International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Impact Factor (2012): 3.358

A Survey on Enabling Rich Mobile Multimedia Constructed By an Adaptive Mobile Cloud Computing

Mayur P. Band[1], N.D.Kale[2]

[1]SavitriBai Phule Pune University, PVPIT College of Engineering, Bavdhan, Pune, India

[2]Professor, SavitriBai Phule Pune University, PVPIT College of Engineering, Bavdhan, Pune, India

Abstract: ***Mobile Multimedia is a broadcast an rapidly growing segment, and almost every mobile user would have a perceived need for a multimedia-based entertainment application[1]. Mobile cloud computing usually consists of front-end users who possess mobile devices and back-end cloud server. This paradigm allow users to pervasively access a large volume of storage resources with portable devices in a distributed and cooperative way. During the period between uploading and downloading data, the privacy, security and integrity of files need to be guaranteed. The article is concluded with a discussion of several open research problems that call for substantial research efforts. All scheme are lightweight in terms of computational overhead resilient to storage compromise on mobile devices, and do not assume that trust cloud servers are present. We firstly propose an encryption based scheme for the situation of single accessible CS. Next, we propose a coding based scheme for the situation that multiple CSs are available without relying on encryption. Finally we propose a sharing based scheme to further decrease the computation overhead by only relying on exclusive-or operation. Also we extend our work to energy consumptions, providing an analysis of the critical factors affecting the energy consumption, privacy of mobile clients in cloud computing.***

Keywords: Mobile Computing, Cloud Computing, Cloud Gaming, Multimedia Applications, Mobile Gaming

1. Introduction

Mobile devices (e.g., smart phone, tablet pcs, etc) are increasingly becoming an essential part of human life as the most effective and convenient communication tools from mobile applications (e.g., iPhone apps, Google apps, etc), which run on the devices and on remote servers via wireless networks. The rapid progress of mobile computing (MC) becomes a powerful trend in the development of IT technology as well as commerce and industry fields the mobile devices are facing many challenges in their resources (e.g., battery life, storage, and bandwidth) and communications (e.g., mobility and security).

Cloud computing (CC) has been widely recognized as the next generation's computing infrastructure. CC offer some advantages by allowing users to use infrastructure (e.g., servers, networks, and storages), and software's provided by cloud providers (e.g., Google, Amazon, and Sales force) at low cost. With the explosion of mobile applications and the support of CC for a variety of services for mobile users, mobile cloud computing (MCC) is introduced as an integration of cloud computing into the mobile environment. Mobile cloud computing brings new types of services and facilities for mobile users to take full advantages of cloud computing. Use of mobile cloud computing will enable more powerful applications, and hence more significant growth[2]. This paper presents a comprehensive survey on mobile cloud computing, also provide a brief overview of MCC, CMM, Cloud storage services and their architecture.

A. Mobile Cloud Computing

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. MCC can be described as a new paradigm for mobile applications whereby the data processing and storage are moved from the mobile device to powerful and centralized computing platforms located in clouds. 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"[4]. These centralized applications are then accessed over the wireless connection based on a thin native client or web browser on the mobile devices. The mobile devices do not need a powerful configuration (e.g., CPU speed and memory capacity) since all the complicated computing modules can be processed in the clouds.

B. Cloud Mobile Media

On the development of Web 2.0, Internet multimedia is emerging as a service. 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[5]. 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 phones. CMM offers new opportunities for mobile network operators to close the growing gap between growth in data usage and data revenue by offering innovative CMM services and experiences.

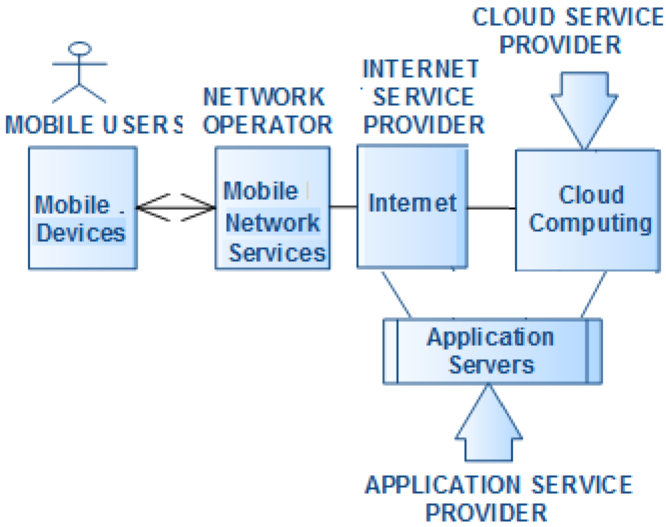

Figure 1: Mobile Cloud Computing Architecture

C. Cloud Storage Services

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[6]. 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 the device platform used to generate the media, and synchronizing data or 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.

