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A Survey on Mobile Cloud Computing

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ABSTRACT

The fast development of cloud computing and mobile computing trigger novel computing paradigm. Mobile Cloud Computing as one of the very important branches of cloud computing. According to today's situation there is a vast increasing usage of mobile computing, exploiting its difficult due to its inherent problems such as frequent disconnections, mobility, and resource scarcity. Mobile Cloud Computing provides mobile users with data storage and processing services on a cloud computing platform. In this paper, highlighting the specific concerns in mobile cloud computing. We provide an extensive survey of mobile cloud computing research.

Keywords : Mobile, Cloud Computing, Client–Server Communication

I. INTRODUCTION

In upcoming years, applications are ready to targeted at mobile devices have started becoming abundant with applications in various categories such as games, entertainment, health, games, business, social networking, health travel, news and social networking.

There are three basic models of mobile cloud service Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).

Infrastructure as a Service (IaaS): The IaaS provider supplies a range of services to accompany the infrastructure components like data center, including servers, storage and networking hardware. Infrastructure as a Service customers access resources and services through a wide area network (WAN).

Platform as a service (PaaS): PaaS is a category of cloud computing that provides a platform and environment to allow developers to build applications and services over the internet. PaaS services are hosted in the cloud and accessed by users simply via their web browser.

Software as a service (SaaS): Users are provided access to application software and databases. SaaS normally refers to a subscription based model where the software is hosted in the cloud and accessed via the internet.

II. 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. 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.

Aepona describes MCC 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. These centralized applications are then accessed over the wireless connection based on a thin native client or web browser on the mobile devices. Alternatively, MCC can be defined as a combination of mobile web and cloud computing, which is the most popular tool for mobile users to access applications and services on the Internet.

MCC provides mobile users with the data processing and storage services in clouds. 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 theclouds.

III. MOBILE CLOUD COMPUTING (MCC) ARCHITECTURE

From the concept of MCC, mobile devices are connected to the mobile networks via base stations (e.g., base transceiver station (BTS), access point, or satellite) that establish and control the connections (air links) and functional interfaces between the networks and mobile devices. Mobile users' requests and information (e.g., ID and location) are transmitted to the central processors that are connected to servers providing mobile network services.

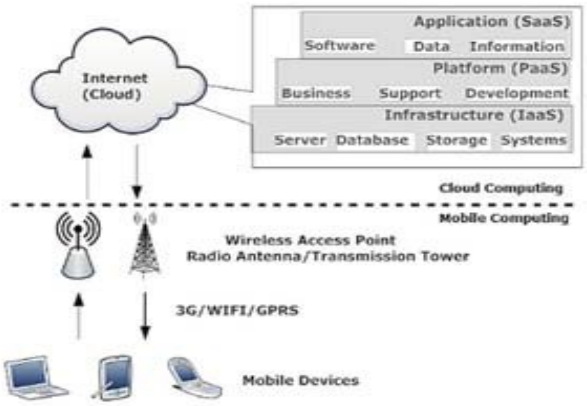

Figure 1: MCC ARCHITECTURE

Mobile network operators can provide services to mobile users as AAA (for authentication, authorization, and accounting) based on the home agent (HA) and subscribers' data stored in databases. After that, the subscribers' requests are delivered to a cloud through the Internet. In the cloud, cloud controllers process the requests to provide mobile users with the corresponding cloud services. These services are developed with the concepts of utility computing, virtualization, and service-oriented architecture (e.g., web, application, and database servers).

Now a days, both hardware and software of mobile devices get greater improvement than before, some smart phones such as phone 4S, Android serials, Windows Mobile serials and Blackberry, are no longer just traditional mobile phones with conversation, SMS, Email and website browser, but are daily necessities to users. Meanwhile, those smart phones include various sensing modules like navigation, optics, gravity, orientation, and so on. Which brings a convenient and intelligent mobile experience to users.

In 2010, Google CEO Eric Schmidt described mobile cloud computing in an interview that 'based on cloud computing service development, mobile phones will become increasingly complicated, and evolve to a portable super computer

IV. LITERATURE REVIEW

Problems in cloud computing are analyzed and uses open cloud computing federation which incorporates multiple CCSP"S (cloud computing service provider's) to provide a uniform resource interface. A new mechanism called MABOCCF (Mobile Agent Based Cloud Computing Federation) is proposed by Zehua et. al. which combines mobile agent with Cloud Computing to construct a cloud computing federation mechanism. This is used in

MABOCCF to ensure better compatibility. Chetan et. Al. proposes Cloud Computing techniques for storage and processing of data on mobile devices.

