International Journal of Engineering Science Invention
ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726
www.ijesi.org Volume 3 Issue 1‖ January 2014 ‖ PP.69-71

Optimal Distribution of Video in Cloud

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ABSTRACT: *Content delivery networks (CDN) use multiple servers in many geographic locations that improve deliveries of static and streaming content. The high fluctuation of user demands in geographically distributed regions results in low resource utilizations of CDN. It also adds complexity to the deployment procedures. Hence in proposed, multiple cloud server data is registered with Video Service Provider (VSP) as they are cost-effective, highly scalable and reliable. The Cloud Service Providers (CSP) is registered with Video Service Providers. A region head is chosen for each location. The user sends request for video, which is received by their region head. Now the region head chooses the best Cloud server (CS) with minimum load to make it cost effective and for faster response time. The proposed algorithm is, Dynamic Load Balancing (DDN) algorithm for faster response time and for handling the changing user demands. It balances the load in the cloud servers using a data structure, which assigns the job from heavily utilized cloud servers to least utilized cloud servers.*

KEYWORDS : *Cloud Service Provider, Content distribution Network, Video Service Provider,*

I. INTODUCTION

Traditional Content Distribution Networks (CDNs) such as Akamai and Mirror Image have deployed tens of thousands of data centers and edge servers to deliver content across the globe. It has become financially prohibitive for smaller providers to compete on a large scale following the traditional model by building new data centers. The recent emergence of storage cloud providers such as Amazon S3, Nirvanix and Rackspace has opened up new opportunities to provision cost-effective CDNs. CDN that is based on storage clouds as a “cloud CDN”, as opposed to a “traditional CDN” is used. Storage cloud providers charge their customers by their storage and bandwidth usage following the utility computing model. Storage cost is measured per GB per unit time and Bandwidth cost is measured per GB transferred. Cloud CDN may take advantage of the competitive prices offered by different cloud providers and reduce its own expense. However, as the only cost for cloud CDNs is the bandwidth and storage cost, they are very sensitive to the usage variations.Internet video providers (e.g., YouTube, Hulu) generally resort to CDN to conduct large-scale video distribution. However, CDN solutions are inadequate for the emerging video traffic growth. First, due to their semi static resource provisioning mechanisms, the resource utilization of existing CDNs is extremely low (normally ranging between 5%-10%), which directly translates into high operational cost. Second, the emerging user generated video contents are long tail nature, defying the operational principle of serving the popular contents of CDNs.
The emergence of cloud computing opens a new door for designing the next-generation video distribution platform. Cloud-based services are more cost-effective, highly scalable and reliable. The popularities of videos to be distributed are dynamic and evolutionary over time. Thus, the deployment of cloud resources is also a dynamic process. It means that a video service provider should adjust resource provisioning at different regions proactively and place video contents according to the changes of user demands. It investigates the optimal deployment of cloud-assisted video distribution services. Therefore, an algorithm is proposed to dynamically balance the load and to ensure the optimum utilization of cloud services.

II. RELATED WORKS

[1] The Opportunistic Load Balancing algorithm (OLB) intends to keep each node busy regardless of the current workload of each node. OLB assigns tasks to available nodes in random order. The Minimum Completion Time algorithm (MCT) assigns a task to the node that has the expected minimum completion time of this task over other nodes. The Min-Min scheduling algorithm (MM) adopts the same scheduling approach as the Minimum Completion Time algorithm (MCT) to assign a task the node that can finish this task with minimum completion time over other nodes. LB3M achieved minimum completion time and provides better load balancing compared to LBMM and MM. [2] CMS is used for optimizing the dynamic multi-service load balancing in cloud based multimedia systems. It further solves the problem by an efficient genetic algorithm with immigrant scheme, which has been shown to be suitable for dynamic problems. [3] Content Distribution Distribution (CDNs) uses storage clouds.

The storage cloud providers operate on data centers that can offer Internet-based storage. These providers charge their customers by their storage and bandwidth usuage following the utility computing model. Storage cost is measured per GB per unit time and bandwidth cost is measured per GB transferred. It placed web sever replicas in cloud to minimize the cost and also satisfies the QoS requirements for user requests.

