

Review of Challenges in Accessing Cloud services through Mobile Devices

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Abstract— Mobile cloud computing is an emerging branch of cloud computing. Mobile cloud computing is a 3+ combination of cloud computing, mobile computing and internet. Nature of accessing cloud services through mobile devices increases as there is continuous growth in the number of mobile users. But, there are several problems in accessing cloud services through mobile devices. This paper discuss about various problems in accessing cloud services in mobile environment. It also discuss about mobile cloud computing in details, current state of mobile cloud computing and its system architecture.

Index Terms— cloud computing, mobile cloud computing, system architecture of MCC, current State of MCC, challenges in MCC, applications.

1 INTRODUCTION

Cloud computing is a technology in which resources are provided to the user on demand basis through internet. Here, resources may be software, platform, services etc...Cloud computing is very adventitious as it reduces downtime and expenditure on servers and other computer equipments. By implementing cloud computing, a company can handle maximum points of stress on their system with minimum number of resources. Actually what is mobile cloud computing means? It is nothing but an infrastructure where both data storage and data processing happens outside of the mobile devices. However, most of the application do most of the data storage and data processing in device itself and not use cloud for the same. Hence we can say that, mobile cloud computing is a very emerging area in cloud technology.

2 MOBILE CLOUD COMPUTING

A Mobile cloud computing is a technology which uses unified elastic resources of varying clouds and different network technologies through functionality, mobility and storage. MCC serves as a multitude of mobile devices anytime, anywhere through Internet regardless of different platform and heterogeneous environment [1]. MCC is 3+ combinations of cloud computing, internet and mobile computing.

In mobile cloud computing, several applications are run on remote cloud server and then output is send to the user. As there is continuous improvements in mobile browsers; nearly every mobile will have a suitable browser in the past couple of years. In also indicates that developer in this field will be having much wide market and they can overcome various restriction created by mobile operating systems. There is two categories of mobile cloud computing. In first category, all the data storage and processing will be carried out outside the mobile device. Here, mobile device simply acts as terminal in cloud computing which is simply provides more convenient way of accessing services in cloud computing [1]. Due to this, storage and computing limitations of mobile devices are avoided. Here, security is provided by centralizing maintenance of critical security.

Second category of mobile cloud computing perform data storage and data processing on mobile device itself. [9]Here, the infrastructure of cloud is different from the data center cloud computing. Each node is owned by mobile devices. It gives access to the multimedia and sensor data without need of large network transfer, efficient access to the data stored on other mobile devices, maintenance of hardware. In this paper, various challenges in accessing cloud services through mobile devices are discussed. What is the need of mobile cloud computing? There are at least three reasons. First is mobility is very important for accessing cloud services. Main obstacle in cloud computing is a service availability[9].mobile cloud computing extract information about the location of user, requested services, context and evolve in heterogeneous access which is generally called as intelligent access[11].Intelligent access can improve the user's experience in cloud computing.

Second reason behind the need of MCC is number of mobile devices increased dramatically with the growth of mobile users, especially with the Smartphone users. Now-a-days, each mobile is full of computing, sensing, storage and power resources. By using these resources, services or applications can be easily accessed inside and outside the mobile network by mobile users. Third and most important reason is there are many shortcomings in cloud computing which can be removed by implementing mobile cloud computing.

3 CURRENT STATE OF MOBILE CLOUD COMPUTING

This section discusses mobile platforms such as Smartphone, tablets, existing mobile applications and users, as well as enabling trends for mobile cloud computing.

3.1 Mobile Platforms: Smartphone

Smartphone no longer offers just the ability to communicate via voice, like a standard phone, or by way of data, such as email. Rather, these have evolved into small personal computing platforms as well. The International Telecommunication Union (ITU) stated in 2009 that the number of mobile phone subscriptions worldwide had exceeded 5 billion in 2010. According to the ITU, in 2007, 85 countries worldwide had

launched 3G networks, with over 335 million mobile broadband subscribers in 2008. Since then 4G has been introduced with a large footprint expected in 2012 (Adolph, 2009). As Pieter Simoens et al noted in (Simoens & Turck, 2011), mobile cloud computing allows mobile devices, such as Smartphone, to act "as a remote display, capturing user input and rendering the display updates received from the distant server" (Simoens & Turck, 2011). This allows for logic or data intensive applications to be utilized on-the-go.

