INTERNATIONAL RESEARCH JOURNAL IN ADVANCED ENGINEERING AND TECHNOLOGY (IRJAET) E - ISSN: 2454-4752 P - ISSN : 2454-4744
VOL 5 ISSUE 2 (2019) PAGES 4132 - 4136
RECEIVED : 02.02.2019 PUBLISHED : 01.03.2019
March 01,2019

DISCOVERY AND PUSH NOTIFICATION MECHANISMS FOR MOBILE CLOUD SERVICES IN CLOUD COMPUTING

[1]Vanitha. D, M.Phil, Research Scholar, K.M.G College Of Arts & Science, Gudiyattam.

[2]Prof. P.P.Vinodhini, Assistant Professor, Pg & Research Department Of Computer Science & Applications, K.M.G College Of Arts & Science, Gudiyattam.

Abstract:

Mobile cloud computing is an emerging technology to improve the quality of mobile services. Together with an explosive growth of the mobile applications and emerging of 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 obstacles related to the performance (e.g., battery life, storage, and bandwidth), environment (e.g., heterogeneity, scalability, and availability), and security (e.g., reliability and privacy) discussed in mobile computing. In this paper, we describe what is mobile cloud computing, including its scope, current developments, and research challenges This section lists some of the major issues in Mobile Cloud Computing. One of the key issues in mobile cloud computing is the end to end delay in servicing a request.. We had also seen the comparison between mobile cloud computing and the cloud computing, the architecture of mobile cloud computing and the developing areas and the application of mobile cloud computing.

Keywords— cloud computing; mobile cloud computing; architecture of mobile cloud computing; advantage; application.

1. INTRODUCTION

Mobile devices (e.g., Smartphone and tablet PC) 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 and Google apps), which run on the devices and/or 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 industry fields. 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. Cloud computing (CC) has been widely recognized as the next generation computing infrastructure. CC offers some advantages by allowing users to use infrastructure (e.g., servers, networks, and storages), platforms (e.g., middleware services and operating systems), and softwares (e.g., application programs) provided by cloud providers (e.g., Google, Amazon, and Salesforce) at low cost. In addition, CC enables users to elastically utilize resources in an on-demand fashion. As a result, mobile applications can be rapidly provisioned and released with the minimal management efforts or service provider‟s interactions. 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 CC into the mobile environment. MCC brings new types of services and facilities mobile users to take full advantages of CC. This paper presents a comprehensive survey on MCC .section 2 provides need of MCC and comparison between mobile cloud computing and cloud computing Section 3 provides a brief overview of MCC including architecture and its advantages. Section 4 discussed the use of MCC in various applications. Then, Section 5 presents several issues that arise in MCC and approaches to address the issues .And the concept of sky computing over MCC Next, the future research directions are outlined in Section 6. Finally, we summarize and conclude.

2. RELATED WORK

The case for mobile cloud computing can be argued by considering the unique advantages of empowered mobile computing, and a wide range of potential mobile cloud applications have been recognized in the literature. These applications fall into different areas such as image processing, natural language processing, sharing GPS, sharing Internet access, sensor data applications, querying, crowd computing and multimedia search. However, as explained in applications that involve distributed computation do have certain common characteristics, such as having data with easily detectable segment boundaries, and the time to recombine partial results into a complete result must also be small. An example is string matching/manipulation such as grep and word frequency counters. Cloud computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the data enters that provide those services"" [6]. A cluster of computer hardware and software that offer the services to the general public (probably for a price) makes up a „public cloud". Computing is therefore offered as a utility much like electricity, water, gas etc. where you only pay per use. For example, Amazon"s Elastic cloud,

However, cloud computing does not include „private clouds" which refer to data centres internal to an organization. Therefore, cloud computing can be defined as the aggregation of computing as a utility and software as a service. Virtualization of resources is a key requirement for a cloud provider—for it is needed by statistical multiplexing that is required for scalability of the cloud, and also to create the illusion of infinite resources to the cloud user. Ambrust et al. Holds the view that „„different utility computing offerings will be distinguished based on the level of abstraction presented to the programmer and the level of management of the resources"". To take an example from the existing cloud providers, an instance of Amazon"s EC2 is very much like a physical machine and gives the cloud user almost full control of the software stack with a thin API. This gives the user a lot of flexibility in coding; however it also means that Amazon has little automatic scalability and failover features. In contrast, Google"s App Engine enforces an API on the user but offers impressive automatic scalability and failover options. Microsoft"s Azure platform is something in between the aforementioned providers by giving the user some choice in the language and offers somewhat automatic scaling and failover functions. Each of the aforementioned providers has different options for virtualizing computation, storage and communication.

