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Mobile Social TV based on Cloud

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ABSTRACT: Today smart phones combines the features of a mobile phone with those of another popular consumer device, such as a personal digital assistant , a media player, a digital camera, and/or a GPS navigation unit. Modern smart phones include all of these features plus the features of a laptop, including web browsing, Wi-Fi, and third party apps and accessories ,multiple microprocessor core and gigabyte RAMs. The most popular smart phones today are powered by Google's Android and Apple's IOS mobile operating systems and the wide deployment of 3G broadband cellular networks. The combination of cloud computing and mobile networks to bring benefits for mobile users, network operators, as well as cloud computing providers The design of mobile social TV system, CloudMoV(Cloud Mobile Social TV), which can effectively utilize the cloud computing to offer a living-room experience of video watching by mobile users with spontaneous social interactions. In cloud mobile social TV, mobile users can import a live or on-demand video to watch from any video streaming site and invite their friends to watch the video concurrently, and chat with their friends while enjoying the video. It therefore blends viewing experience and social awareness among friends on the move.

KEYWORDS: Computers and Information processing, Mobile computing, Communications technology, Mobile TV.

I. INTRODUCTION

In recent Smart phones are shipped with gigabyte RAMs and multiple microprocessor cores. They possess more computation power when compared to personal computer. In addition, the extensive use of 3G broadband cellular infrastructure. The common tasks of productivity like web surfing, emails and Smartphone are flexible of their strengths. The challenging tasks are online gaming and real-time video streaming at the same time viewing as the important tool for social exchanges. Even though numerous mobile media or social applications have emerged, really destroyer. In addition grouping the acceptance is immovable by the limitations of wireless technologies. In existing mobile battery lifetime and unstable connection bandwidth are the very difficult. Based on this process changes normal to alternative of the cloud computing.

Cloud computing mechanism offered the low cost, agile, scalable source supply to mobile data communication. In addition, it supports power efficient to mobile devices. With virtually infinite software and hardware, the cloud can delegate the tasks and other calculation involved in mobile application. Cloud can effectively reduce battery consumption to the mobile devices. The big challenges task is how to efficiently extend cloud services to mobile data in cloud computing. They have a lot of application to designing mobile systems, but none of them can't offer the on demand requirements. CloudMoV offered the real-time experience of video watching by using resource to multiple mobile users with spontaneous social interaction. In CloudMoV gives the importance of on-demand or live video watching to mobile users from any video streaming area, invite and chat their friends at the same time as enjoy the video. As observing about watching experience and social awareness among friends on this procedure.

The traditional system the adoption of some formats of encoding are used before the beginning of a video programme. Though the highly important information provider not capable in presenting the total possible mobile platforms. CloudMoV customizes the offloading transcoding mechanism in multiple devices at real time in IaaS cloud. The development of a copied one far the individual user in IaaS cloud. The virtual machine downloads the programme and transcodes it into appropriate formats. It provides a particular configuration of the mobile devices, current connectivity quality and battery efficiency.

The focus is on the wireless 3G network. It is mostly adopted and the challenge is on the design. Where compared to Wi-Fi based transmission, it is depended on the analysis of cellular network of 3G network. In the configuration of 3G network, it contains the power states and inactivity timers which are the parameters. In mobile devices streaming is designed by the new burst transmission method. The burst transmission method constructing purpose we make the judgment about the burst sizes and power consumptions modes of high or low of the device. These processes significantly improve the lifetime of battery and social interaction. In the design of CloudMoV different methods are included to enable the additional social interactivity and sharing experience.

