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Enhancing Media Access Using Cloud Computing for Mobile Devices

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Abstract: ***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. Mobile users accumulate rich experience of various services from mobile applications (e.g., iPhone apps, Google apps, etc), which run on the devices and/or on remote servers via wireless networks. However, the mobile devices are facing many challenges in their resources (e.g., battery life, storage). The limited resources significantly impede the improvement of service qualities.Mobile Cloud Computing at its simplest refers to an infrastructure where both the data storage and the data processing happen outside of the mobile device. Mobile cloud applications move the computing power and data storage away from mobile phones and into the cloud, bringing applications and mobile computing to not just smartphone users but a much broader range of mobile subscribers. In this new cloud-based multimedia-computing model, users store and process their multimedia application data in the cloud, eliminating full installation of the media application software on the users' computer or device and thus reducing the burden of multimedia software maintenance and upgrade as well as sparing the computation of user devices.***

Keywords: Cloud, Mobile Cloud Computing, Media, Smartphone.

1. Introduction

Recent advances in smart phone technologies have fuelled a new wave of user demands for rich mobile experience. Today's mobile users not only expect broadband connection wherever they go and interaction with each other via social network on the road, but also seek ubiquitous access to a wealth of media-based contents and services. With the increase in number of smartphone users and mobile application offerings are growing rapidly. Smartphones are often expected to offer PC-like functionality, which requires powerful processors, abundant memory and long-lasting battery life. However, their hardware today is still very limited and application developers are forced to take these limitations into consideration.

According to MarketsAndMarkets.com, the global mobile applications market is expected to be worth $25.0 billion by 2015 [1], use of mobile cloud computing will enable more powerful applications, and hence more significant growth.

The motivation behind this system is to allow smartphone users to more easily tap into the power of the cloud and to free them from the limit of processing power, memory and battery life of a physical smartphone. Using this system, smartphone users can store and play multimedia files in the cloud server. Running multimedia files remotely in the cloud has a number of advantages, such as boosting computing resources, continuing to run applications on the background and opening up new ways to use smartphones.

2. Literature Review

A smartphone is a mobile phone that includes advanced functionality beyond making phone calls and sending text messages. Most smartphones have the capability to display photos, play videos, check and send e-mail, and surf the Web. Modern smartphones, such as the iPhone and Android based phones can run third-party applications, which provides limitless functionality.

Since smartphones have a wide range of functionality, they require advanced software, similar to a computer operating system. The smartphone software handles phone calls, runs applications, and provides configuration options for the user. Most smartphones include a USB connection, which allows users to sync data with their computers and update their smartphone software [2].

A number of service providers such Dropbox [3] and Zumodrive [4] provides online storage services to Smartphone users in attempt to alleviate the limitations of Smartphone storages. However, there is still no service that offers full computation resources to Smartphone users.

As smartphones begins to replace laptop PCs in some occasions, they will slowly become attractive targets for attackers. Security threats that were once considered PC issues are slowly crossing the line and becoming serious concerns for mobile users [5][6][7][8]. In particular, [9] further studied Android as a potential target because of Android's design philosophy on openness. The authors created a proof of concept malware using undocumented Java functions and demonstrated the possibility to bypass the Android permission system using native applications.

3. Analysis of Problem

With the evolution of mobile devices and networks, and the growing trend of mobile Internet access the mobile application offerings are also growing continuously. Nowadays smartphone are offering computer like functionality, which requires powerful processors, abundant memory and long-lasting battery life. However, current architecture with their hardware today is still very limited and application developers are forced to take these

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limitations into consideration while developing any smartphone based application.

Among all the kinds of multimedia data traffic, video data traffic comprises most of the part. According to CISCO report of global traffic data rate, mobile video market is expected to exceed by 69 % in duration 2013 to 2018 [10].

At present there are many service providers that are providing online storage services to the smartphone users in attempt to overcome the limitations of Smartphone storages. However, there is still no service that offers full computation resources to Smartphone users. Also there are native media player applications available for playing multimedia content on mobile devices, but these media players require that the multimedia data should be stored in device memory.

Cloud computing can be the powerful solution. Using this system, smartphone users can store and play multimedia files in the cloud server. Using cloud resources to execute these applications significantly. Running multimedia files remotely in the cloud has a number of advantages, such as boosting computing resources, continuing to run applications on the background and opening up new ways to use smart phones.

