SocioVision: Cloud based Social Texting with Video Streaming

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***Abstract* – Now a days the usage of smartphones is increasing rapidly. These devices provide mobile social activities. As the smartphones have many advantages it also has several limitations such as limited battery life and unstable wireless network. The recent trend of cloud computing technology can be used to overcome many of the limitations of mobile devices and connections to provide the ideal platform to support desired mobile services. Here we propose a "SocioVision: Cloud Based Social Texting with Video Streaming." This service utilizes both IaaS (Infrastructure-as-a-Service) and PaaS (Platform-as-a-Service) cloud services and provides better experience of video streaming as well as chatting with the group of people who are watching the same video in the same group. It provides better streaming by making use of surrogate for each user in the IaaS cloud for video encoding, downloading and social exchanges on behalf of the user. The surrogate performs most of all the work on behalf of user at the cloud to minimize the load on the user smartphone. By using burst transmission from surrogate to mobile users and by deciding the burst size we can provide good video experience staying within the bottleneck of battery life as well as network quality. Social interactions among the users like sharing of video and chatting in the group of number of people, are achieved by better designs of data storage dynamic handling of large volumes of concurrent messages in a Platform-as-a-Service cloud. The chatting of the users will be according the requirement like when user will wish to text chat then only text chat can done otherwise if user will wish to chat over video then chatting over the video will be possible to give living-room experience. These various designs together provide a good platform for mobile social video streaming services.**

***Keywords* – Cloud Computing, Mobile Computing, TV, Mobile TV, Social Interactivity.**

I. INTRODUCTION

A smartphone is a mobile phone that is capable of doing much more than what you would traditionally expect from a phone. Smartphones nowadays are shipped with multiple microprocessor cores and gigabyte RAMs; they possess more computation power than personal computers of a few years ago.

The Rapid growth of technology in the field of communication is delivering many advantages to the users including media sharing such as photos, videos, files and applications as well as social interaction among the users. The smartphone is one of the recent trending technology which offers such type of sharing on the go. Many Web applications also offers media sharing and social interaction.

The main advantage smartphones serve is their working capability. They have more computation power than the personal computers a few years ago. Although there are many applications which offers the sharing of videos there is no any dedicated application which offers the co-viewing experience of watching videos and also social interaction. The cloud computing is another recent trend which provides many advantages. This is a paradigm for low-cost, agile, scalable resource supply, to support power-efficient mobile data communication. Though smartphone is a main tool for multitasking as well as social interaction it has several limitations such as limited battery life and unstable wireless network. The effective use of the cloud computing paradigm can be used to overcome limitations of these mobile devices.

In this paper, we describe a design for SocioVision i.e. Social TeleVision, which can effectively use cloud computing paradigm to provide the living room experience of video watching for the users and allows to download the videos from any video site and share the video on the go as well as spontaneous social interactions. There are the situations in which the family members or friends are geographically apart from each other and still hope to share co-viewing experience. The SocioVision allows the users to share video and do chat with the group members while watching the video [1]. Opposite to the traditional video systems the SocioVision is ultimate user experience for the video watching considering todays' life style and the trend of smartphones.

Although we are using the cloud computing paradigm it still remains the challenge that how effectively the cloud computing services can be used. We are achieving this by using the two services that is IaaS (Infrastructure as a Service) and PaaS (Platform as a Service). These two services allows us for flexible transcoding capabilities, battery efficiency of mobile devices and spontaneous social interactivity to the mobile as well as web users.

A. Encoding Flexibility

Different mobile devices have different configurations. To adopt to those configurations staying within a network limitation is very difficult task. The configuration includes different screen sizes, screen resolutions, playbacks, codecs and different bit rates. Traditional systems can only adopt few of those configurations. But in SocioVision there is surrogate for each user which is virtual machine on IaaS cloud. The surrogate downloads the video on behalf of the user and converts it into the desired formats of the user according to the configuration of the mobile devices. This is the main feature of our system which makes sure that the video is of the good quality.

B. Battery Efficiency

The one of the issue for the smartphone devices is its battery efficiency. The smartphone devices consumes more

battery than the other mobiles. So to achieve the good battery life of smartphone devices we use efficient data transmission mechanism. We target the 3G wireless network over the Wi-Fi network as it is widely used now days. We consider the 3G configuration parameters to achieve the energy saving mechanism. The burst mechanism is nothing but the division of the video into the bursts. This burst transmission mechanism takes careful decisions on different burst sizes and as per the requirement the stream is provided to the user in order to effectively increase the lifetime of battery [1].