The data storage and dynamic handling of huge amount of concurrent messages handled by the bigtables. In PaaS cloud, additional support the social communication due to its provision of robust underlying platforms with automatic scaling of users, transparent application to cloud. CloudMoV system was developed following the scenario of “write once, run anywhere”. The frontend and backend server module were developed by the 100% pure java and with well known common data models for any bigtable like data store and the only exemption is the transcoding module. The transcoding module is developed by ANSIC because the performance reasons and independent of platform or proprietary APIs. The frontend module can run on individual mobile device by using the HTML5, including Android phones, iOS system etc. Performance increases purpose we design the system on Amazon EC2 and Google App Engine. We conduct the several experiments on iOS platforms. Our design can be easily transfer to different cloud and desired platforms with small effort.

II. RELATED WORK

A number of mobile TV systems have emerged in past years both software and hardware developed in mobile devices. Some early systems bring the co-viewing experience to Smartphone's on the move these things focus more on convergence of the mobile network and the television network. research has focused on documenting the demand of social communication among mobile users.

2.1Amazon Elastic Compute Cloud (EC2)

Amazon EC2 is a central part of Amazon's cloud computing platform, Amazon Web Services (AWS). EC2 allows users to rent virtual computers on which they can run their own computer applications. EC2 allows scalable distribution of application by providing a Web service through which a user can boot an Amazon Machine Image to create a virtual machine, which inturn calls an instance containing any desired software. ew user can build, launch, and end server instances as planned by paying the hour for active session of servers, hence the term elastic. EC2 provides users with control over the geographical location of instances that allows for latency optimization and high levels of redundancy. Amazon EC2 is a representative IaaS and paaS cloud, offering raw hardware resources including networks to users, CPU, storage and EC2 is an appropriate platform for computing intensive tasks in mobile social TV *i.e.*, those the surrogates carry out.

2.1.1 Amazon Machine Images (AMI) :

An Amazon Machine Image AMI) gives the information required to start an instance in the cloud which acts as a virtual server in the cloud. You can notify an AMI when you launch an instance and also you can launch as many instances as possible from the AMI as you need.

An AMI includes the following:

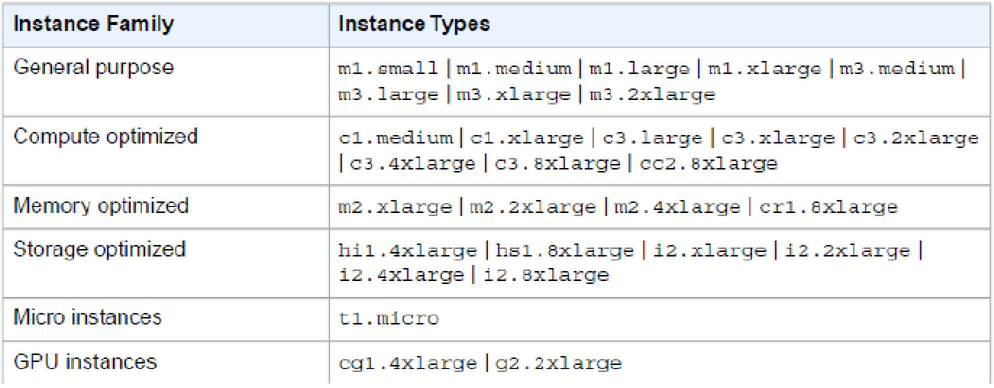
- For each instances root volume a template is assigned.
- Start-up permissions that guides & control which AWS accounts can use the AMI to launch instances

2.1.2 Amazon EC2 Instances:

Amazon EC2 provides each instance with a consistent and predictable amount of CPU capacity, regardless of its underlying hardware. Amazon EC2 dedicates some resources of the host computer, such as instance storage, memory and, CPU to a specific instance. Amazon EC2 utilizes other resources of the host system, such as the disk subsystem of instances and the network .If each virtual machine on a host system tries to utilize one of these shared resources as much as possible, each receives an equal amount of that resource however when a resource is not utilized properly, an instance can grabe the available resources. Each instance type provides low or high performance through shared resource. For example the type of instances with high I/O performance have a larger allocation of shared resources. The variance of I/O performance is also reduced due to Allocating a larger share of shared resources. For most applications average I/O performance is more than enough, However for applications that require more consistent I/O performance, available instance types are shown in Fig 1.