3. ARCHITECTURE

Mobile peer-to-peer network. Thus, the collective resources of the various mobile devices in the local vicinity, and other stationary devices too if available, will be utilized as shown in Fig. 2. This approach supports user mobility, and recognizes the potential of mobile clouds to do collective sensing as well. Peerto- peer systems such as SATIN for mobile self-organizing exist, but these are based on component model systems representing systems made up of interoperable local components rather than offloading jobs to local mobile resources. This paper focuses primarily on this latter type of work. The cloudlet concept proposed by Satyanarayanan is another approach to mobile cloud computing this

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approach where the mobile device offloads its workload to a local „cloudlet‟ comprised of several multi-core computers with connectivity to the remote cloud servers. PlugComputers8 can be considered good candidates for cloudlet servers because of their form factor, diversity and low power consumption. They Especially, Rudenko *et al* evaluates large-scale numerical computations and shows that up to 45% of energy consumption can be reduced for large matrix calculation. In addition, many mobile applications take advantages from task migration and remote processing. For example, offloading a compiler optimization for image processing can reduce 41% for energy consumption of a mobile device. Also, using memory arithmetic unit and interface (MAUI) to migrate mobile game components to servers in the cloud can save 27% of energy consumption for computer games and 45% for the chess game.

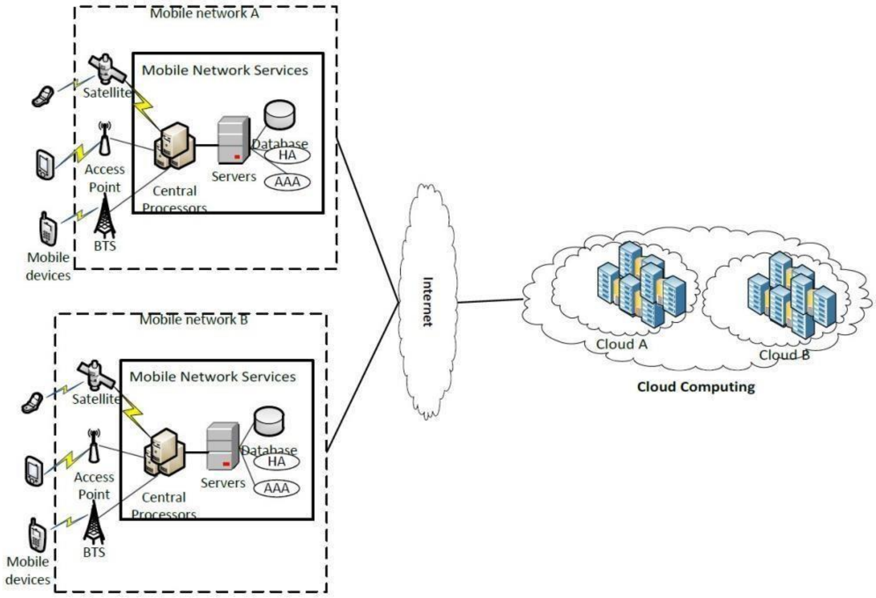

Fig.1.Architecture of MMC

have the same general architecture as a normal computer, but are less powerful, smaller, and less expensive, making them ideal for role small scale servers installed in the public infrastructure. These cloudlets would be situated in common areas such as coffee shops so that mobile devices can connect and function as a thin client to the cloudlet as opposed to a remote cloud server which would present latency and bandwidth issues. Mobile cloud computing would also be based under the basic cloud computing concepts. As discussed by Mei et al. There are certain requirements that need to be met in a cloud such as adaptability, scalability, availability and self-awareness. These are also valid requirements for mobile cloud computing. For example, a mobile computing cloud also needs to be aware of its availability and quality of service and enable diverse mobile computing entities to dynamically plug themselves in, depending on the requirements and workload. And in order for mobile users to efficiently take advantage of the cloud, a suitable method of self-assuming one‟s own quality is needed—since the internal status and the external environment is subject to change. However, in addition to the similar requirements, a mobile cloud needs to consider other aspects such as mobility, low connectivity and finite source of power as well.

