

"Mobile Cloud Computing for Cloud based application and services-Security Considerations"

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Abstract-Mobile Cloud Computing (MCC) which combines mobile computing and cloud computing, has become one of the industry buzz words and a major discussion thread in the IT world since 2009. MCC integrates cloud computing into the mobile environment and overcomes obstacles related to performance (e.g. battery life, storage, and bandwidth), environment (e.g. heterogeneity, scalability, availability) and security (e.g. reliability and privacy). Mobile cloud computing can improve user experiences by executing applications on resource providers external to the mobile device. In this paper, we discuss recent mobile application models related to cloud computing technologies. This paper will explain how cloud computing and mobile devices combine present and future new imperatives and challenges for developing countries. We conclude that the future of mobile clouds will be in novel technologies such as network coding as well as in combination with social networks in order to boost cooperation among users as well as connect people over the shared content.

Keywords- Mobile cloud computing, offloading, mobile services, mobility

I. INTRODUCTION

Mobile devices (e.g., Smartphone, Tablet Pcs, etc) are densely used in today's scenario and still get even more important since the usage of mobile Internet. The growth of the number of applications available for those devices in the last few years has shown that there is a high demand for mobile apps. As a development and extension of Cloud Computing and Mobile Computing, Mobile Cloud Computing, as a new phrase, has been devised since 2009. In order to help us grasping better understanding of Mobile

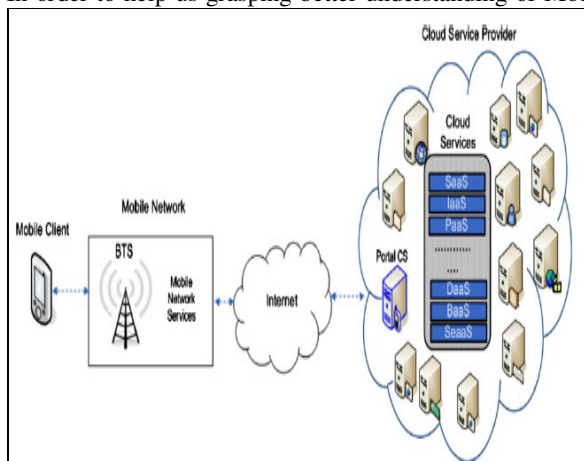


Figure 1.0 Mobile Cloud Computing

Cloud Computing, let's start from the two previous techniques: Mobile Computing and 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. 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 smart phone users but a much broader range of mobile subscribers".

II. KEY REQUIREMENTS FOR MOBILE CLOUD COMPUTING

There are some key features of Mobile Cloud Computing that make it possible to implement seamless service delivery in a cross network environment. From the perspective of the enterprise solution provider or web/mobile application developer, the objectives of the Mobile Cloud Computing platform are:

- Simple APIs offering transparent access to mobile services, and requiring no specific knowledge of underlying network technologies.
- The ability to deploy applications across multiple carrier networks, under a single commercial agreement.
- Seamless handling of each carrier's specific network policy – such as subscriber opt-in/opt-out and privacy management.

Because of user mobility, the wide diversity of applications, and the varying wireless channel status, the mobile cloud computing context is highly dynamic. Future research should therefore focus on the design of a comprehensive framework that integrates the existing solutions and activates the most appropriate one depending on the current device, network, and cloud server status.

III. TECHNOLOGICAL CHALLENGES IN MOBILE-CLOUD COMPUTING

A. Compute Capability and Storage Capacity

Despite an order of magnitude higher computational power of today's mobile devices compared to the ones from just a few years ago, the relative computational power ratio of a non-mobile and a mobile device is likely to stay approximately the same in the foreseeable future. This is due to the architectural and technological state-of-the-art advances being applied to mobile platforms as well as non-mobile platforms simultaneously by different market leaders such as Intel for desktop platforms and ARM for mobile platforms.

B. Network Connectivity

A primary concern in the use of mobile-cloud computing is the non-negligible latency over the WAN (Wide-Area Network) between the mobile and the cloud, which hurts the user experience in mobile-cloud computing. Interactive applications that constantly engage the users are likely to suffer the most from long delay, jitter and jerky and sluggish processing. Studies show that the quality of client performance becomes highly variable with long latency.