2. Related Work

In [13] mobile video games and the gaming experience over network remain constrained in two ways: (1) unlike the richness and interactivity of Internet/PC games, current mobile video games are very light-weight, both in terms of graphics/features supported, as well as the content in the case of mobile versions of Internet games; and (2) unlike the multiplayer capability, and the associated social networking, that made Internet/PC video gaming so popular, current mobile video games are primarily single player games. Enhance the Mobile Gaming User Experience (MGUE) model to address cloud server latency and scalability issues that may be faced in real deployment scenarios with significant number of mobile game players. In [12] authors may be promising to investigate an alternative approach Cloud Mobile Gaming (CMG), where cloud servers are responsible for executing the appropriate gaming engines, and streaming the resulting game video to the client devices. Two challenges which are vital for the success of CMG approach: (1) communication constraint in terms of limited and fluctuating mobile network bandwidth (2) computation constraint reflected by the available server computing resource for each client. Streaming game video over the bandwidth constrained wireless network may cause unexpected delay and packet loss, leading to an increase in response time besides adverse impact on the video quality, thereby unacceptable gaming experience. In [6] Authors Consider resource allocation and job scheduling problem of the data analytics cluster in the cloud. A resource allocation strategy that (1) divides machines into two pools core nodes and accelerator nodes and (2) dynamically adjusts the size of each pool to reduce cost or improve utilization. In [5] authors enabling mobile Internet gaming will significantly change the experience of mobile users from thin, single player gaming possible today to rich, multi-player Internet gaming experience, of their familiar games from anywhere. A cloud server based mobile gaming approach, termed Cloud Mobile Gaming (CMG), where the burden of executing the gaming engine is put on cloud servers and the mobile devices just communicate the user's gaming commands to the servers. In [9] authors propose a joint scheduling adaptation algorithm that can systematically leverage adaptation techniques introduced in to adapt the communication needs of in service users if the available wireless network bandwidth is not sufficient for a new CMG user. Our simulation outcome express that the use of WCS and the joint scheduling adaptation algorithm, can extensively improve the performance of the CMG approach, increase the number of simultaneous CMG sessions that can be supported, while maximize aggregate MGUE and minimize the average cloud service cost.

3. Problem Statement

We envision media rich cloud based mobile applications to emerge, besides many current mobile media services migrating to the cloud. These developments can lead to new and efficient mobile media experiences, and thereby revenue growth opportunities. However, as pointed in this section, several technical and eco-system challenges will need to be addressed, including ensuring high availability, data integrity and user privacy, lowering energy consumption and cooling costs, ensuring response time and user experience over wireless networks, and reducing cloud service cost associated with high computing and bandwidth needed by CMM applications, and thereby ensuring service scalability.

A. JREA Algorithm

It addresses the challenge of fluctuating and band-width constrained wireless network by judiciously utilizing the power of changing the video source through rendering adaptation, with large impact on network bandwidth needed, together with adapting the video encoding bit rate address relatively small but frequent network bandwidth fluctuations. The motivation for developing an online Joint Rendering and Encoding bit rate Adaptation (JREA) algorithm. We next describe the steps of the JREA algorithm, which decides when and how to switch the Communication Complexity (CommC) rendering level Computation Complexity (CompC) rendering level and the encoding bit rate during a gaming session in response to the current network conditions and server utilization. Adapting both rendering and video encoding jointly will necessitate understanding the optimal values (leading to a joint adaptation model) of encoding bit rate or rendering level that can be used when encoding or rendering is adapted respectively.

The first step is to decide the encoding bit rate used to encode the rendered video. During a short time interval, if the network Round trip Delay (RDelay) keeps increasing and its average value is greater than minimum Acceptable RDelay JREA algorithm will reduce encoding bit rate

The second step is to check and update CommC rendering level. After the first step, the new encoding bit rate may be below the Minimum Encoding Bit Rate (MEBR) for the current CommC rendering level, which will lead to an unexpected user experience as we discussed before. But this happen, JREA algorithm has to reduce CommC rendering level to reduce the Minimum Encoding Bit Rate. On the other hand, if the CommC rendering level has not been changed for over a certain significant period, it will be updated and changed to the Maximum CommC Rendering Level (MCRL) depending on the current encoding bit rate.

