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OPTIMISED ONLINE ALGORITHM FRAMEWORK FOR VIDEO SERVICES IN CLOUD WITH PERFECT QoE

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Abstract— **Cloud Computing plays a vital role in running video applications that is being provided by Video service providers (VSP) to run applications in cost effective manner. Virtual machine (VM) from multiple clouds has been rented by the video service provider based on the requestor's location. The Virtual machine cost may vary in different places and also the request of the user is dynamic optimising the number of VMs of the same type rented from clouds in different places in a given timeframe is essential to achieve effective costing for VSPs. The main factor we have to consider while running video application is good Quality of Experience (QoE). We propose the problem as a theoretical optimization problem and to design a optimisation algorithm framework that is solved online. Theoretical analysis depicts that the online algorithm gives a solution better than the optimal solution produced through offline computing. We also given a comparative analysis of how the algorithm works for varied length and varied resolution.**

Index Terms— **Cloud Computing, Balancing Workload, Virtual Machine, dynamic optimisation, Video Service provider**

I. INTRODUCTION

Video based providers (VSP) host video based services for users in multiple locations by using cloud server providers (CSP) and outsourcing it to content delivery network (CDN).This method when used needs more than one CSP for each location and also users Quality of Experience (QOE) is sacrificed to reduce the cost for the CSP's and CDN rented by the VSP.

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The dynamic resource allocation algorithm answers this problem by hosting the CDN onto the cloud and uses various virtual machines in the cloud to provide user the video based on his QOE requirements and if a virtual machine is not available for a geographical location, the CDN optimally searches for another data centre and redirects the user request to it and thereby provides the user the video with his QOE requirements as optimal as possible.

The existing system is the adequate level of QoE that is provided to users in a cost effective manner by the Video Service Providers who dynamically rent resources for computing using the cloud. It is difficult to predict the user's demands and also the request arrivals are dynamic in nature. Finding the optimal way to map them to various resources types in cloud is difficult because of the different QoE requirements along with the user requests. Another problem is to balance the QoE of the users and cost of cloud resources renting which is a difficult decision based problem in itself. For Example, A higher QoE may cost the provider more but the provider will be rewarded in long term. And also, a single CSP cannot have servers in many places at a time and guarantee of it serving all people in a particular region is very difficult. The difference in pricing of the cloud resources in various regions and timeslots makes the resource renting and user request scheduling more complicated for VSPs

II. RELATED WORKS

Previous studies show that Cloud computing services are ubiquitous, and are going to serve as the source of computing power for enterprises and also personal computing applications [1]. We consider a theoretical model of a cloud cluster, where jobs arrive according to theoretical process and request virtual machines (VMs), which are represented in terms of CPU, memory and storage space resources.

It also showed that an application in the internet, IPTV has the potential to flood Internet access and back ISPs with massive

amounts of new traffic [8]. We measured 200,000 IPTV users for a single program, at an aggregate s rate of 100 gigabytes per second. Although many architectures is possible for video distribution, several point to point architectures is successfully deployed in the Internet. In order to gain insight into point to point IPTV systems and the traffic loads on ISP, we undertake an in-depth measurement study of PPLive.

The problem of optimally redirects user requests in CCMN to multiple destination Virtual Machines (VMs) is considered, which elastically scale their capacities to service so as to minimize a cost function that include various service response times, computing costs, and routing costs[5]. We allow the arriving request process to switch between normal and high crowd modes to model user requests to a cloud-centric media network (CCMN).

We quantify the trade-offs in flash crowd detection using delay and a false alarm frequency, allocation of request rates, and service capacities at the VMs. We show that under every request arrival mode (normal or flash crowd), the redirection policy can be found in terms of a price for each VM, which is a function of the VM's service cost, with requests redirected to VMs optimally in order of non-decreasing prices, and no redirection is done to VMs with prices above a threshold price.

We investigate the energy-efficient job dispatching algorithm for service that transcodes (TaaS) in a multimedia cloud [2]. We minimize the energy consumption of service engines in the cloud by achieving low delay for TaaS. We formulate the job dispatching problem as a optimization problem under the framework of dynamic optimization. We propose an algorithm which is online and transfers the jobs to different servers, with an objective to reduce the Energy consumption while achieving the Queue stability.

The perspective of game coders, player's behavior is the most important factors they have to consider when designing a game. To achieve a fundamental understanding of the game, play behavior of gamer online, exploring user's game playtime provides a good starting point [3]. This is because the concept of gameplay time is applied to all genres of games and also enables us to model the system workload as well as the impact of system and network QoS on user's behavior. It can even help us predict player's loyalty to specific games.

A framework is proposed that systematically handles renting of resources from multiple CSPs and schedules user requests to these resources in somewhat optimal manner. In particular, the user requests, workloads and QoE requirements which are heterogeneous can be handled by the framework. QoE plays a major role in running the video applications. If the QoE is high then cost will be more. [4] There are different types of VMs in the cloud and are priced dynamically according to the type.

The Video sequence is sent as a bitstreams.[7] To solve the joint stochastic problem to and also to balance the cost saving and QoE, an algorithm is proposed. The existence of content delivery network (CDN) is leveraged to host video services on the various datacenters distributed in various regions. A systematic optimised algorithm is proposed to address this problem. With this approach the video service provider can provide an efficient, cost effective and quality service to any number of clients.

