The traffic management over the network is needed to minimize the transmission delay. When there is more traffic over the network, with prior knowledge of traffic the bandwidth allocation can be done accordingly.

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The data traffic analysis is important for data centers as well. Many web applications optimize customer experiences based on data traffic, that is to say these applications more efficient and faster if the data traffic over the network is less. As an example we can think of packet data services such as chat applications. The messages will be delivered faster if the traffic is less over the corresponding network. If there is some congestion in the network the messages will be delivered with an unknown delay. Network operators must be aware of the data traffic across the network. Because knowing the traffic across their network will make it easier for them to take up necessary management and planning decisions. [3]

3. Challenges in traffic management:

The existing traffic measurement and analysis methods cannot be easily extended to the data centers. The density of links at the data centers is much higher than the density of links at the enterprise network. This makes the worst case scenario for the existing methods [3] to be applied to measure traffic across the cloud computing network.

Most of the existing methods are used for the enterprise level network data traffic management. These methods are capable of analyzing traffic across few hundred hosts. But a modular data center may have several thousand servers; this is where the existing methods fail. Since these methods are designed for the enterprise networks, they assume the flow patterns that are reasonable in the Internet and enterprise networks. But when it comes to cloud network it is not possible to assume a pattern because the data traffic will be varying. The variation is not linear nor is it predictable. The systems deployed on cloud platform needs to be scalable since the data traffic across the system may change any time. The traffic management decisions are often made in a centralized manner. This leads to high complexity and poor scalability.

4. Existing techniques:

4.1 VPN:

The easiest method in which an enterprise can access a cloud computing application is through the Internet/VPN. It needs a little synchronization of data between the cloud host and the enterprise data center. The use of VPN puts only a little impact on the enterprise network but it will cause technical considerations that should be resolved in both technical sense and also in terms of the contract with the cloud computing provider. [5] The VPN is complex to set up and expensive to maintain. The main disadvantages of using the VPN on cloud for traffic management are- in the cloud VPNs are hard to scale, local VPN clients might not work most of the times, audit records like how long the connection was used, who accessed your server are not easy to maintain. The audit information most of the times has to be retrieved manually. [6]

The virtual private network though is the easiest method for an enterprise to access the cloud network.

- A virtual private network is complex to set up and expensive to maintain.
- It needs data synchronization between the cloud application host and the enterprise data center.
- In a virtual private network it is scalability is difficult to achieve.
- The network traffic can be handled easily, since only that enterprise traffic is to be supported.
- Security is easy to achieve.
- The network might not be used to its full potential since most of the time clients might not be working.

4.2 Verisign traffic management services:

Verisign's Dynamic traffic management service which is available as a valued added service on managed DNS can be easily deployed in the network. For global organizations it becomes easy to manage the traffic patterns dynamically based on the real time information. Dynamic Traffic Management service makes it possible to manage the traffic in the network based on real time information. It allows virtually unlimited ways for rule based customization of organization's traffic. Verisign offers traffic managemnet services such as failover, geolocation, weighted load balancing, dynamic traffic management. The Lua scripting language is exclusively available as a part of the Verisign's traffic management service. [7]

Verisign provides dynamic traffic management services across the cloud network. The global organizations can monitor their network traffic easily, the traffic patterns can be monitored, and mostly because it is dynamic the application downtime can be avoided in many cases. This is a software tool to manage traffic across the network.

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- As it is a software package it can be easily deployed.
- Low cost: When compared to hardware solutions, it offers lower operating costs.
- Since it is deployed globally it allows easy scalability
- It is suitable for critical internet services because of its enhanced availability and performance.
- Reduces the risks of DDos attacks as it is DNS based. [11]
- Speed: the data can be delivered to the destination much faster as it offers minimum latency or lag time. [11]

4.3 Microsoft Azure Traffic Manager

An organization's Azure cloud services or website may be running on different data centers across the world. To control the distribution of traffic to organization's specified endpoints one can make use of the Traffic Manager. Traffic Manager applies an intelligent policy engine to DNS queries for the domain name of your Internet resources. Deployment of Traffic Manager helps to improve availability of critical applications, responsiveness for high performance applications. It allows upgrading and performing service maintenance without downtime. The performance of a large complex system is optimized by traffic distribution.[8].

