

A Survey of Mobile Cloud Computing for Smart Phones

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Abstract— Mobile Cloud Computing (MCC) combines mobile computing and cloud computing, has one of a major discussion thread in the IT world. By combining mobile computing and cloud computing concept, Mobile Cloud Computing (MCC) has been introduced to be a potential technology for mobile services. MCC integrates the cloud computing into the mobile environment and overcomes problems related to the performance, environment and security. There are many mobile cloud applications such as email access, image editing, web browsing, document editing, video playback, games etc. These applications are using the software as a service model. By using cloud computing these applications are stored in cloud server and access users whenever they needed, this reduces storage capacity and battery usage. The users of MCC are still below expectations because of the associated risks in terms of privacy and security. These risks are playing most important role by preventing the any organizations to adopt the MCC environment. This paper provides efficient data storage for Mobile Cloud Computing (MCC) and reduces security issues and challenges.

Index Terms— Mobile Computing, Cloud Computing, Mobile Cloud Computing.

I. INTRODUCTION

Mobile computing involves mobile hardware devices mobile communication, and mobile software applications. Nowadays markets of mobile phones have developed rapidly as mobile devices (Smart Phones, PDA, Tablets etc.) are becoming the most essential part of human life as the most effective and convenient communication tools not bounded by time and place. This rapid growth of mobile computing has become a powerful part in the development of IT industries as well as commerce and other industry field [1]. Mobile users accumulate rich experience of various services from mobile applications (e.g., Google apps, Android apps, iPhone 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, and bandwidth) and communications (e.g., mobility and security). The limited resources significantly impede the improvement of service qualities [2].

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Cloud computing is similar to the computer networks which includes the collection of more than computing resources commonly referred as a server and the computing resources are connected through a communication networks such as an internet, an intranet, local area network (LAN) or wide area network (WAN). Instead of using computer for every time to application, we use the cloud server to run the application of the user from anywhere at any time in the world and the processing power for the application is provided by the cloud server [3]. There are different types of clouds that can be used, depending on your needs. There are Public Cloud, Community Cloud, Private Cloud, and Hybrid Cloud.

II. LITERATURE REVIEW

Zhibin Zhou and Dijiang Huang [4] proposed that security framework for cloud data storage services to secure the data management in public clouds. This paper uses Attribute-Based Encryption (ABE) to protect user's encrypted data. The main disadvantage is Cipher text size is limited and for the mobile users no security measures provided. C Shravanthi and H S Guruprasad [5] proposed that energy conservation in migration issues, mobile devices, application development platforms and the various mobile cloud computing applications. The drawbacks in this paper are less secure and it concentrates only on mobile related applications.

Mazedur Rahman, Jerry Gao and Wei-Tek Tsai [6] presented that energy saving strategies and solutions in three perspectives: mobile devices, network infrastructures and communications and cloud infrastructures and computing software. The main drawbacks are security mechanism did not provided and only focuses on energy saving. Yanuaris Teofilus Larosa et al [7] proposed and analyzed to bring the new concept in constructing mobile cloud computing system. Information exchanging process is presented. The drawbacks in this paper are it provides how to process data in wireless environment and security algorithm did not provided. Andreas Klein et al [8] proposed that framework for the use of mobile related information for the Heterogeneous Access Management (HAM) provided by the Mobile Cloud as a service for the mobile terminals. The main disadvantage is it provides only access scheme and lack of security.

III. OVERVIEW OF MOBILE CLOUD COMPUTING

Mobile Cloud Computing (MCC) integrates the cloud computing technology into the mobile computing environment and overcomes problems related to the environment, performance and security. Mobile Cloud Computing can be divided into two classes: first one is carrying out data storages and second is processing outside the mobile device.

Mobile cloud applications moves away the computing power and data storage far from mobile phones and into the cloud, bringing applications and mobile computing to not just Smartphone users into much broader range of mobile phone subscribers [9].

A. MOBILE CLOUD COMPUTING ARCHITECTURE

Fig. 1 shows the typical architecture of Mobile Cloud Computing.

