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An Improved Multilevel Resource Handling Strategy for Cloud based Video Streaming

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ABSTRACT

Video data transmission and video streaming allows people to access the stored video media using the network anywhere in the world. An adaptive scheme is applied to perform the resource allocation in terms of bandwidth and video memory in cloud-based video streaming. Advances and commoditization of media generation devices enable capturing and sharing of any special event by multiple attendees. Video streaming is multimedia that is constantly received by and presented to an end-user while being delivered by a video service provider or sender. With the rapid development of cloud technology, many services have been transferred from local computers to the cloud-based platform, which decreases the amount of computation done on the former. Graphics processing, apart from providing user interfaces featuring diversified special effects, is also significant in terms of application programs and play interactions. The proposed model combines a QoS aware resource allocation strategy for mobile 3D graphics rendering, which is a hybrid rendering technology combining the client-side graphics processing capabilities with the graphics processing units on the cloud-based platform. The proposed system is called Graphics Adaptive Resource Allocation Strategy (GARAS), and it delivers multiple views of an event to viewers at the best possible video representation based on each viewer's available bandwidth GARAS is a complex system having many research challenges. The objective of the study is to maximize the overall viewer satisfaction by allocating available resources to transcode views in an optimal set of representations, subject to computational and bandwidth constraints.

Keywords : Cryptography, ECC, Graphics processing, QoS, RSA, Streaming, Streaming Cloud.

I. INTRODUCTION

Cloud Computing refers to both the hardware and systems software in the datacenters that provide those services and the applications delivered as services over the Internet. The services are referred to as Software as a Service (SaaS), so we use that term. The datacenter hardware and software are what we will call a Cloud. In cloud computing, cloud service providers offer an abstraction of infinite storage space for clients to host data. Today's cloud service providers offer both massively parallel computing resources and highly available storage at relatively low costs. As cloud computing becomes extensive, an increasing amount of data is being stored in the cloud and shared by users with specified privileges, which defines the access rights of the stored data.

In a cloud computing environment many entities are involved. The entities that are of concern are the cloud provider and the cloud consumer. The entity which owns and manages the resources is the cloud provider and the entity that consumes the resources which may be an individual or an organization, is the cloud consumer. When a cloud consumer is an organization, the users or employees will have access to its cloud resources. There may be casual users that have no relationship with the cloud provider but are accessing cloud consumers' web services that are developed and hosted within the cloud. Here the concern about the security and trust relationship is between the cloud provider and the cloud consumer.

In this work the main objective is to improve the security in a cloud environment by utilizing the available cloud resources, for creating the streaming cloud. The goal is to provide secured storage and access normal & multimedia data seamlessly in cloud communication. This work is done to reduce eavesdropping and to increase the performance efficiently.

II. Related Work

Monjur Ahmed and Mohammad Ashraf Hossain (2014) in this paper "Cloud Computing and Security Issues in the Cloud" addressed that Cloud-based service providers are being evolved, which has resulted in a new business trend based on cloud technology. The introduction of diverse cloud-based services and service providers dispersed geographically, sensitive information of different entities is normally stored in remote servers. The locations of these servers have the possibilities of being exposed to unwanted parties in situations where the cloud servers storing this information are compromised. If security is not sturdy and consistent, the flexibility and advantages that cloud has to offer will have little reliability. This paper presents a review on cloud computing concepts as well as security issues inherent within the context of cloud computing and cloud infrastructure.

Water Marking Multimedia Content

The problem of protecting various types of multimedia content has gained significant attention from academicians and the industry. One approach to this problem is to use watermarking, in which some distinctive information is embedded in the content itself. A method is used to search for this information to verify the authenticity of the content. Watermarking is simply inserting watermarks in the multimedia objects before releasing them as well as mechanisms to find objects and verify the existence of correct watermarks in them.

Crowdsourced Live Streaming Over The Cloud

The focus of this paper is on the other approach for protecting multimedia content, which is content-based copy detection (CBCD). In this approach, signatures (or fingerprints) are extracted from original objects. Signatures are also created from query (suspected) objects downloaded from online sites. Then, the similarity is computed between original and suspected objects to find potential copies. Many previous works proposed different methods for creating and matching signatures. These methods can be classified into four categories: spatial, temporal, colour and transform-domain. Spatial signatures (particularly the block-based) are the most widely used. However, their weakness is the lack of resilience against large geometric transformations. Temporal and colour signatures are less robust and can be used to enhance spatial signatures. Transform-domain signatures are computationally intensive and not widely used in practice.

