Secured Video Streaming and Video Sharing in Mobile Networks using Cloud

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Abstract

The tradition of videos over mobile networks has been increasing staggeringly in such however that the wireless networks cannot keep up with the rigorous traffic. Poor quality of videos (long buffering time, intermittent disruptions) are transmitted over the mobile networks owing to the restricted capability of wireless link and increasing traffic demand. Efficient video streaming and sharing can be achieved by using an AMES cloud framework, wherever a personal agent is employed to regulate the streaming flow with a Scalable Video Coding technique based on the feedback of wireless link capacity and prefetching the videos in advance to reduce the buffering time. In this paper, unauthorized access of videos uploaded by one user and other cloud service providers can be prevented by using Homomorphic and Incremental encryption techniques.
Keywords- Scalability, Adaptability, Streaming, Scalable Video Coding, Prefetching

I. INTRODUCTION

Over the past decade, wired networks don't suffer from video streaming whereas, in wireless networks streaming of videos are affected owing to the restricted capability of wireless link and limited bandwidth. Recent technologies like 3G, 4G and LTE are also suffering from the problem of efficient video sharing due to limited bandwidth. Therefore, it is very important to improve the quality of video streaming over mobile networks using the networking and computing resources efficiently. Scalability and Adaptability are the two aspects based on which the quality of mobile video streaming can be improved. Scalability can be achieved by using Scalable Video Coding technique, which consists of a Base layer, and multiple Enhance Layers. Prime quality video will be achieved if additional Enhance layers are delivered. Low quality videos are delivered if solely the Base layer is delivered. Adaptability will be achieved by adjusting the rate at which the video bits are transferred based on the fluctuating conditions of the wireless link and the bandwidth of mobile user. As a result, both the Scalable Video Coding and Adaptive Streaming technique are used to accomplish the most effective quality of video streaming services.

II. AMES CLOUD FRAMEWORK

Nowadays Social Network Services are increasing universally, wherever the mobile users upload and download the videos based on their interest in face book, twitter etc. In this regard, cloud computing is employed, wherever the videos should be prefetched ahead and stored in cloud, in order that the users can play the videos any time, without buffering. A new mobile video streaming framework called AMES cloud is established to prefetch the videos in advance. AMES cloud consists of two parts: AMoV (Adaptive Mobile Video Streaming) and ESoV (Efficient Social Video Sharing). In AMES cloud, personal agents are used to serve the mobile users with efficiency consistent with their request. The performance of AMES cloud can be demonstrated by implementing a paradigm of the cloud framework.

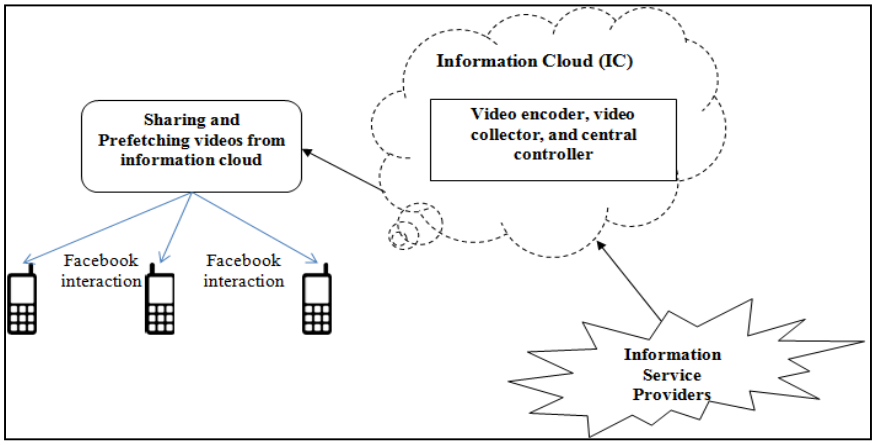


Fig. 1: Illustration of AMES cloud framework

As shown in Figure.1, Information Service Providers' (ISPs) are used to provide the original video data to customers demanded by them. Multiple requests can be processed by the VSP at a similar time, however the quality of video delivered isn't satisfactory. To overcome this, the Video Cloud has been established to provide a reliable service to the mobile user. Information Cloud (IC) consists of an Information Base (IB) which stores the videos provided by ISPs. Information Base contains a temporal Information Base (temp IB) that contains the information concerning the recently and regularly accessed videos by the customers. Collector in Information Cloud is employed to gather the videos from ISPs and therefore the videos are encoded into Scalable Video Coding format by using encoder.

For every mobile users there will be a personal agent (Vagent) accustomed forward their requests to Information Cloud, process the request and return the requested video to the mobile user. Vagent is employed to save the video link for retransmission within the future if the same was requested by another client. Vagent is responsible for delivering the video to mobile user by making a sub Information Cloud for every mobile user. Sub-Information Cloud incorporates a Sub-Information Base that contains the foremost recently fetched video segments.