3.2 Mobile Platforms: Tablet PCs

Larger versions of Smartphone are booming in the market such as iPads and tablet PC. Market for these versions is generally much sophisticated and broader audience such as educational and healthcare industry. The larger version of the iPhone is iPad which essentially provides larger battery-life and greater processing capabilities. iPad uses iOS operating system while most of the leading mobile operating system is Google's Android operating system which can be considered as a more customizable and open OS for mobile devices.

3.3 Existing Mobile Applications

According to [9], the Apple App Store has exceeded 10 billion downloads and features more than 325,000 apps. The Google Android OS claims it has more than 30,000 applications available for its end-user. These two platforms are not the only two platforms, and as more companies create products to compete with Apple and Google, the number of applications and platforms will increase.

3.4 Existing Users/Consumers

A More than 8 million iPads were sold this year (Ankeny, 2011) and more than 10 million Samsung Galaxy S phones were sold in just 7 months (Schroeder, 2011). Across all makers in all markets, the number of mobile devices such as Smartphone and iPads is exponential of that noted above. People are buying Smartphone and iPads or Tablet PCs for both business and personal use. Many people like the idea of having technology at their fingertips, the ability not to have to lug around a laptop to and from school or a book or textbook everywhere with them. Instead, they can nearly full-sized keyboard. Others like instant access to emails or the ability to tweet on Twitter or submit a new have it all in one small device which provides a Facebook status on something small like a Smartphone. Regardless of the reason, the trend is still increasing, and it is predicted that the iPad will dominate the tablet market through 2015 (Whitney, 2011). Android designs from Samsung, Acer, and the budget-friendly Amazon Kindle Fire are close competitors of the iPad.

3.5 Enabling Trends for Mobile Cloud computing

There are several reasons why mobile cloud computing is emerging filed in cloud computing. Because though numbers of the cloud-ready devices are available, consumers are expecting tablet and Smartphone applications so that they can

access various key applications. According to the survey conducted by Pew research project, most consumers are using internet applications on remote servers accessed through networked devices.

4 SYSTEM ARCHITECTURE OF MOBILE CLOUD COMPUTING

4.1 Access layer:

Access layer is also called access control layer, which includes service interface to the client, service registration and reasonable service access. It standardized all kinds of rules, service standards in mobile cloud computing, which is the gateway to cooperation between client and cloud end, can accomplish user registration or service registration and be made and used according to the service.

4.2 Basic managing layer:

In cloud computing technology, managing layer is located between service and server group, which provides management, service and managing system in mobile cloud computing system architecture. It can take standard operations to services such as acknowledgement, directory, and security and so on, provide standard procedure interface and protocol to application service, hide dissimilarity between bottom hardware and operating system synchronizing, and manage network resources all together. Client management includes mobile account management, environment configuration, interaction management and charging system. Task management includes task configuration, task execution, lifetime management and so forth. Resource management includes load balancing, problem testing, problem recovery and monitoring system. Security management includes client identification, access acknowledgement, security assurance and comprehensive defense.

4.3 Virtual layer:

A Virtual layer means the virtual items such as computing pool, storage pool and network pool, the virtual functions can be realized by software realization. It includes virtual environment, virtual system, and virtual platform and so on.

4.4 Physical layer:

A Physical layer mainly indicates the hardware equipment and technology which supports mobile cloud service; it can be cheap PC and unintelligent cell phones. A cloud with super service can be provided by distributed computers by present network technique, parallel technique and distribution technique. In the period of mobile cloud computing, handheld equipment do not need large enough hard disk, powerful intelligent computing capability, but only need some necessary equipment such as network equipment and basic input and output equipment.

mobile cloud computing with low delay.

5.4 The problem of input and output interface:

Anyhow, the input and output of cell phones are always limited, additional hardware will increase the load, it is also weak in usage, by letting clients to define their own input and output interface, picking out their common functions to form the input interface, and pick out deeper interfaces when needed. As to output interface, we should also make the data briefly, letting small cell phone screen to provide as much information as possible and maintain the convenience.