C. Social Interaction

We use two different mechanisms in SocioVision for managing the effective social interaction and living room experience of watching the video. First, we use efficient synchronization mechanism to make sure that the members in group who are watching the video should be watching the same portion of the video if they wish to and share the social exchanges. And, second, we design the mechanism for managing the social messages. These mechanisms are very efficient and they guarantees that the users in a group experience the co-viewing experience. We chose the textual messaging over voice messaging as they are less distractive and efficient and easy to manage.

We manage the social interactions by using the PaaS cloud. All the data related to the social messages such as chat history, conversations, invitations, sessions, records, online statuses of the users etc.

II. RELATED WORK

There are many prototypes which are implementing the social TV. Most of the systems implement the social TV on the traditional TV systems like [2] combines broadcast television with rich communication and community support in order to leverage a rich social experience, and can be seen as a perfect example of where experience design can lead us to. Some systems uses peer-to-peer interactivity [3] By integrating findings from related fields to develop a definition of Mobile Social TV and outline its design space in order to discuss opportunities of integrating content and communication.

JointZapping (i.e. synchronized channel switching) and "See-what-I-see" ShareMark messages are used by the system like [5] to achieve a joint Mobile TV watching experience. But Authentication, registration, service discovery, and recipient invitation are not provided.

Some early systems like [4] bring the "living-room" experience for small screens on the move. Further they focus more on barrier clearance in order to realize the convergence of the television network and discusses the issues and challenges in moving towards this next generation network also the mobile network, than exploring the demand of "social" interactions among mobile users.

Voice chatting is also provided by some systems. In [6] a social audio link was established between the rooms using two computers running Robust Audio Tool (RAT). By relaying all audio between the two rooms, each group could hear what the other was saying at all times.

Scalable video coding is the technique which is used by the systems like [7] in which it delivers high-quality streaming videos by transcoding the original video in real time to a scalable codec which allows streaming adaptation to network dynamics. But in this system chatting over the video is not applicable.

Considering energy consumption and its efficiency systems like [8] develops some techniques in which the application will be able to synchronize with the OS so that OS can control adaptation by concurrent applications to give a battery life of user-specified duration. Some Systems like [9] designs CPU Scheduling for mobile devices that primarily run multimedia applications. It support application quality of service and save energy.

III. SOCIOVISION: THE ARCHITECTURE AND DESIGN

The fig.1 shows the overall architecture and design of the *SocioVision: Cloud Based Social Texting with Video Streaming*.

The *SocioVision* serves two major functionalities they are *Universal Streaming* and *Co-Viewing Experience.* These two functions are solely responsible to make this system efficient. These two functions are detailed further.

(1) Universal Streaming. A user who is participating in the group can demand, request or stream the video from any video providing site such as YouTube, etc. with proper encoding formats.

(2) Co-Viewing Experience with social Interaction. While watching the video, a user can invite friends or family members to watch the same video and while watching the video the members in group can share social exchanges which gives an ultimate co-viewing experience.

The key elements of SocioVision are the following.

A. Key Elements

As said earlier the important part of the SocioVision is a VM surrogate which is made up of four subparts that are *Transcoder*, *Reshaper*, *Messenger*, and *Syncer*. The VM surrogate downloads the video from the video streaming site on the internet on behalf of the user and provides it to the user according to the users' need with a good quality. The surrogate acts as a proxy between the mobile user and video sources. The surrogate performs different important tasks such as transcoding, segmenting the video for the burst transmission, handling social messages etc. It is also responsible for avoiding the unnecessary traffic for the mobile users and enables the battery efficient, spontaneous social interactions. The gateway is used to keep track of the social interactions with the help of IaaS cloud. All the social data is maintained in a PaaS cloud and all the social exchanges are takes place via PaaS cloud.

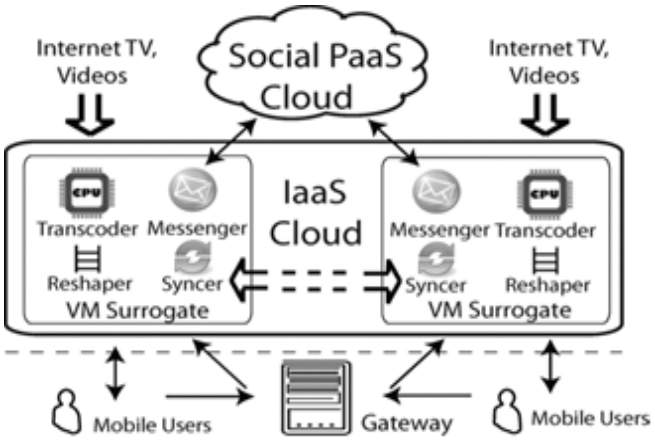

Fig 1. The architecture of *SocioVision*

The key parts of the SocioVision are divided into the following major modules.