4. Implementation

Generally mobile phone applications run locally on the mobile phone. This means that the application is downloaded and then executed on the mobile phone. The application might interact with servers on the Internet to get information that the application need, but the computation and processing of data is mainly performed on the mobile phone, which has its limitations when it comes to mobile phone resources.

A cloud computing mobile phone application can be downloaded in the same way as a local mobile phone application but would execute on a server instead of on the mobile phone. The application would function as a communicator with the cloud server which function would be to display the data received by it.

As discussed in previous sections, to deal with resource scarcity in mobile devices for executing multimedia applications, a model of mobile multimedia application which uses resources on cloud is proposed.

One part of this model consists of cloud server which is used for storage of multimedia content. In this model we are considering multimedia content. Second part of model consists of android client which will be installed on android device. User has to sign in into android application using username and password. After user authentication, he can view list of available multimedia contents, if user clicks on one of the contents in list he will be redirected to next screen consisting of media player where user will be able to run selected content.

As this technique does not require actual multimedia content to be stored on mobile device, in the proposed model it is not required that the multimedia content being played should be stored on mobile device.

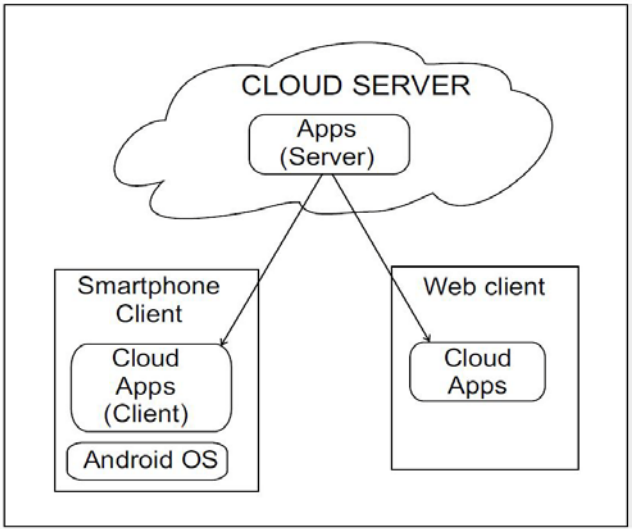


Figure 1: Implementation Architecture

Implementation Architecture is shown in figure 1. A simple client server based program is implemented in this architecture.

- **On the server side:-** Cloud server is the most important part of the system. Cloud server is used for storage of multimedia content. The cloud server admits service request from smartphone users or web client across the internet and establishes remote session with them. Once remote session is established, the server allows smartphone user or web client to access multimedia contents which are stored on the cloud.
- **On the client side:-** There are two types of client, one is the smartphone client and another one is the web client. If the user is new, he has to register first by making some advance payment and if the user is already registered then user has to sign in by using username and password. After remote session is established, the client can access the multimedia contents that are available on the cloud server.

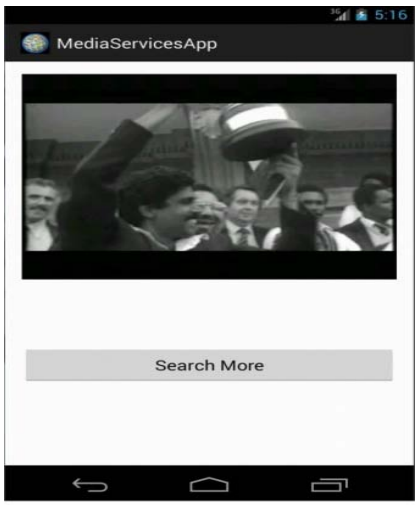


Figure 2: Prototype in Action

Figure 2 shows prototype of mobile multimedia applications when actually implemented. Note that the media content and the media required to access that respective content is present on cloud and the cloud server is providing this facility. Neither smartphone memory is required to store the data, nor is its CPU utilized for processing the data.

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5. Conclusion

As mobile multimedia applications have high resource requirements on mobile devices, whereas only some of the devices are able to fulfil those requirements. However, other mobile devices are facing many challenges in their resources. Cloud computing can be the powerful solution. Using this system, smartphone users can store and play multimedia files in the cloud server. It uses cloud resources for executing mobile multimedia applications. Users can store and process their multimedia application data in the cloud, eliminating full installation of the media application software on the users' computer or device. This application can help to reduce the gap between requirements and availability of resources. This will also improve the reliability for accessing the media content finally, the future research direction of cloud-based multimedia-computing model have been outlined with this project.

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