2.2 HTTP Live Streaming (HLS)

HTTP Live Streaming (also known as HLS) is an HTTP-based media streaming communications protocol implemented by Apple as part of their QuickTime and IOS software. It works by dividing the overall stream into a small sequences of HTTP-based file downloads, each download loads one small piece of an overall potentially unbounded transport stream. As and when the stream is played, the user may select one from a number of different alternate streams containing the same material encoded at a different data rates, letting the streaming session to adapt to the available data rate. At the beginning of the session streaming it downloads an extended M3U playlist containing the metadata for the various sub streams which are available.



Instance Family	Instance Types
General purpose	m1.small | m1.medium | m1.large | m1.xlarge | m3.medium | m3.large | m3.xlarge | m3.2xlarge
Compute optimized	c1.medium | c1.xlarge | c3.large | c3.xlarge | c3.2xlarge | c3.4xlarge | c3.8xlarge | cc2.8xlarge
Memory optimized	m2.xlarge | m2.2xlarge | m2.4xlarge | cr1.8xlarge
Storage optimized	hi1.4xlarge | hs1.8xlarge | i2.xlarge | i2.2xlarge | i2.4xlarge | i2.8xlarge
Micro instances	t1.micro
GPU instances	cg1.4xlarge | g2.2xlarge

Fig.1 Instance Types

2.3 Prior work

A number of mobile TV systems have been emerged in recent years both hardware and software are driven by the advancement in Smartphone's. Some early systems [1], bring the co-viewing experience to the mobile users. But they concentrate more on convergence of the mobile network and television network, than exploring the demand of social message exchange among mobile users. There are some other works dedicated to enhance social elements to television systems [13], [14], [10]. S. Kosta [2] ,have proposed a supporting work that makes it simple for developers to migrate their Smartphone applications to the cloud. Coppens[4] try to add fast screening social interactions to TV but their design is limited to traditional broadcast programs. Y. Feng Z. Liu [6] designed and implemented a new system framework to provide the required system support to achieve spontaneous social interaction with other users in the same mobile application. Oehllberg [13] conduct a plenty of experiments on human social activities while watching different types of program. Even Though these designs are not that much suitable for in a mobile environment. Chuah [11] extend the social experiences of viewing traditional broadcast programs to mobile devices, but the quality of servie is not that much feasible. Schatz *et al.* [12] have designed a mobile social TVsystem which is customized for Symbian devices and dvb-H networks forlarge number of users . Compared to these prior work and systems we target at a design for a generic, featuring co-viewing experiences among mobile users, portable mobile social TV framework. Our substructure is open to all Internet based video programs either live or on-demand and supports a wide range of devices with HTML5 compatible browsers installed without any other component on the devices.

III. CLOUDMOV: ARCHITECTURE

The Architecture of Mobile Social TV based on cloud provides two major functionalities to mobile users: (1) Universal streaming: A Mobile user can choose any Television program provider or an Internet video streaming site, with customized encoding formats and rates for the device each time. (2) Co-viewing with social exchanges: A mobile user can invite their friends to watch the same selected video, and exchange text messages while watching. The host of the session is the mobile user who initiates the session. The group of friends watching the same video is referred to as a session.

The architecture of Cloud-MoV contains different components in the following:

3.1 Mobile Client: Mobile client is user which can access Messenger, and can watch videos on to his Mobile using HTML5 compatible browser which are Google Chorme

3.2 Gateway: For users to login to the Cloud-MoV system gateway provides authentication services, and user's credentials are stored in a permanent table of a database in database software (MySQL) has installed. It also stores information of currently available Virtual machines in the Infrastructure-as-a-Service (IaaS) cloud in another MYSQL in-memory table. Virtual machines (VM) surrogate will be assigned after mobile user successfully login to the cloudmov system, from the pool to the user. To guarantee small query latencies the in memory table is used, as the gateway reserves and destroys Virtual machines instances then the Virtual machines pool is updated frequently according to the current workload. In addition, each user's friend list the gateway stores in a plaintext file in extensible markup language (XML) formats, after it is assigned to the user, which is immediately uploaded to the surrogate.