III. PROPOSED SYSTEM

System Architecture:

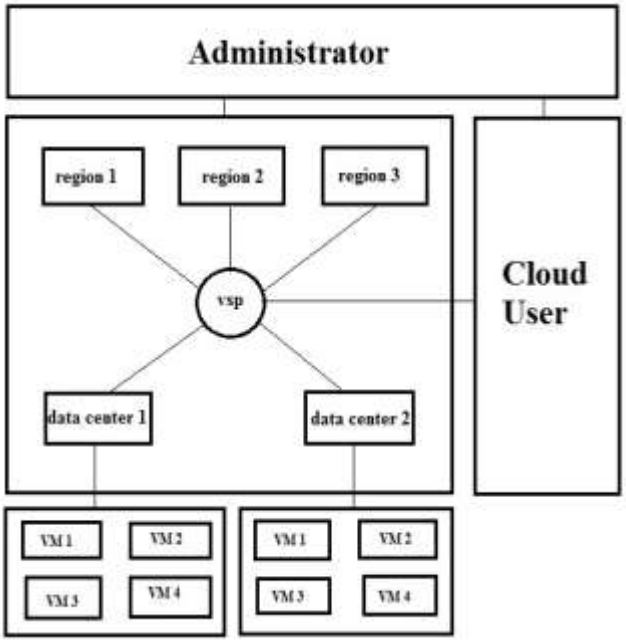

Fig 1: System Architecture

The proposed system consists of a set of Virtual Machines that has to be rented for service. We have a set of data centers through which

the video sequence is sent as a set of bit streams. The main core part is the Video service provider which satisfies the dynamic request of the user. The user demand is dynamic. The algorithm framework provides the perfect QoE for the dynamic request.

IV. PERFORMANCE MEASURE

A. *Experimental Setup:*

In this experiment, the system consists of two data centers distributed geographically running three types of services for users spread across 5 varied locations. Three Types of virtual machines are used in the experiment namely low medium and high virtual machines. The cost of purchasing the virtual machine from the Cloud Service Provider is reduced because of our Algorithm. The time needed to start and load the virtual machine is within seconds

B. *Experimental Result and Inference:*

A comparison experiment is conducted to validate if the proposed algorithm is capable in dealing with various length of videos and its varied resolutions.

Impact of Length L on Time T:

For increasing value of Length L, the time to load the video increases non-linearly. In other words as Length of the video increases the time needed to Load the Video increases and vice-versa. Length- Time characteristics is shown below as graph

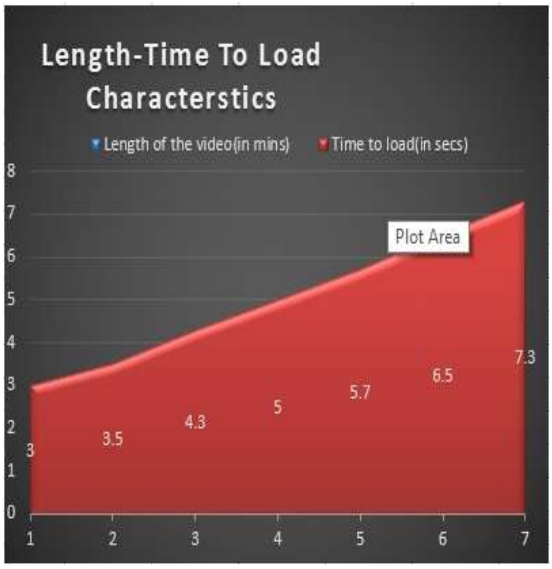

Fig 2: Impact of Length L on Time T

Impact of Resolution R on Time T:

For increasing value of Resolution R, the time to load the video increases exponentially. In other words time increases with increase in resolution and vice-versa. The characteristics of Resolution on Time is shown below as graph

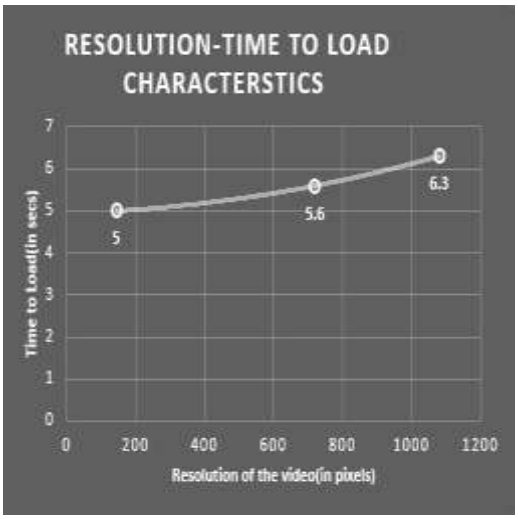

Fig 3 : Impact of Resolution R on Time T

V. CONCLUSION

This paper proposed a novel online algorithm and we have showed that it is capable of achieving video hosting using cloud with very little cost and time. [6] In the future, we will focus on 1) Taking into account the video consumption pattern in social network team to share VM resources. 2) Solving the problem at the level of job/VM match instead of job/datacenter match considered in this paper. 3) Taking into account more factors in modeling objectives (e.g., resource utilization, storage cost, VM migration cost etc) and QoE function definition (e.g., router delay, propagation delay etc)

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