3D Video Signature

Content-based copy detection of 3D videos is a new problem; we are aware of only two previous works. On one hand, the work computes SIFT points in each view and uses the number of matching SIFT points to verify matches. Comparing all SIFT points in each frame is not practical for large databases due to the storage overhead and search complexity. On the other hand, the work assumes that the depth maps are given or estimated. Estimating the depth map from stereoscopic videos is quite expensive. The method is suitable for 3D videos encoded in the video plus depth format, but not for stereoscopic videos. The proposed method in this paper captures the depth properties without calculating the depth map itself and it is computationally efficient because it does not compare all features in the frame.

III. Existing System

Common cloud services are mostly meant to speed up CPU computing. However, with improved graphics processors, cloud services that can speed up GPU computing concerning remote streaming are coming into the spotlight, such as virtualized screen, remote operation interface and cloud gaming systems, etc. Increased GPU computing was first achieved through open source code, and through hybrid streaming architectures, etc., which have been proposed in recent years. Regarding the current research topic, while there are already many relevant studies of the reduction of data transfer, solutions under unstable network Resource remain lacking. In terms of this research topic, however, there have been few relevant issues concerning network speed and quality in terms of remote streaming systems, thus, this research sets out to enhance graphic capabilities through the graphic operations of mobile devices.

Given that remote streaming might call for greater Internet Resource, this research takes the graphic processing capabilities of mobile devices into consideration, and simultaneously puts the graphic processors of mobile devices and cloud-based platforms into computing operations, and with the graphics capabilities of current embedded devices, the current network transmission rate and quality as the selective parameters for the function of cloud support streaming in the current research. Through this parameter operation, the users can carry out drawing via the remote cloud-based platform when network transmission is not stable. To achieve a relatively smooth frame rate for the local computer, as well as to reduce the transmission of network packets, the priority of this research will be given to the graphics processing capabilities of the local computer. In addition, the resource allocation strategy for mobile graphics streaming for mobile graphics streaming proposed here will only be used in drawing when the mathematical capabilities of the local computer are below the minimum frame rate.

With the progress of computer mathematical capabilities in recent years, application programs have placed substantially higher demands of 3D graphics. Instead of the simple application programming interfaces in the past, application programs are placing more emphasis on beautiful user interfaces. Apart from Flash animations, the user interfaces of many application programs are presented by 3D graphics. Given the substantially higher demands for 3D graphics, the hardware of the local computer is often found by the users to be functionally insufficient. If the 3D graphics can be transferred and computed by remote hardware featuring higher efficiencies by means of remote streaming, and the ultimate frames are transferred back to be displayed on the client side, the user's experience of these 3D application programs could be improved.

The client side is a mobile device, which hardware is inferior to ordinary PCs, and when complex 3D graphics calculations occur, it will be impossible for the client side to carry out real-time calculations, resulting in a poorer user experience. The 3D graphics calculations in this study are mostly concerned with complex mathematical calculations, such as matrix, inverse matrix, trigonometric functions, etc. Remote streaming works by carrying out a drawing transferred by complex graphic calculations to the remote cloud-based platforms, thus, not only improving the user experience, but also increasing 3D graphics efficiency. In its applications however, the key issue faced by this technology is the network environment.

Priority should thus be given to the network speed and quality between the client side and the cloud-based platform in terms of this technology. Remote streaming could also be applied through frame splitting. That is, when an application program is running on a monitor featuring high resolution, small blocks of the frames could be handed over to be rendered by the cloud-based platform after the frames are split. A large cloud-based platform can simultaneously process multiple small blocks before they are transferred back to be displayed on the monitor.

A management program for frame splitting is required in this application to manage the frames waiting to be split. For the client side, therefore, the splitting could only be done after detailed analysis of the application information is made. In most common remote streaming architectures, it is necessary to increase the computing time of the cloud-based streaming platform to reduce the transfer of packets; however, if the aim is to create better user experiences and increase the users' interactive feedbacks, the transfer of packets should be increased.

