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Implementing Mobile Multimedia Applications Using Cloud Computing

Snehal P.Warhekar,.V.T.Gaikwad

Sipna COET
Amravati, Maharashtra, India

***Abstract*— Multimedia on phones is a rapidly growing segment, and almost every mobile user would have a perceived need for a multimedia-based entertainment application. The size of the worldwide mobile video market was comprised of 429 million mobile video users in 2011, projected to grow exponentially to 2.4 billion users by 2016. Smartphones and tablet sales will contribute 440 million new mobile video users during the forecast period. [1]. However, in spite of advances in the capabilities of mobile devices, a gap between mobiles and pcs will continue to exist, and may even widen, with the requirements of rich multimedia applications. Mobile cloud computing can help bridge this gap, providing mobile applications the capabilities of cloud servers and storage together with the benefits of mobile devices and mobile connectivity. Proposed model demonstrates the applicability of emerging cloud computing concepts for mobile multimedia. This model will use cloud for storage and content management of multimedia content (e.g. video data) across various devices like desktop and mobile devices. This ensures high availability and integrity of data, along with content security and user privacy.**

***Keywords*— multimedia, cloud mobile media, streaming, RTP, RTSP**

I. INTRODUCTION

Mobile devices (e.g., smartphone, tablet, pcs, etc.) are increasingly becoming an essential part of human life as the most effective and convenient communication tools not bounded by time and place. The widespread use of smartphones and other mobile devices contributes to unprecedented sharing of mobile multimedia on social networking sites like Facebook or streaming on web sites like YouTube. Additionally, web and mobile multimedia converge, as the mobile networks become an integral part of the Internet. However, with mobility come its inherent problems such as resource scarceness, finite energy and low connectivity. High quality Mobile multimedia applications demand intensive computing resources. In recent years, this problem has been addressed by researchers though cloud computing by development of mobile cloud apps. Besides storage and download services, a big boost to mobile consumer cloud services has come from a major shift in the mobile applications market, from primarily native applications to ones based on mobile cloud computing: utilizing the computing and storage resources available in the cloud, thereby enabling the use of cutting edge multimedia technologies that are much more computing and storage intensive than what mobile devices can offer, and thus enabling much richer media experiences than what current native applications can offer[2]. While according toMarketsAndMarkets.com, the global mobile applications market is expected to be worth $25.0 billion by 2015 [3], use of mobile cloud computing will enable more powerful applications, and hence more significant growth**.**

A. Cloud Mobile Media

To provide rich media services, multimedia computing has emerged as a noteworthy technology to generate, edit, process, and search media contents, such as images, video, audio, graphics, and so on. For multimedia applications and services over the Internet and mobile wireless networks, there are strong demands for cloud computing because of the significant amount of computation required for serving millions of Internet or mobile users at the same time. Mobile applications may offload computationally expensive tasks to the cloud. In this new cloud-based multimedia-computing paradigm, users store and process their multimedia application data in the cloud in a distributed manner, eliminating full installation of the media application software on the users' computer or device and thus alleviating the burden of multimedia software maintenance and upgrade as well as sparing the computation of user devices and saving the battery of mobile

In the proposed model, we will focus on Cloud Mobile Media (CMM) applications and services, which will enable mobile users to not only access rich media from any mobile device and platform, but even more importantly, which will enable mobile users to engage in new, rich media experiences, through the use of mobile cloud computing, that are not possible otherwise from their mobile devices.

B. Cloud Storage Service

Mobile Cloud Storage is the most commonly used category of CMM application/service today, with offerings from Amazon, Apple, Dropbox, Funambol, and Google, among others. These services provide diverse capabilities, including storing documents, photos, music and video in the cloud, accessing media from any device anywhere irrespective of the source of the media and/or the device/platform used to generate the media, and synchronizing data/media across multiple devices a typical user owns.. To enable mass adoption of such services, the PaaS providers will need to ensure high availability and integrity of data, and the SaaS provider will need to ensure content security and user privacy.

C. *Audio and Video Streaming*

Audio and video streaming based services can benefit by utilizing cloud computing resources to perform compute intensive tasks of encoding, and transcoding and transrating needed to adjust to different devices and networks. For on-demand video, computing costs can be reduced by caching popular videos at different resolutions and bit rates. Besides lower initial capital expenses, the advantage of cloud based audio/video services is the use of elasticity in cloud computing resources to more cost-effectively handle variable peak demands.

II. ANALYSIS OF PROBLEM

The proposed model will focus on following issues:

A. *Data Management*

With the growing scale of web applications and the data associated with them, cloud data management becomes necessary part of the cloud ecosystem.. The common approach to increasing availability (reducing access latency or increasing bandwidth) is to use solutions like content delivery networks.