III. ADAPTIVE STREAMING OF VIDEOS OVER MOBILE NETWORK

A. Cloud Computing Techniques

Cloud computing techniques manage to offer scalable resources to content, service suppliers, and method offloading to mobile users. Thus, cloud knowledge centers can merely provision for large-scale amount video services as s several studies on mobile cloud computing technologies have projected to urge personalized intelligent agents for servicing the mobile users, hence, inside the cloud, multiple agent instances or multithreads is maintained dynamically and efficiently looking on the time-varying user demands.

B. Scalable Video Coding Technique (SVC)

Scalable Video Coding is employed to compress the video images in such how that it provides multiple totally different streams, each containing totally different components of high-quality video image. The primary video stream may be a low resolution image which will operate at a modest bandwidth. Remaining streams are then encoded that contain the data for higher resolution, higher frame rates, and better quality levels to make higher resolution images. Using SVC encoding techniques, the client will be able to decode and watch the videos, even if the quality of wireless link is low.

C. Video Streaming

In video streaming the data from a video file is continuously delivered through the internet to a remote user. Streaming technologies have become progressively necessary with the growth of the internet because most users don't have quick access to download large multimedia files quickly. Real-time video applications require the packets to be delivered to the destination without any packet loss and time delay.

IV. EFFICIENT SOCIAL VIDEO SHARING

Many users of SNSs have connected with their friends, subscribe to famous people and also to the particular interested content publishers. There are several types of social activities within the different users in SNSs, like direct message or public posting. Subscribers will watch videos over SNSs quickly, posted by user in public or video can be directly recommended to a particular friend, else one can even get notifications for new or standard videos periodically from the subscribed content publisher. In this way videos are spread over SNSs.

Hitting probability is the probability of a user watching the video shared by another user. Based on this probability, that particular video segment can be prefetched in advance and stored in the cloud to avoid the long buffering time. Prefetched videos will be stored in the local Information Base of mobile user, so that when a user plays the video by clicking the link, immediately the video will be played without buffering time. If the video is not stored in the local Information Base, then the private agent will look for the videos from sub IB in sub IC. Sub IC will initiate the transmission if the video is in information cloud (IC).

V. VIDEO STORAGE AND STREAMING FLOW BY AMOV AND ESOV

AMoV and ESoV are the two different parts of AMES cloud used to perform video streaming and sharing based on cloud computing platform. Both AMoV and ESoV accomplish higher quality video by adjusting the bit rate of video, and prefetching the video content ahead. Private agent of the mobile user keeps track of information about the status of wireless link to deliver the video to the client without any packet loss. A two-tier structure is used to facilitate the distribution of video streams in an efficient manner, where the first tier is a content delivery network and the second tier is a data center. This structure can be used to optimize the video sharing within cloud.

VI. VIDEO SHARING OVER UNTRUSTED CLOUD STORAGE PROVIDERS

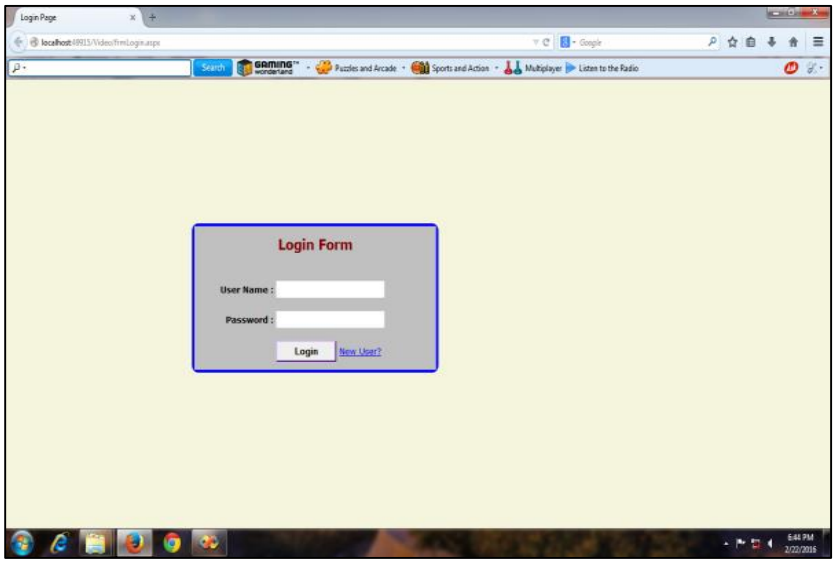
Videos stored in the cloud should be kept confidential in such a way that unauthorized users could not access the video without the knowledge of the owner who uploaded the video. Authorization of the video can be done by using two techniques: Homomorphic encryption is a form of encryption that allows computations to be carried out on cipher text, thus generating an encrypted result which, when decrypted, matches the result of operations performed on the plain text. Incremental encryption is a form of encryption in which the cipher text output is generated by using the initial cipher text and plain text. The videos should be encrypted and stored in the cloud so that the videos will be available only to the authorized persons with the corresponding token.