The cloud-based streaming platform will produce two 3D models, a high-quality model and a low-quality model. When the low-quality model is completed, it will be compressed and transmitted to the client side for first-phase streaming. At the same time, the platform will carry out a difference calculation between the high-quality model and the low-quality model, in which a difference image of the two models will be produced. This image is compressed and transmitted to the client side. After the first-phase streaming is completed on the client side, an image overlay calculation will be conducted via the difference image from the cloud-based platform, thus, generating the ultimate frame.

Drawbacks of Existing System

The existing system is used to protect different multimedia content types including videos, images and audio. It is deployed in both public and private cloud. A key management process during the new user join or revoking existing user in hybrid cloud is not included. A same key is used for long period in hybrid cloud communication. Symmetric key encryption standard has less secure. Exponential based polynomial function will increase the complexity of algorithm in both memory well as execution time. In existing system, during the user update process private key information is not updated. This will lead to data leakage in the cloud data access in secured groups. If the file size is large, then signature code size is high. It increases the complexity of the signature generation process.

IV. Proposed System

The proposed system is used to protect different multimedia content types including videos, images and audio. It is deployed in both public and private in-network. It creates signatures for multimedia content, and distributed matching engine for multimedia objects. The signature is generated based on the depth signal in the video like spectrum value of the audio signal. Multi-level signature generation process is used to design the efficient encryption for multimedia content this code generation process is repeated by processing the complete file into number of chunks Individual signature codes are merged by using logical operation such as XOR operation.

The aggregate user satisfaction obtained by using a specific set of representations are considered as profit or gain, and consumed number of cloud instances and aggregate bandwidth for all users serve as weights. For instance, if a view is transcoded to all five representations, then the weight will be 5, and viewers' QoE will be maximum, as all of the viewers will get the desired representation. However, if a view is transcoded in just one representation, then the weight will be 1, and aggregate user QoE will be ≤ 1, depending on the bandwidth capabilities of the viewers watching that view.

The profit values serve as the major selection criteria. Considering number of representation in set R, a single view can be transcoded into 2 –1 possible combinations considering requirement to fulfill all of the viewer's bandwidth constraints. For instance, if a chunk of viewers can only receive 360p video, then the selected representations set must have 360p representation. If there is only one computational instance available, then the only possible representation is 360p, as only this representation fulfills constraint (4a) for all of the viewers. Though, the overall QoE for this representation will be less as viewers capable to receive higher bitrate representations are forced to watch 360p representation. If the view can be transcoded into two representations, then the possible set to choose a representation set is {{360, 480}, {360, 720}, {360, 1080}, or {360, 4K}}. 360p represents the least bitrate representation required to serve the users having capability to receive 360p only.

The response of a local Web cache is often three times faster than the download time over the WAN, for the same content. End users see impressive improvements in response times, and the implementation is completely transparent to them. A Web cache stores Web pages and content on a storage device, that is logically or physically closer to the user-closer and faster than a Web lookup. By reducing the amount of traffic on WAN links and on overburdened Web servers, caching provides significant benefits to ISPs, enterprise networks, and end users.

Ensuring that the network supports traffic localization is the first step in creating a network-integrated cache engine, which can be achieved by setting specific parameters to optimize network traffic and enabling content routing technology at the system-level. Once the right network foundation is in place, network caches are added into strategic points within the existing network. By pairing software and hardware, Cisco creates a network-integrated cache engine.

RSA is widely used public-key encryption algorithm. RSA stands for Ron Rivest, Adi Shamir and Len Adleman, who first publicly described it in 1977. In our proposed work, we are using RSA algorithm to encrypt the data to provide security so that only the concerned users can access it. By securing the data, we are not allowing the unauthorized access to it. RSA is an algorithm for public key cryptography, involves a public key and a nonpublic key. The overall public keys are regularly known to everybody and are utilized for scrambling messages. Messages encoded with the overall population key will exclusively be unscrambled abuse that particular key. Client information incorporate encryption before capacity, client verification methodology before capacity or recovery, and building secure channels for information transmission.