C. Quality of communication

In contrast with wired network uses physical connection to ensure bandwidth consistency, the data transfer rate in mobile cloud computing environment is constantly changing and the connection is discontinuous due to the existing clearance in network overlay. Furthermore, data centre in large enterprise and resource in Internet service provider normally is far away to end users, especially to mobile device users. In wireless network, the network latency delay may 200 ms in 'last mile' but only 50 ms in traditional wired network. Some other issues such as dynamic changing of application throughput, mobility of users, and even weather will lead to changes in bandwidth and network overlay. Therefore, the handover delay in mobile network is higher than in wired network.

D. 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.

E. Network Monitoring

In addition to latency and bandwidth problems network performance monitoring is also an important issue which need proper concern and care. It is critical to have a dynamic cloud performance system that can allow traffic re-routing, access swapping and handover. With all these key challenges given mobile computing is still viable business and is being preferred by more cloud users. Foreign intelligence services (FIS) have extensive resources and have repeatedly demonstrated their capability to use automated „social engineering“ techniques to mine social media sites. By their very nature, social media sites have an abundance of information, which makes them susceptible to data mining. Our adversaries can use this data to analyze aggregated information. Without adequate network monitoring, an organization cannot ensure that whether users are complying or not its policies regarding the release of high-value information. Additionally, programming languages used in Web 2.0 applications (e.g., Java, Ajax, and the JSON data interchange format) may create other opportunities for malicious actors to access an organization's back-end network infrastructure and do

irreparable damage (e.g., access or corrupt data or applications). Consequently, an organization using social media may need to implement increased security controls for any separate sensitive information residing on the server's backend

F. Mobile Cloud Convergence

In order to achieve advantage of mobility by integrating cloud computing to mobile world, Data distribution is the key issue. Limitation of mobile devices for their computing power makes task distribution very important as the computing power of mobile devices is not powerful enough for making these devices to be the main computing platform. Mobile cloud convergence provides performance improvement, longer battery life, and a solution to the computation power problem. Basic approach of mobile cloud convergence is to partition application such that parts that need more computation run on the cloud and remaining parts which is associated with the user interface run on the mobile device. As a single process is being partitioned here so IPC (inter-process communication) is very important to realize this convergence. An improved and optimal PI calculation algorithm can be achieved by optimizing mobile cloud convergence. Wireless technologies, advanced electronics and internet are overlapped and integrated to achieve pervasive and ubiquitous computing

G. Data Availability in Clouds

The problem of maintaining high system availability is well studied. As such, there are many options available one is to build system out of components that seldom fail; it is often expensive to assemble highly reliable components. The other way to make a system available is to use redundancy, so that the system can function by switching to working components in case of failures. This concept applies to data services at all levels: archival storage, distributed data storage systems, and web-services that facilitate access to these distributed data.

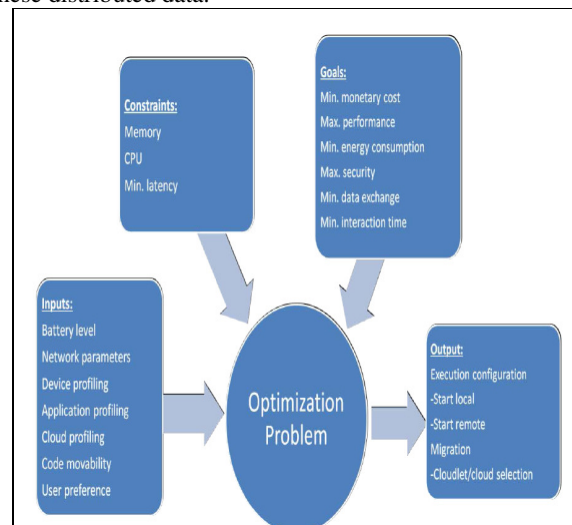


Figure 2.0 Mobile Cloud Consideration

When deploying data access web-services using Clouds, replicating the services across multiple availability zones,

providers, and servers is one of the ways to solve the data availability problem in Clouds

IV. CONCLUSION

The mobile cloud concept foresees that mobile devices connect to each other directly without any help of the overlay network. For the actual sharing among mobile devices new technologies such as network coding are the key enabler for support of energy saving, privacy, security, data protection, and fast exchange of data. This article has provided an overview of mobile cloud computing in which its definitions, architecture, and optimized solutions have been presented. The applications supported by mobile cloud computing including mobile commerce, mobile learning, and mobile healthcare have been discussed which clearly show the applicability of the mobile cloud computing to a wide range of mobile services. Various kinds of internet services using mobile cloud computing will also be popular with people's daily life. Mobile cloud computing will not only become popular but also develop continuously during all challenges, which are the opportunities for us.

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