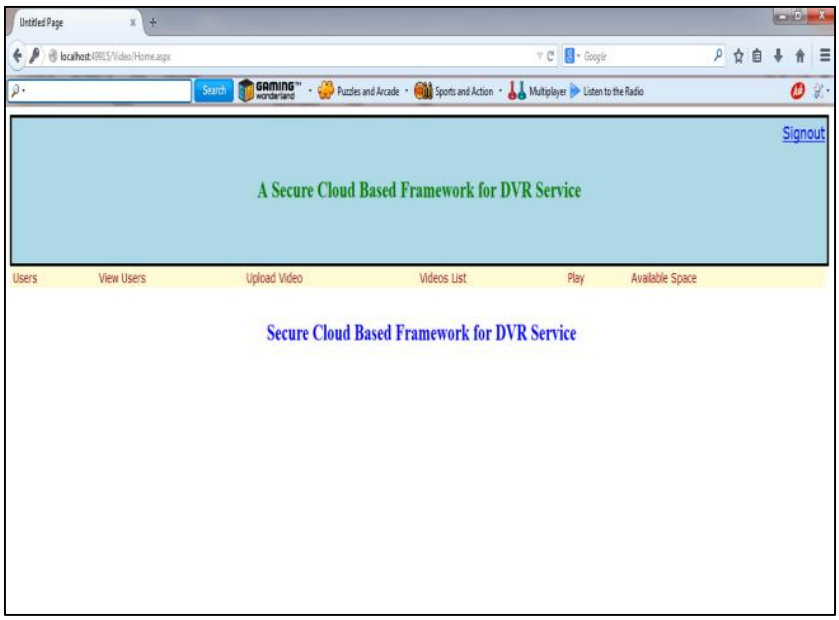
VII. CONCLUSION AND FUTURE WORK

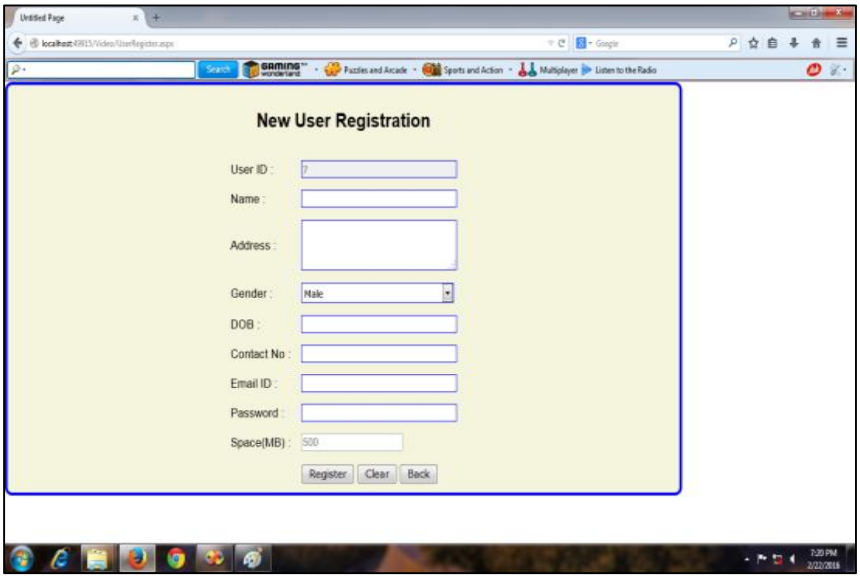
In this work, an adaptive mobile video streaming and sharing framework is constructed to store videos in cloud and provide a non-terminating video streaming to the mobile users by constructing private agent. It also provides non-buffering experience of the videos by using VB, sub-VB and local VB for each mobile user. Security is also provided to the videos stored in the cloud by using homomorphic and incremental encryption techniques.