5.5 The problem of service provider:

The difficulty of developing handheld equipment makes not all IT companies can enter the wireless internet soon, but they are eager to extend the service on the internet to endless internet. In this case, some service providers will no doubt come out and will have a bright future, for example, they can provide information exchange, payment, reading, email delivery, games, SNS and so on. These service providers will provide standard technique interface, making another company to use freely, which exactly the amazing part of mobile cloud is computing.

5.6 The problem of the individualization of handheld equipment:

Currently, there are many kinds of handheld operating systems, if we want to develop application based on handheld equipment rapidly, we must make application software as simple client end. Simple client end means that a large amount of data processing will be put in the cloud end, and the design of technique architecture must be realized according to cloud computing.

5.7 The problem with the loss of battery and network flow:

If an application need a lot of battery and flow, the application will be hard to be used in handheld equipment. In order to solve the problem with the loss of battery and network flow, we can cut down the data exchange rate and amount between handheld equipment and cloud end by optimizing cloud end, which will induce the loss of battery and network flow effectively be applied to handheld equipment either.

6 APPLICATIONS

6.1 Mobile Commerce:

There is tremendous explosion in e-commerce from last few years. Buying and selling product and services over internet and other communication network called as E-Commerce. In future, E-commerce will become key factor in business. Wide markets, easy transactions and decreased overheads are the important factors of ecommerce.

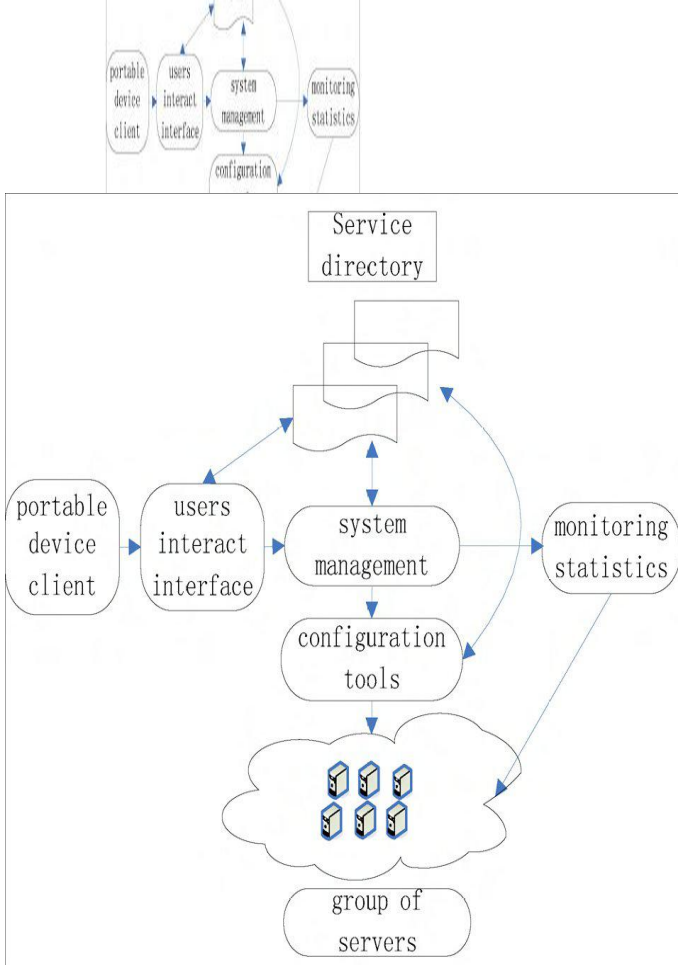


FIG 1: SYSTEM ARCHITECTURE OF MOBILE CLOUD COMPUTING

5 PROBLEMS WITH MOBILE CLOUD COMPUTING

All kinds of services of wireless internet of mobile cloud computing will dig into people's life, in the mean time, using all kinds of services of wireless internet will enhance the convenience, however, a lot of problems still remain in the realization of mobile cloud computing[3].