The third step is to decide on CompC rendering level, depending on server utilization (ServUtil). If ServUtil is over, the lower CompC rendering level is selected. Otherwise, if CompC rendering level has not been changed for more than time, and ServUtil is below, it increases CompC rendering level by 1.Next, based on the new selected CommC and CompC rendering levels JREA algorithm will use the optimal rendering settings from to update the game graphic engine, as it use the new selected video bit rate to update the video encoder.

4. Proposed Work

Considering the increasing need of resources on mobile devices for multimedia applications as discussed in previous sections, we have proposed a model which used cloud resources for mobile multimedia application. We focus on the storage outsourcing in distrusted CSs (computation outsourcing is usually conducted in trusted CSs). After a MD creates a file and processes it, it may upload the file into a CS or multiple CSs. Host user or other cooperators may access it in the future distributed. Obviously, the privacy and integrity of the file must be maintained in the storage of CSs during the period between uploading and accessing. We extend our work to provide an analysis of the critical factors affecting the energy consumption of mobile clients in cloud computing. Further, we present our measurements about the central characteristics of contemporary mobile handheld devices that define the basic balance between local and remote computing. We also describe an example, which demonstrates energy savings.

A. Encryption based Scheme (EnS)

In this scheme, file encryption and integrity checking are conducted by MD (Mobile Device) itself

B. Coding based Scheme (CnS)

We observe that under some situations multiple s CS may be presented, further decrease the computation overhead of encryption function in power consumption, we propose a Coding based Scheme called CoS without encryption function but maintaining the secrecy.

C. Shared based Scheme (CnS)

On Cns we propose a Sharing based Scheme. The scheme applies a simple n,n) xor-based secret sharing method. That is, for sharing a secret s in n holders such that s can be recovered only when n holders are present, randomly generates n −1 shares and computes the last share.

D. Energy trade-off analysis

The critical feature for mobile clients is the trade-off between energy consumed by computation and the energy consumed by communication. also consider the energy cost of performing the computation locally (Elocal) versus the cost of transferring the computation input and output data (Ecloud).The proposed system also extend to analyzed the energy consumption of mobile clients in cloud computing. There are many factors that make cloud computing an attractive technology and efficient but energy consumption is a fundamental criterion for battery powered devices and needs to be carefully considered for all mobile cloud computing scenarios. In this module we analysis and compare the performance of the proposed system in the term of security, privacy, energy and computation overhead and propose effective techniques.

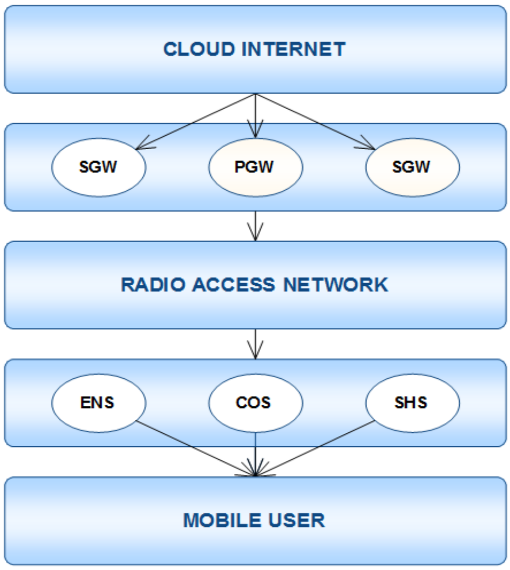

Figure 2: Proposed System Architecture

5. Future Directions

We present an adaptive mobile cloud computing for rich mobile applications approach to address the challenges associated with Cloud Mobile Gaming, one of the most computing and communication intensive Cloud Mobile Media applications.. A critical challenge for CMM applications is the latency and jitter associated with the uplink and downlink transmissions between the mobile device and the Internet cloud servers. We will conclude this paper by discussing two additional new approaches which we believe can significantly help address the user experience, cost and scalability challenges associated with CMM applications

Over the transmission of large amount of data between cloud servers and mobile devices, inherent in CMM applications, poses a major concern for the capacity of the networks to enable CMM applications. A promising direction will be to bring cloud computing to the edge of the mobile network, supplementing gateway nodes in the mobile Core Network (CN), and edge nodes like base stations in Radio Access Networks (RAN), and WiFi.