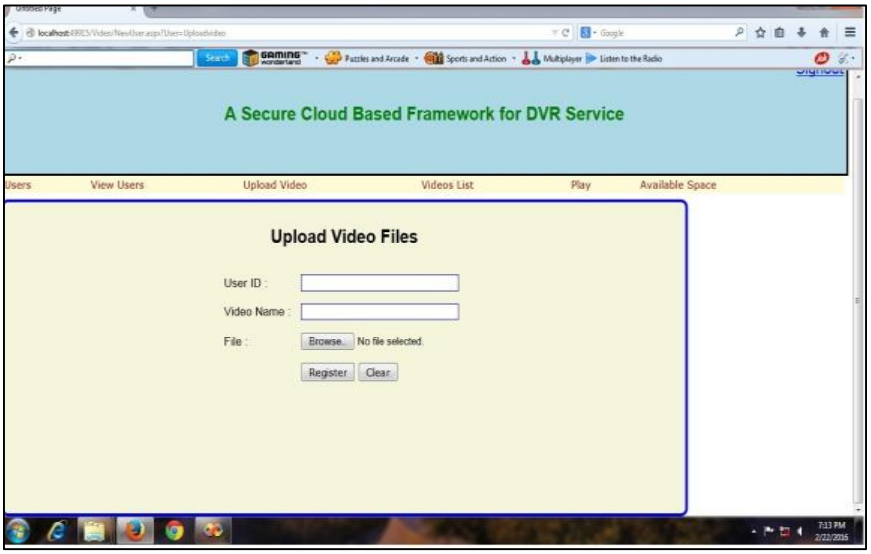
As a future work, large-scale implementation of this cloud framework, by considering energy saving and price cost will be carried out. Implementation of SNS-based prefetching can also be carried out in the future.

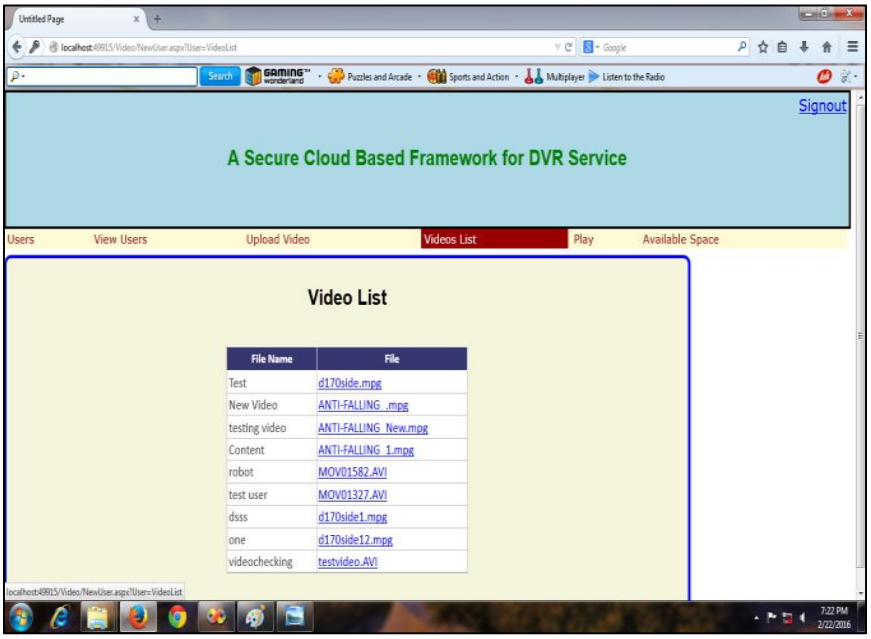
VIII. RESULTS

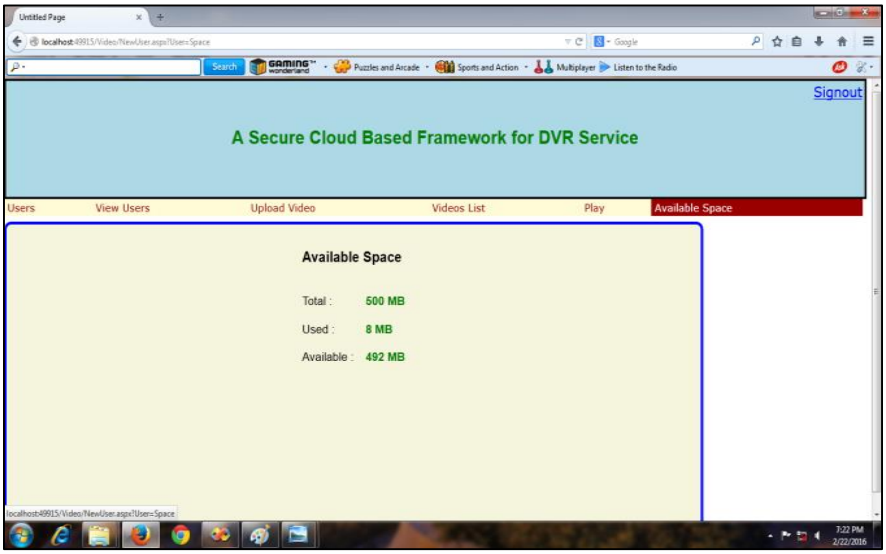












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