3.3 A VM Proxy Server: VM (Virtual Machine) proxy server which acts between video streaming sites and mobile devices which provides transcoding services to the user. In order to efficient way of exchanging social messages between the user virtual machine proxy server is used. In Cloud-MOV we have gateway server which tracks participating users and their VM surrogates.

3.4 Video Convertor: Video Converter is a Transcoder which converts video from any video streaming sites into appropriate format that supports required mobile devices.

3.5. Reshaper: Reshaper receives the encoded stream which divides it into segments and sends each converted stream in to mobile devices.

3.6 Google Social PaaS Cloud: Google Social cloud stores all the social data in the system, including the online statuses of all users, records of the existing sessions, user login details and messages.

3.7 Syncer: syncer is component of surrogate which can be used to retrieve (current playback positions) user viewing status within certain time limit.

3.8 Messenger: Messenger is residing in each surrogate in the Infrastructure-as-a-Service (Iaas) cloud and messenger is the client side of the social PaaS cloud. On behalfof the mobile user, for the social data messenger periodically queries the social cloud and messenger preproceses the data into a light-weighted format such as plain text files, at a low frequency. From the surrogate to the user the plain text files are asynchronously delivered in a traffic-friendly approach, i.e., little traffic is incurred. In reverse direction, the messenger disseminate this user's messages such as chat messages and invitations to other users through the data store of the social PaaS cloud.

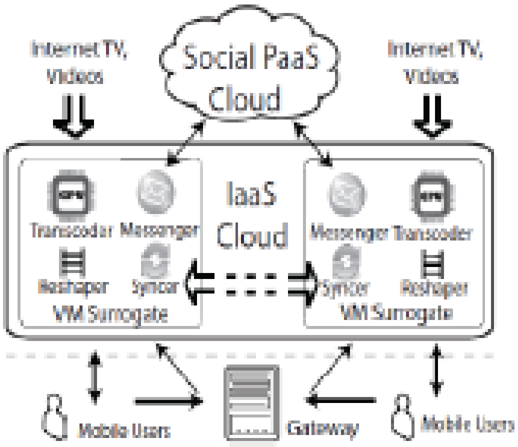


Fig.2 : Architecture of Cloud-MOV

IV. PROTOTYPE IMPLEMENTATION

Following the design guidelines in Section III, since our implementation is done on Java platform, we can deploy our system in Google App Engine (GAE) [As a matter of choice] and Rackspace (freely available cloud service) which are most commonly used PaaS and IaaS platforms respectively. GAE, as a PaaS cloud, provides rich services on top of Google‟s data centers and enables rapid deployment of Java-based and Python-based applications. Hence, GAE is an ideal platform for implementing our social cloud, which dynamically handles large volumes of messages. On the other hand, GAE imposes many constraints on application deployment, *example* , lack of support for multi-threading, file storage, etc.,

Rackspace is a representative IaaS cloud, offering raw hardware resources including CPU, storage, and networks to users. Rackspace has two main service-level segments: Managed and Intensive. Both service levels receive support via e-mail, telephone, live chat, and ticket systems, but they are designed to fit the needs of different businesses. The Managed support level consists of "on-demand" support where proactive services are provided, but the customer can contact Rackspace when they need additional assistance. The Intensive support level consists of "proactive" support where many proactive services are provided, and customers receive additional consultations about their server configuration. Highly customized implementations generally fall under this level of support.