This paper addresses the issues and possible solutions related to Mobile Cloud Computing. It also describes the open source project for mobile cloud platforms called OPENMOBSTER and the services needed by mobile cloud client and server. To ensure security in mobile cloud platform, the paper proposes a new model of security where detection services can be moved to cloud. This architecture consists of three components such as Host agent (runs on each device and watches out the file activities on the system), Network Service (analyses the files sent by the host agent), and Caching (is a local, private and global shared cache The mobile devices are facing many challenges in their resources (e.g., battery life, storage, and bandwidth) and communications (e.g., mobility, privacy of data and security). The value and originality of cloud computing comes from packaging and offering resources in an economical, scalable and flexible manner that is affordable and attractive to IT customers and technology investors.

A user lends resources (software, storage, server, network) as needed, uses them, get a support of real-time scalability according to service load, and pays accordingly. On the other hand, mobile devices used in the mobile environment include personnel information and enable to provide the environment that collects a variety of context-aware information.

Hence, context-aware reasoning technique has been studied to provide a suitable service for user by using user context and personal profile information in mobile environment.

V. EXISTING WORKS ON MOBILE CLOUD COMPUTING

According to our definition of mobile cloud computing, there are two key issues: How to build up a mobile cloud using mobile devices and how to access services provided by clouds in a mobile way. Thus, existing work on mobile cloud computing can be classified as that based on the cloud platform, or that based on access schemes. For the former, we investigate existing work on mobile cloud platforms consisting of mobile devices.

VI. A TAXONOMY OF MOBILE CLOUD COMPUTING:

We present taxonomy of current approaches in mobile cloud computing research based on issues related to Operational, End user and Service levels, and also in areas of Security, Context awareness and Data management. Our criteria for defining the taxonomy are based on the key issues in mobile cloud computing, and how they have been tackled in academia. We focus on:

- Operational level issues
- End user level issues
- Service and application level issues
- Privacy, security and trust
- Context-awareness
- Data management

As the main areas. These issues at the top tier of the taxonomy are applicable to many areas, and not just mobile cloud computing. We believe these similarities would help give a comparison on how mobile cloud computing relates to other fields. Moreover, we expand each issue to highlight the unique set of challenges in mobile cloud computing, and how they have been tackled in existing work.

VII. OPERATIONAL ISSUES

Operational issues refer to underlying technological matters such as the method of offloading Computations, cost–benefit models

That aid in taking the decision to offload or not, how the mobility of devices is managed/supported, and connection protocols used.

Method of offloading:

The main operation in any mobile cloud would be the offloading of jobs that take place from the resource constrained mobile device to the cloud. Because of issues such as the physical distance separating the mobile device and the cloud and the heterogeneity of the underlying systems, different research has tackled this in a variety of ways. Current research discusses offloading methods in three main directions; Client–Server Communication methods, Virtualization, and Mobile agents.

Client–Server Communication:

In the Client–Server Communication process communication is done across the mobile device (offloader) and surrogate device via protocols such as Remote Procedure Calls (RPC), Remote Method Invocation (RMI) and Sockets. Both RPC and RMI have well supported APIs and are considered stable by developers. However, offloading through these two methods mean that services need to have been pre-installed in the participating devices.

This is a disadvantage when considering the ad hoc and mobile nature of a mobile cloud and restricts the mobility of users if in the vicinity of devices that do not support the needed services. Developers need to manually partition the applications by specifying which methods might be candidates for offloading. Spectra decide at runtime depending on the resource pool, which of those aforementioned methods, if any will be offloaded and to which surrogate.

VIII. CHALLENGES

Based on the related literature, we find that the following issues have not been sufficiently solved. These are the gaps in the reviewed work that would prove to be directions for future work.

Supporting continuous mobility while ensuring connectivity to the cloud:

While mobile devices connecting to remote cloud servers to run apps such as Google translate can connect while mobile, this depends on the user's 3G connection.

Even if the reception is sufficient, data costs and latency has a huge impact on these kinds of mobile cloud computing apps.

II. CONCLUSION

Mobile devices will be improved in terms of power, CPU, and storage. Mobile cloud computing has emerged as a new paradigm and extension of cloud computing. In this survey, terminologies and concepts are clarified, and a definition of mobile cloud computing is provided based on an understanding of underlying technologies and applications.

Mobile cloud computing could become the dominant model for mobile applications in the future. Firstly, immigrate task from terminal to loud be also a good way to achieve better results. Secondly, as we know the quality of communication in wired network is better than in wireless network, so reducing the proportion of data delivery in wireless environment is an effective way to improve the quality. Deploying an effective elastic application division mechanism is deemed to be the best solution to guarantee the application service in MCC; its complicated, but promising high impact results.

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