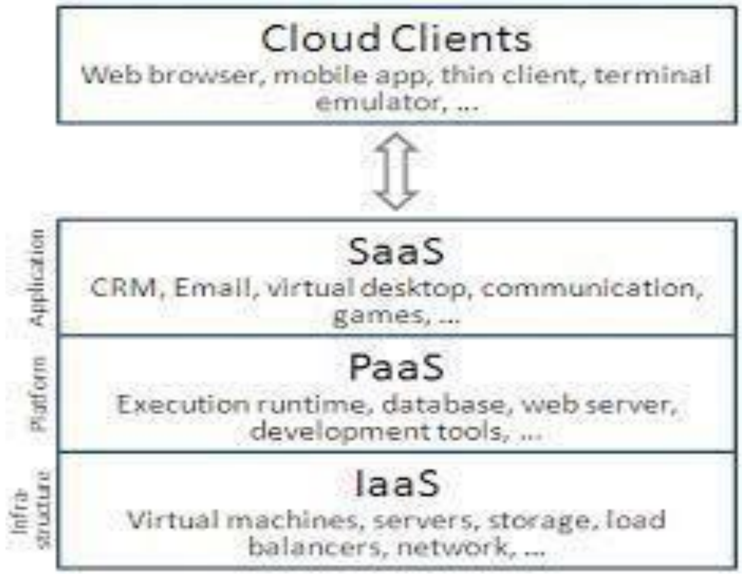

Fig.2.Server Oriented Architecture

4. ANALYSIS

Storage capacity is also a constraint for mobile devices. MCC is developed to enable mobile users to store/access the large data on the cloud through wireless networks. First example is the Amazon Simple Storage Service which supports file storage service. Another example is Image Exchange which utilizes the large storage space in clouds for mobile users . This mobile photo sharing service enables mobile users to upload images to the clouds immediately after capturing. Users may access all images from any devices. With the cloud, the users can save considerable amount of energy and storage space on their mobile devices because all images are sent and processed on the clouds. Flicker and ShoZu are also the successful mobile photo sharing applications based on MCC. Facebook is the most successful social network application today, and it is also a typical example of using cloud in sharing images. . Mobile cloud computing also helps in reducing the running cost for compute-intensive applications that take long time and large amount of energy when performed on the limitedresource devices. CC can efficiently support various tasks for data warehousing, managing and synchronizing multiple documents online. For example, clouds can be used for transcoding , playing chess , or broadcasting multimedia services to mobile devices. Storing data or running applications on clouds is an effective way to improve the reliability because the data and application are stored and backed up on a number of computers. This reduces the chance of data and application lost on the mobile devices. In addition, MCC can be designed as a comprehensive data security model for both service providers and users. For example, the cloud can be used to protect copyrighted digital contents (e.g., video, clip, and music) from being abused and unauthorized distribution. Also, the cloud can remotely provide to mobile users with security services such as virus scanning, malicious code detection, and authentication. Also, such cloud-based security services can make efficient use of the collected record from different users to improve the effectiveness of the services. Mobile learning (m-learning) is designed based on electronic learning (e-learning) and mobility. However, traditional m-learning applications have limitations in terms of high cost of devices and network, low network transmission rate, and limited educational resources. Cloud-based m-learning applications are introduced to solve these limitations. For example, utilizing a cloud with the large storage capacity and powerful processing ability, the applications provide learners with much richer services in terms of data (information) size, faster processing speed, and longer battery life. Zhao *et al.* presents the benefits of combining learning and CC to enhance the communication quality between students and teachers. In this case, smartphone software based on the open source Java ME UI framework and Jaber for clients is used. Through a web site built on Google Apps Engine, students communicate with their teachers at any time. Also, the teachers can obtain the information about student‟s knowledge level of the course and can answer students‟ questions in a timely manner. In addition, a contextual m-learning system based on Mobile Interaction in Augmented Reality Environment platform shows that a cloud-based m-learning system helps learners access learning resources remotely. Another example of MCC applications in learning is „Cornucopia‟ implemented for researches of under graduate genetics students and „plantations pathfinder‟ designed to supply information and provide a collaboration space for visitors when they visit the gardens. The purpose of the deployment of these applications is to help the students enhance their understanding about the appropriate design of MCC in supporting field experiences. An education tool is developed based on CC to create a course about image/video processing. Through mobile phones, learners can understand and compare different algorithms used in mobile applications (e.g., deblurring, demonizing, face detection, and image enhancement).

CONCLUSION

Mobile cloud computing is one of the mobile technology trends in the future because it combines the advantages of both MC and CC, thereby providing optimal services for mobile users. That traction will push the revenue of MCC to $5.2 billion. With this importance, this paper had provided an overview of MCC in which its definitions, architecture, and advantages have been presented. The applications supported by MCC including mcommerce, mlearning, and mobile healthcare have been discussed which clearly show the applicability of the MCC to a wide range of mobile services. Then, the issues and related approaches for MCC have been discussed. Finally, the future research directions have been outlined.

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