A. Client Use of Cloud Mobile TV

Android is used for programming for the client mobile devices. Our Cloud based Mobile social TV is installed with HTML5 compatible browsers can use *Cloud based mobile TV* services, as long as the HTTP Live Streaming (HLS) [24] protocol is supported, for achieving this have used Used the Http servelet objects for the interface between the data owner and cloud system.

The user first connects to the login page of *application*, after the user successfully log in through the gateway (Third Party Auditor), User is assigned a VM surrogate from the VM pool (Multi-threading) user is automatically redirected to the assigned VM surrogate, and welcomed by a portal page. The user can enter the filename of the video which downloads the stream on the user‟s behalf, converted video and sends properly encoded segments to the user. From the surrogate to the mobile device, the video stream delivered using HLS is always divided into multiple segments, with a playlist file giving the indices. The client starts to play the video as soon as the first segment is received. When watching a video, the user can check for their friends‟ messages and invite them to join in watching the video. Users in the same session can exchange opinions and comments on the “Chat” tab where new chat messages can be entered and the chat history of the session is shown.

B. VM Surrogates

All the VM surrogates are provisioned from Rackspace web services and tracked by the gateway. We have also installed a Tomcat web server (version 6.5) to serve as a Servlet container and a file server on each Surrogate and process the video stream by video converting and segmentation. For example, in our experiments, since we are working in better speed of internet we have excluded the different streaming part dynamically, but we have the proposed system to implement high-quality stream to have “480 x 272” resolution with 24 frames per second, while the low-quality one has a “240 x 136” resolution with 10 frames per second. The transcoded stream is further exported to an MPEG-2 transporting stream (.ts), which is segmented for burst transmission to the user.

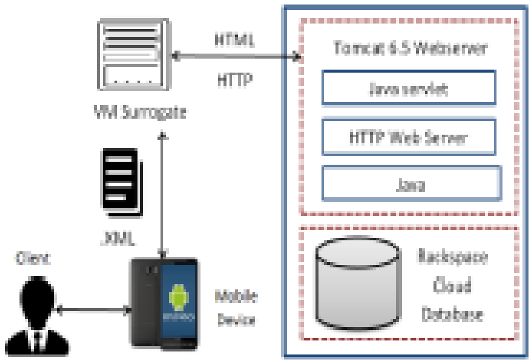


Fig. 3. Social message exchange via Google App Engine

C. Data Models in the Social Cloud

Google App Engine is mainly used as the back-end data store keep online presence status, social messages (invitation and chat messages) in all the sessions shown in Fig. 6. With Jetty as the underlying Servlet container, most Java-based applications can be easily migrated to GAE, under limited usage constraints, where no platform-specific APIs are enforced for the deployment.

GAE provides both can be easily migrated to other PaaS clouds as well. If the user wishes to synchronize his playback progress with that of the session host, his VM surrogate synchronizes with the session host to maintain the playback "current time" value (HTML5 property). The social cloud maintains a "Logs" entry for each existing session in *Cloud based mobile system TV* with the session ID as the primary key and an array list as the value, which corresponds to individual messages in this session.

When a user in a session posts a comment, this message is first sent to his VM surrogate, which further injects the message into the social cloud via another Servlet listener. The message is stored as a "Message" entry in the social cloud, with the message content as the value, and an auto-generated integer as the key. this message can then be viewed by the client. the user can also reply to the messages that has been received, hence this leads to a chat or and interaction which is socially among the users using the cloud mobile TV.

V. CONCLUSION

This paper presents mobile social television based on rich functionalities of cloud computing. CloudMOV utilizes both Paas and IaaS clouds to offer living room experience to a group of people who interact socially while watching and sharing the video. Surrogate in the IaaS cloud performs efficient stream. transcoding mechanism services for most platforms and supports co viewing through timely chat message exchanges among the mobile users under various networks conditions. Sharing of encoded streams directly from one surrogate to another surrogate enabled in a peer to peer fashion.

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