4.4 CNMM: In October 2014 Dr. Mamta Madan and Mohit Mathur have proposed a Cloud Network Management Model (CNMM) in order to overcome the problems with SNMP. Some of the problems with SNMP are – data may be lost as SNMP uses unreliable UDP (user datagram protocol) for data transmission, sometimes an SNMP poller restarts and it loses the track of the counter; counter restarts. This results in an error in the estimation of traffic. Another problem in SNMP is the 'jitter' caused by polling. The CNMM model uses a set of agents sending updates to the managers in the cloud about their performance. Each agent contains a set of objects called Management Information Base (MIB) that stores the performance and other related information. To provide better QoS of cloud services the network administrator should be aware of the current status of the manager in the cluster, their CPU, storage and network utilization, how many instances of virtual machine are allocated and so on. In order to ensure proper management all the messages in the CNMM are acknowledged. The CNMM is a hybrid of centralized and decentralized management. [9]

Cloud Network Management Model (CNMM) is a hybrid of centralized and decentralized approach. The loopholes in the SNMP model lead to the development of CNMM model. It removes or minimizes a few pitfalls of the former model. It provides enhanced security than the SNMP model.

- CNMM model enhances the network performance: use of less number of packets reduces the jitter it which in turn enhances the network performance.
- The network traffic is reduced
- There are no polling problems.
- Ensures the secure communication
- Concept of virtualization helps in the faster recovery in context of failures.
- It provides for better security.

5. Impact on the cloud:

A network is always analyzed based on the parameters such as performance, security, speed, scalability.

The performance of a cloud network should be analyzed from both service providers' view and also from the customer's view point.

Service provider's view point:

The service provider may be more concerned about the infrastructure performance of the cloud network. Cloud service provider needs to monitor the storage, virtual machines and network traffic.

Customer's point of view:

The customers tend to decide the network performance on the basis of how the applications work; the speed of the network, accessibility of the remote data, and reliability. [10]

After studying the above tools, it is clear that dynamic traffic management is efficient and a wise choice for traffic management related problems over the cloud computing networks than the hardware solutions.

The traffic across the cloud network is not the same at all the time, it varies. For example traffic across the virtual private network to access cloud might be different at different time. When the traffic is less, it will not cause any problems but if the traffic across the network is more; then, the network becomes congested and the chances of application downtime are high due to bottlenecks. In the cloud computing scenario downtime is not accepted. The applications

should be running smoothly all the time. Hence traffic management plays an important role. The network should be able to scale up and scale down depending on the requirements.

The hardware solutions become expensive because when the traffic low, most of the systems remain idle. But if we adopt software solutions to dynamically monitor the traffic across the network, then, the load can be distributed may be evenly among all the available systems. This leads to better performance and minimizes the latency and improves the response time.

6. Conclusion

Cloud computing is a platform that is cost-effective and also provides faster means of data transmission. Hence traffic management across the cloud computing network becomes very important. In order to reduce the transmission delays few of the above described solutions are used. Managing the network traffic based on the real time scenario will be a more appropriate solution. The network must be deployed in such a way that it is scalable. This not only helps in easier traffic management but also provides better Quality of Service (QoS) for the customers.

7.References:

[1] www.wepopedia.com/TERM/cloud_computing
[2] Wide-Area Traffic Management for Cloud Services by Joe Wenjie Jiang, A Dissertation Presented to the Faculty of Princeton University in Candidacy for the Degree of Doctor of Philosophy
[3] Cloud computing: state-of-the-art and research challenges by Qi Zhang · Lu Cheng · Raouf Boutaba, Published online: 20 April 2010 © The Brazilian Computer Society 2010
[4] consumers .of com. org. uk /internet/ internet_traffic_ management/
[5] A Comprehensive Solution to Cloud Traffic Tribulations by Mathur Mohit, International Journal on Web Service Computing (IJWSC), Vol.1, No.2, December 2010
[6] 5 reasons VPNs suck in the cloud, http://www.dome9.com/blog/5-reasons-vpns-suck-in-the-cloud
[7] Verisign Traffic Management, Increase Availability, improve user experience, and optimize network performance with global load balancing in the cloud, Data Sheet
[8] Microsoft Azure Traffic Manager, https://azure.microsoft.com/en-in/documentation/articles/traffic-manager-overview/
[9] Cloud Network Management Model: A Novel Approach to Manage Cloud Traffic, International Journal on Cloud Computing: Services and Architecture (IJCCSA) ,Vol. 4, No. 5, October 2014 DOI : 10.5121/ijccsa.2014.45029
[10] Performance monitoring in cloud, View point, by Vineeta V, Infosys.
[11] www.verisign.com