RSA crypto framework understands the properties of the multiplicative Homomorphic encryption. Ronald Rivest, Adi Shamir and Leonard Adleman have imagined the RSA calculation and named after its creators. RSA utilizes measured exponential for encryption and decoding. RSA utilizes two examples, a and b, where a is public and b is private. Let the plaintext is P and C is cipher text, then at encryption. User data is encrypted first and then it is stored in the Cloud. When required, user places a request for the data for the Cloud provider. The Cloud provider delivers the data after authenticating the user. RSA is a block cipher, in which every message is mapped to an integer. In our Cloud environment, private key is only known to the user for who originally owns the data whereas public key is known to all. Does, encryption is done by the cloud service provider and decryption done by the Cloud user or consumer. Once the data is encrypted with the public key, it can be decrypted with the corresponding private key only.

V. Results And Discussion

Simulation is conducted in random environment 50 mobile devices using NS2 with random way point mobility model. Network area is defined as 1000 x 1000 sq.ft area. The connection pattern is generated using Video Generation and the mobility model is generated using setdest utility. Setdest generates random positions of the nodes in the network with pause time and specified mobility. Protocol performance is estimated in terms of Packet delivery ratio, Throughput, Transmission Delay. Cloud based Regular Video Streaming model achieve acceptable results compare to Video Streaming.

Fig.1 Packet delivery ratio

CBS Model outcomes high packet delivery ratio compare to Streaming Model. Packet delivery ratio has been evaluated for Cloud Video streaming and regular streaming results as shown in Fig.1. CBS model throughput is high compared to Streaming model.

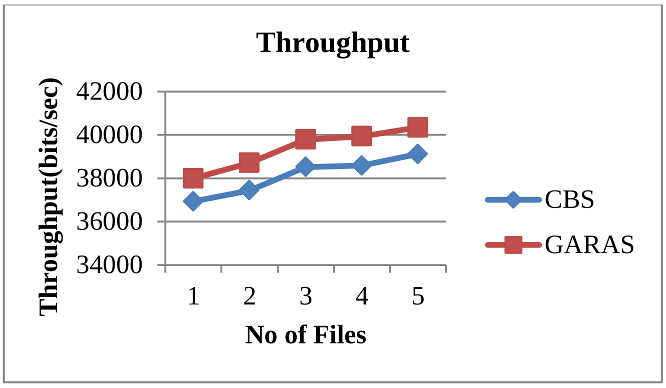

Fig.2 Throughput

Throughput has been evaluated for Cloud Video streaming and regular streaming results as shown in Fig.2.

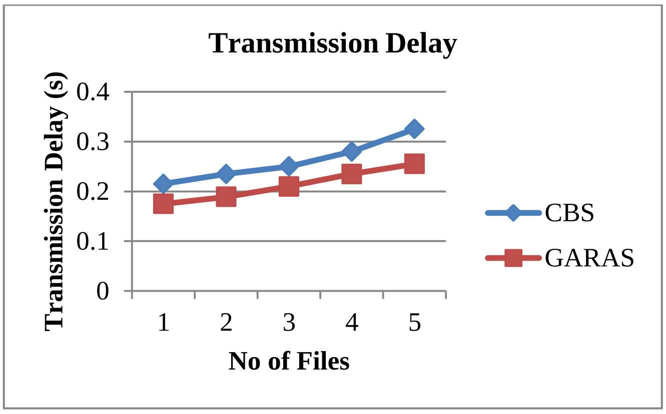

Fig.3 Transmission Delay

Transmission delay is achieved very less compare to Streaming Model. Transmission delay has been evaluated for Cloud Video streaming and regular streaming results as shown in Fig.3.

VI. Conclusion

Video streaming is a type of multimedia that is constantly received and presented to an end-user while being delivered by a video service provider or sender. The proposed model combines a QoS aware resource allocation strategy for mobile graphics rendering, which is a hybrid rendering technology combining the client-side graphics processing capabilities with the graphics processing units on the cloud-based platform. Key updating process is done for each user update process in the user join and leave the process. i.e., whenever any node leaves or added in cloud, a new key is generated without exchanging the key message with Third Party Auditing. Moreover, the QoE metric is based on the received video quality and the viewer's bandwidth capabilities. The proposed system significantly differs from legacy multi-view video systems in the fact that multiple views are generated from non-professional crowdsources instead of professionally calibrated settings and expensive equipment. The presented cloud-based architecture of the system for a scalable and cost-effective solution.

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