5.1 The problem with cell phone platform:

In order to realize cloud computing, a good cell phone end platform is needed to realize input and output procedures. According to the current situation, a smooth client interface is realized in the cell phone end, which mainly includes flash and java. However, currently, most cell phones which support both flash and java are most intelligent cell phones, while most ones in the future will support them, which means that mobile cloud computing is not far away from us.

5.2 System problem of cloud end:

As to system and software of cloud end, cloud end should possess a synchronized system of input and output of equipment like cell phone which is in charge of data processing.

5.3 Stability of bandwidth:

This is a problem which can rely on Mobile Corporation totally. However, it is also the key problem to maintain the stability of cloud computing; only when the mobile corporation can provide bandwidth that is stable enough, can we talk about

6.2 Mobile Learning:

Day-by-day, mobile learning is becoming popular as there is tremendous growth mobile users. Mobile learning is e-learning with mobility. Mobile learning is beneficial and convenient for users as they can learn through mobile anywhere, anytime. But due to some problems, like expensive mobile devices, poor transmission rate, and network's high cost it is somewhat difficult for mobile learning to be popular.

6.3 Mobile Healthcare:

There is a continuous development of telecommunication technology in medical field which makes treatment easy. This helps many patients to monitor their health regularly. It increases efficiency of healthcare providers and also improves quality of healthcare services. Cloud computing play, a very important role in providing convenience to users while accessing resources easily and quickly.

6.4 Mobile Computing:

Mobile computing has changed every type of service. Mobile computing continuously becoming popular since last few decades, there is continuous development in mobile network with its software and hardware. Mobile computing provides various day to day applications. Mobile computing provides various functions which improve our day to day works like checking emails, banking, online booking etc.

7 CONCLUSION

As we know that there are several challenges in accessing cloud services through mobile devices, we have to concentrate on various solutions to overcome these challenges. There are various proposed remote display solutions to overcome these problems. Computation offloading seems to best solution to save the battery life of mobile. As mobile cloud computing is a future of cloud computing, researchers has to focus on these challenges so that mobile cloud computing becomes more and more user friendly day by day as mobile devices have become the part of our life.

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REFERENCES

- [1] W. Michael Miller. Cloud Computing Web-Based Applications That Change the Way You Work and Collaborate Online, 2009.4.
- [2] R Kang Chen, Weimin Zheng. Cloud Computing System examples and current research situation [J]. Software Journal, 2009 (5) : 1337-

1348

- [3] D Peng Wang. Approaching Cloud Computing [M].
- [4] D Quan Chen, Qianni Deng. Cloud Computing and its key techniques. Computing Applications. 100 I - 908 1 (2009) 09 - 2562 - 06.
- [5] R. Man Yuan. Mobile Computing. Harbin: Harbin Industrialization University Press. 2008. (8): 2- 10. [6] A. Blake and M. Isard. Active Contours. Springer, 1998.
- [6] Canfeng Chen. Wide Band Mobile Internet. Beijing: People's Delivery
- [7] Xinwen Zhang, Joshua Schiffman, Simon Gibbs, Anugeetha Kunjithapatham, and Sangoh Jeong. Securing elastic applications on mobile devices for cloud computing. In CCSW '09: Proceedings of the 2009
- [8] Zehua Zhang and Xuejie Zhang. Realization of open cloud computing federation based on mobile agent. In ICIS '09: IEEE International Conference on Intelligent Computing and Intelligent Systems, 2009., volume 3, pages 642-646, 2009
- [9] E. Marinelli, "Hyrax: cloud computing on mobile devices using MapReduce," Master thesis, Carnegie Mellon University, 2009
- [10] D Android. [Online]. Available: <http://www.android.com>.
- [11] A. Klein, C. Mannweiler, J. Schneider, and H. Schotten, "Access schemes for mobile cloud computing," Proc. 11th Intl. Conf. on Mobile Data Management (MDM'10), Kansas, MO, 2010, pp. 387-392
- [12] Apache Hadoop. [Online]. Available: <http://hadoop.apache.org/>
- [13] G M. Satyanarayanan, P. Bahl, R. Cáceres, and N. Davies, "The case for VM-based cloudlets in mobile computing," IEEE Pervasive Computing, vol. 8, no. 4, pp.14-23, Oct. 2009