[6] CMLB makes each multimedia service task to obtain the required resources in the shortest time through load balancing. This paper facilitates the execution of complicated multimedia tasks, as well as supports specific and stringent multimedia QoS provisioning. It uses effective load balancing approach for cloud-based multimedia systems (CMLB). [7] used NBS algorithm for resource allocation but it focuses on reducing the cost more than time. This paper investigates the optimal deployment problem of cloud assisted Video distribution services and explores the best tradeoff between the operational cost and the user experience. It aims at paving the way for building the next-generation video cloud. [8] aimed to avoid deadlocks in cloud by the use of virtual machines (Vm). If a Vm is 100%, then it is fully utilized. It comprises of users requesting for the services of diverse applications from various distributed virtual servers. [9] ACO uses pheromone table and pheromone update mechanism is proved as a efficient and effective tool to balance the load but it does not consider the fault tolerance issues. This paper deals with the main concern of load balancing in cloud computing. The load can be CPU load, memory capacity, delay or network load. Load balancing is the process of distributing the load among various nodes of a distributed system to improve both resource utilization and job response time.

III. PROPOSED WORK

Design

The following is the block diagram of the overall system design. The user sends the request for the video. The request is received by their region head which is forwarded to the CSP based on the availability of the resource and load. The proposed algorithm helps in balancing the load. Additionally CSP uses the cache. The cache is a buffer which is used to keep the recently retrieved videos. The CSP initially checks its cache for the requested video. In case of absence, the request is forwarded to the VSP from where the video is retrieved and sent back to the requested user.

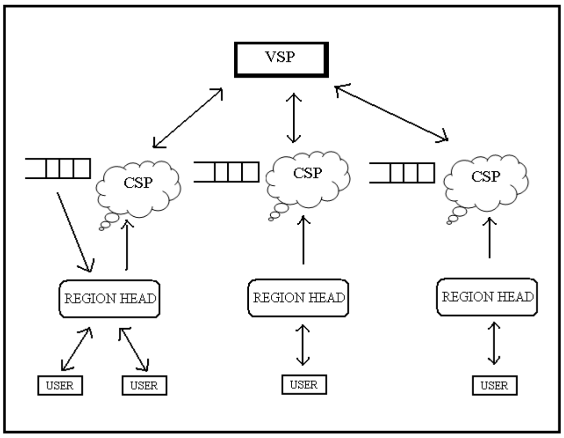

Fig. 1. Overall Design

IV. ADVANTAGES

- Maximum utilization of resources.
- Maximum Speed.
- No wastage of Resources.
- Low network traffic.

V. PROPOSED ALGORITHM

DDN (Dynamic Distributed Non-pre emptive) Load Balancing Algorithm

[1] STEP : The CSP has sub servers known as cloud server (CS). Initially the status of CS will be zero as all the CS are available.

[2] STEP : The region head maintains the data structure comprising of Job ID, CS ID, CS status.

[3] STEP : When there is a queue of requests, the region head parses the data structure for allocation to identify the least utilized CS.

[4] STEP: If availability of CS is more, then the CS with least hop time is considered.

[5] STEP : The region head updates the data structure automatically after allocation.

VI. IMPLEMENTATION

Allocation of Job

The user registers with the cloud service provider and the information are stored in the database. These cloud service providers are connected to the video service providers to provide the requested videos. When the user requests, it is forwarded to the region head which chooses the suitable cloud server.

Load Balancing

The region head maintains a data structure comprising of Job ID, CS ID and CS status. When the requests arrive, the region head parses the data structure for allocation to identify the least utilized CS. If an overloaded CS is found, the region head assigns the load of overloaded CS to the under-utilized CS. The region head updates the data structure by modifying the entries accordingly on a time basis.

Cache management

When another user requests the same video to the cloud service provider in short duration of time, then it does not communicate directly to the video service provider. Rather it first checks its cache for the requested video. If present, fetches from its cache, otherwise it requests the VSP.

VII. CONCLUSION

The new user can register with CSP and request the video. During the allocation of job, the log is monitored and maintained which helps in load balancing. It also aims in reducing the response time for retrieval of video using cache management and effectively balancing the load based on the CS status.

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