With a Mobile Cloud architecture, content processing (like graphic rendering or video encoding) and retrieval can be performed at the edge of the mobile networks, as opposed to in Internet clouds, thereby reducing round trip network latency, as well as reducing congestion in the mobile CN and RAN. While the direction of Mobile Cloud looks appealing, there are multiple challenges that need to be addressed. Since there are thousands of base stations and access points, the proposed Mobile Cloud will be a massively distributed network of smaller computing and storage resources, as opposed to the more centralized architecture of Internet clouds consisting of a few data centres with much larger computing and storage footprints.

Our initial work developing mobile cloud scheduling techniques for Cloud Mobile Gaming has shown promising results: the ability to significantly increase the number of simultaneous CMG users using available network resources, while reducing cloud cost. In the future, mobile cloud scheduling techniques will need to be developed for other CMM applications, as well as consider capacity limited computing and storage resources in the Mobile Cloud.

6. Conclusion

This paper introduces On consideration of challenges we proposed schemes for protecting the confidentiality and integrity of uploading files or data in mobile storage cloud. The scheme EnS tackles the situation where only one cloud server exists. We ensure that it guarantees the security goal and the necessary condition for this situation. The scheme CoS can avoid the computation of encryption algorithm in the situation that multiple cloud servers exist by applying linear coding. The scheme ShS can further decrease the computation overhead by relying only on exclusive-or operations. All proposed schemes are resilient to the storage compromise on mobile devices, and all assume that the cloud servers are distrusted. We have also analyzed the energy consumption of mobile clients in cloud computing. There are many factors that make cloud computing an attractive technology, but energy consumption is a fundamental criterion for battery powered devices and needs to be carefully considered for all mobile cloud computing scenarios. While energy can be a challenge for mobile cloud computing, it is also as an opportunity.

7. Acknowledgment

I like to acknowledge my vigorous thanks to Prof. Mr. N.D.Kale for providing and giving suggestions which helped me a lot in my research work and I also want to thanks our computer department staff, friends and classmates for helping me in this research work by giving me there timely suggestions and feedbacks on my research work.

References

[1] Gartner report, Market Trends: Worldwide, the State of Mobile Video, 2012.
[2] Shaoxuan Wang and Sujit Dey, “Adaptive Mobile Cloud Computing to Enable Rich Mobile Multimed Applications”, IEEE Transactions on Multimedia, Vol. 15, No. 4, June 2013
[3] MarketsAndMarkets, World Mobile Applications Market-Advanced Technologies, Global Forecast (2010-2015), Aug. 2010 [Online]. Available: http://www.marketsandmarkets.com/.
[4] Dejan Kovachev et al,” Mobile Cloud Computing: A Comparison of Application Models”, Information Systems & Database Technologies, RWTH Aachen University
[5] Kumar K, Lu YH (2010),” Cloud computing for mobile users: can offloading computation save energy?”, IEEE Computer, Vol. 43, No. 4, April 2010
[6] Chun BG, Maniatis P (2009), “Augmented smartphone applications through clone cloud execution”, Proceedings of the 12th workshop on hot topics in operating systems (HotOS XII). USENIX, Monte Verita, Switzerland
[7] Satyanarayanan M et al, ”The case for VM-based cloudlets in mobile computing”, IEEE Pervasive Computing, Vol. 8, No. 4, pp. 14–23, 2009
[8] Dejan Kovachev et al,” Building mobile multimedia services: a hybrid cloud computing approach”, Springer Science Business Media, LLC 2012
[9] Niroshinie Fernando, Seng W. Loke, Wenny Rahayu, ”Mobile cloud computing: A survey”, Future Generation Computer Systems 29 (2013) 84–106
[10] Shaoxuan Wang and Sujit Dey, “Adaptive Mobile Cloud Computing to Enable Rich Mobile Multimedia Applications”, IEEE Transactions on Multimedia, Vol. 15, No. 4, June 2013
[11] http://kcchao.wikidot.com/multimedia-over-ip
[12] ONVIF™ Streaming Specification, Version 2.1, June, 2011
[13] Introducing JSON, Available: http://www.json.org/[Accessed:Oct 20, 2012]
[14] Yu Wu et al, “AMES-Cloud: A Framework of Adaptive Mobile Video Streaming and Efficient Social Video Sharing in the Clouds”, IEEE Transactions on Multimedia, Vol. 15, No. 4, June 2013
[15] Cisco visual networking index: global mobile data traffic forecast update, 2011–2016, White paper, Cisco Systems (2012), FLGD 10229 02/12.