- **Transcoder:** As the different smartphone devices have the different configurations. The transcoder performs encoding according to these configurations. The transcoder dynamically decides how to encode the video for the particular device considering its bit rate, screen size, screen resolution and proper format.
- **Reshaper:** The burst transmission mechanism is performed by the reshaper. It receives the encoded video from the transcoder and then it divides it into the segments for the burst. Each burst is sent to the user according to the request to achieve the power efficiency.
- **Syncer:** When the group of people want to watch the same video then at that time syncer plays important role. The group of people watching the same video is referred to as session. And the person who initiates the session is known as host of that session. In these circumstances to maintain the playback or viewing progress of the video syncer is used. To achieve the same viewing progress the syncer tracks the playback progress of the host and make aware the other users to adjust their playback position. In this way the group of people can enjoy co-viewing experience.
- **Messenger:** As all the social data is stored in the PaaS cloud the Messenger acts as a mediator between the mobile user and social PaaS cloud for the social exchanges. The Messenger send queries on periodic basis to social cloud on behalf of the user for the social data. It processes the data into light weighted format so that the minimum traffic is incurred. The social exchanges are takes place via social cloud through the messenger.
- **Social Cloud:** This is used for storing the social data by using Big Table like data structure on the top on any PaaS cloud. This stored all the social data such as chat histories, invitations, online statuses of the users, conversations, messages, records of the existing sessions, data related to the sessions etc. The social cloud is queried by the VM surrogates from time to time basis so that the social exchanges can takes place efficiently.
- **Client:** This is nothing but the client software which uses the SocioVision. The client can be a mobile user or web user. But the SocioVision is specially designed for the mobile users more precisely for the smartphone users. And it yields better results for mobile users.
- **Gateway:** This is the intermediate part of the system through which the users can communicate with the SocioVision. The gateway provides the authentication services and makes sure that only authorized users can access the system. The data of the authorized users can be maintained in a database by using MySQL.

B. Interface

All of the devices supports HTTP protocol and it is the universal standard for the internet-connected platforms. So that almost all the devices which has support for the HTTP protocol has the access for SocioVision. Also now a days android is an evolving OS so that the android application can be a key by which the whole system can be implemented so that user can access it on the go as well as user does not need to open browser each time he wants to access the service.

The Social messages can be exchanged amongst friends in SocioVision which employs asynchronous communication with the surrogate in the cloud. Those messages are routed via one surrogate to another to deliver it to another end user. BigTable like structures can be used to store the messages in the cloud by utilizing the PaaS.

C. Synchronized Video and Video Processing

The Video is processed internally by the VM surrogate to make it supported by the end device of the user. Transcoder in the Surrogate of each user encodes each video and transfers it to the reshaper where the video segmentation and transmission is done. The segmented video is then streamed over the device. The transcoder launches multiple threats to transcode the video into multiple bit rates and according to the bandwidth of the device the highest bit rate video is delivered to the user.

D. Burst Transmission

1) Transmission Mechanism: By using transmission mechanisms we try to achieve the minimum battery utilization so that user will get maximum battery efficiency. Burst Transmission Mechanism can be implemented for the transmission of video from surrogate to mobile device.

2) Burst Transmission: The data is encoded in the burst to deliver it to the user in very high rate (burst rate). Then at the user it again decoded to get the actual data. Burst transmission utilizes the actual bandwidth available and tries to achieve maximum throughput so that the user

does not need to compromise with the quality of the video staying within the length of bandwidth.

3) *Burst Size:* Firstly we have to decide the burst size, i.e., the size of the segment transmitted in one burst, we must have to take into consideration characteristics of mobile streaming and energy consumption. For video streaming without considering anything else it is desired to download the most of the video staying within the bandwidth. However for streaming over cellular network one should avoid downloading more than what is being watched. User may switch any channel at any time so that the unnecessary consumption of the bandwidth as well as battery may lead to less battery life and extra data charges. For this the burst size must be kept small and to minimize the battery consumption and data traffic charges. On the other hand, state transitions introduces latency as well as energy overheads. To avoid this burst should be large enough otherwise, such overheads may lead to reduced battery energy which can be achieved by an intelligent state transition mechanism.

IV. Conclusions and Future Work

This paper presents the design for the framework which might will become the ultimate trend in mobile social TV. The SocioVision is the framework that makes efficient use of cloud computing paradigm and provides user the best possible way to experience the video watching along with social interaction. This system effectively utilizes both IaaS (Infrastructure as a Service) and PaaS (Platform as a Service) cloud services by offering living room experience of video watching to the disparate group of people who can also interact socially while watching the video. We achieve an ultimate scalability of a system by using VM surrogate dedicated for each user. User can also chat over the video so that it can give the experience of commenting in the living room while watching the video with the group.

However, in our future work if the user want to watch a video which has already downloaded on the other surrogate user nearby and its' in a same format which user wants then it can be downloaded directly from the other surrogate device than the cloud.

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