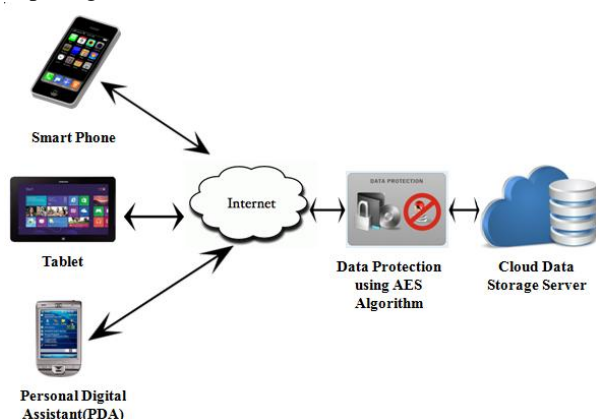


Fig. 1 Mobile Cloud Computing Architecture

Mobile devices like Smart Phones, Tablet, PDA, etc are connected to the Cloud server via internet service providers. Whenever user wants any data, mobile applications etc they send request to cloud service provider, they process the request and send back the required information for the users. A gateway is provided to protect data from unauthorized users between users and cloud service provider.

B. ADVANTAGES

1. Extending Battery Lifetime

The Computation power of mobile phone large computations and complex processing from resource-limited devices (i.e., mobile devices) to resourceful machines (i.e., servers in clouds). Remote application execution can save energy significantly.

2. Improves data storage capacity & processing power.

MCC enables mobile users to store and access large data on the cloud. MCC reduces the running cost for computation intensive applications. Mobile applications are not constrained by storage capacity on the devices because their data now is stored on the cloud.

3. Improving reliability and availability

Keeping data and application in the clouds reduces the chance of lost on the mobile phones. MCC can be designed for a comprehensive data security model for both service providers and users: Protect copyrighted digital contents in clouds and to provide security services such as malicious code detection, virus scanning and authentication for mobile phone users.

4. Dynamic provisioning

Dynamic on-demand in MCC provisioning of resources on a fine-grained, self-service basis No need for advanced reservation.

5. Scalability

Mobile applications can be performed and scaled to meet the unpredictable user demands. Service providers can easily add and expand a service.

6. Multi-tenancy

Service providers can share the various mobile apps resources and costs to support a variety of applications and large number of mobile phone users.

7. Ease of Integration

Multiple services from different network providers can be integrated and easily through the cloud and the Internet to meet the users' demands.

C. APPLICATIONS

1. Mobile Healthcare

M-healthcare is to minimize the limitations of traditional medical treatment. M-healthcare provides mobile users with convenient access to resources. M-healthcare offers hospitals and healthcare organizations a variety of on-demand services on clouds.

2. Mobile Gaming

M-game is a high potential and more profit market generating revenues for service providers. Rendering adaptation technique can dynamically adjust the game rendering parameters based on communication constraints and gamers' demands.

3. Assistive technologies

Mobile cloud computing provides assist to pedestrian crossing guide for blind and visually-impaired. Blind and visually impaired persons it assist mobile currency reader. Lecture transcription for hearing impaired students.

4. Other applications

There are many other useful applications like sharing photos/videos, keyword-based, voice-based, tag-based searching and monitoring a house, smart home systems [10].

IV. OPEN ISSUES IN MOBILE CLOUD COMPUTING

There are some issues in implementing cloud computing for mobile. These issues can be related to limited resources, related to network, related to security of mobile users and clouds. Some issues are explained as follows:

A. LIMITED RESOURCES

Having limited resources in mobile device make use of cloud computing in mobile devices difficult. Basic limitations related to limited resources are limited battery, limited computing power, and low of quality display.

B. NETWORK RELATED ISSUES

All processing in MCC is performed on the network. So there are some issues related to the network like bandwidth, latency, availability and heterogeneity.

C. SECURITY

Mobile devices also have to face a number of problems related to security and privacy. To overcome this problem threat detection services are now performed at clouds but this also has to face a lot of challenges. There are so many security threats like, hacking, viruses, Trojan horses in mobile devices also. The use of global positioning system (GPS) in mobile devices gives birth to the privacy issues.

D. LOW BANDWIDTH

Bandwidth is one of the big issues in MCC since the radio resource for wireless networks is much scarce as compared with the traditional wired networks. A solution to share the limited bandwidth among mobile users who are located in the same area (e.g., a workplace, a station, and a stadium) and involved in the same content (e.g., a video file).

E. AVAILABILITY

Service availability becomes more important issue in MCC than that in the cloud computing with wired networks. Mobile phone users may not be able to connect to the cloud to obtain service due to network failures, traffic congestion and the out-of-signal.

V. CONCLUSION

Mobile Cloud Computing is one of the mobile computing technology trends in future as it combines the advantages of both cloud computing and mobile computing, and hence providing optimal services. The requirement of mobility in cloud computing gave birth to Mobile cloud computing. MCC provides more possibilities for access services in convenient manner. It is expected that after some years a number of mobile users will going to use cloud computing on their mobile devices. This paper has provided an overview of mobile cloud computing in which its definitions, architecture, existing work application, advantages and challenges have been presented.

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