B. *Sharing & Collaboration*

People as social beings by nature would like to interact with each other's. Meanwhile, the capabilities of mobile networks and devices craft new ways of ubiquitous interaction over Web 2.0 digital social networks.. First, there is an exponential growth of user-generated mobile multimedia on Web 2.0 which, on the other hand, is a driving force for further mobile device improvements. Second, there are a large number of diverse emergent communities, i.e. groups of people, usually co-workers or groups of people who have similar interests trying to perform some tasks to achieve a common goal.

C. *Ubiquitous multimedia services*

One of the biggest challenges in future multimedia application developments is device heterogeneity. Future users are likely to own many types of devices. One-quarter of mobile users are predicted to own two or more mobile-connected devices by 2016 [12]. Switching from one device to another user would expect to have ubiquitous access to their multimedia content. Cloud computing is one of the promising solutions to offloading the tedious multimedia processing on mobile devices and to making the storage and access transparent.

III. PROPOSED METHOD

The proposed method will use cloud computing resources to enable rich multimedia applications on mobile devices. As a prototypical model, a cloud server will be developed which can be accessible from various devices like desktops as well as mobile phones after user authentication. This cloud can be used to store as well as synchronize data (e.g. video data) across various devices for user. This video data then can be accessed from each device using http request to that cloud server .RTP and RSTP (Real Time Protocol) will be used for streaming of video data. Video data will be transmitted in JSON format over network. Further, transcoding of video data (converting data from one media format to other) can also be done within cloud, so that computational resources are required in cloud only and not on mobile devices. As video data will be accessed from cloud there will be no need of storage space for this data on user's device

A. *Streaming*

"Streaming" describes the act of playing media on one device when the media is saved on another. The media could be saved on a computer, media server or network attached server (NAS) on your home network. A network media player can access that file and play it on your home theatre. The file does not need to be moved or copied to the device that is playing it.

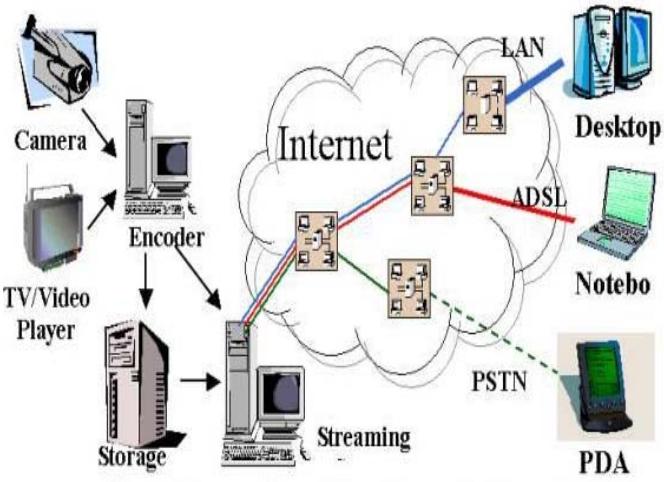

Fig. 1 video streaming in cloud applications

B. *RTP and RSTP*

It's important to distinguish between RTP and Real-Time Streaming protocol (RTSP), another transfer protocol. RTSP is used when viewers communicate with a unicast server. RTSP allows two-way communication; that is, viewers can communicate with the streaming server and do things like rewind the movie, go to a chapter, and so on. By contrast, RTP is a one-way protocol used to send live or stored streams from the server to the client.

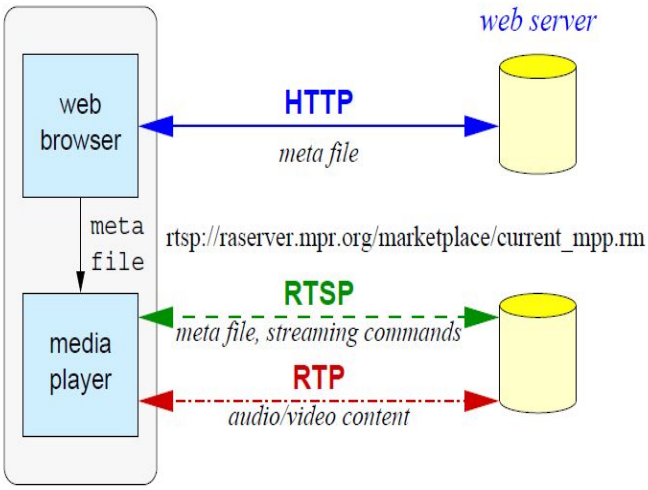

Fig. 2 RTP and RSTP over HTTP [13]

IV. IMPLICATION

Thus proposed model will help in effective content management of video data for user across various devices. Users of the system will be able to access their data from anywhere within network on their own device. As storage resources are provided by cloud, mobile multimedia applications can work even on basic smartphones, which lack in high memory resources or extensive computation capability. This will also help in synchronization of data for user and will prevent the need of storage requirement on each user's device.

Results of the proposed model will be verified and compared with application which is not using cloud. This will illustrate effectiveness of proposed model.

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