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Swot Analysis of Mobile Cloud Computing

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Abstract: Mobile Cloud Computing (MCC) has revolutionized the way in which mobile subscribers across the globe leverage services on the go. The mobile devices have evolved from mere devices that enabled voice calls only a few years back to smart devices that enable the user to access value added services anytime, anywhere. 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). *This paper explains about Mobile cloud computing and SWOT analysis of MCC. This analysis is useful for mobile providers.*

Index Terms: Mobile Cloud Computing, Cloud Computing

I. INTRODUCTION

Mobile devices (e.g., Smartphone, tablet Pcs, etc) 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, Google apps, etc), which run on the devices and/or on remote servers via wireless networks. The rapid progress of mobile computing (MC) [1] becomes a powerful trend in the development of IT technology as well as Commerce and 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) [2]. The limited resources significantly impede the improvement of service qualities. Cloud computing (CC) has been widely recognized as the next generation's 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 software (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 cloud computing into the mobile environment. Mobile cloud computing brings new types of services and facilities for mobile users to take full advantages of cloud computing.

II. OVERVIEW

(A) What is 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".

Mobile devices that access the Internet are performing mobile cloud computing: handsets need to borrow storage and computing power from the cloud because of their limited resources or because it makes more sense. For example, consider modern wireless car navigators, like the Dash: these devices not only can store locally the maps and calculate routes, but they rely on the cloud to get real time information about traffic conditions and plan the routes accordingly. Accessing data in the cloud from mobile devices is becoming a basic need.

Some of the key features are:

- We access the data anywhere and the data is available any device.
- Optimize tasks for using both on device and cloud computing.
- Enable previously impossible scenarios on mobile (offload computationally intensive tasks to the cloud).
- Mobile access to enterprise applications and data becomes easier.

(B) The Range of Mobile Devices

- Smart Phones
- Laptops, "Net-books", iPads
- Sensors
- Embedded Systems (e.g. RFID Readers, Biometric Readers, OnStar)
- Satellites

(C) Mobile cloud computing differ from other forms of cloud computing in Location of variable, Perishable user demand Answer-based, not document hit list-based services, More difficult to anticipate the need for a particular service ,Location-

aware and proximity-aware applications, and Small screen real estate and small physical interface make interaction is difficult.

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(D) Architectures of Mobile cloud computing

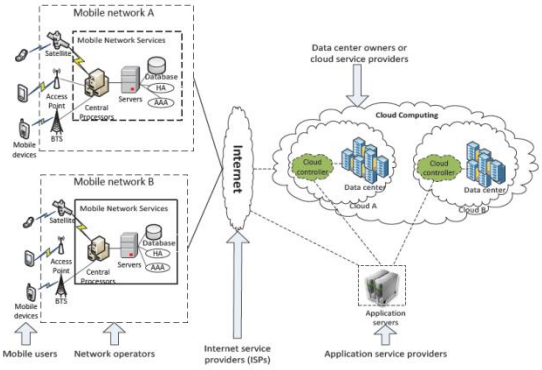

Fig.1. Mobile cloud computing architecture

From the concept of MCC, the general architecture of MCC can be shown in Fig.1. In Fig. 1 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. Here, 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).

(E) Types of MCC

Private Clouds: are typically owned by the respective enterprise and / or leased. Functionalities are not directly exposed to the customer, though in some cases services with cloud enhanced features may be offered – this is similar to (Cloud) Software as a Service from the customer point of view.
Example: eBay.
Public Clouds: Enterprises may use cloud functionality from others, respectively offer their own services to users outside of the company. Providing the user with the actual capability to exploit the cloud features for his / her own purposes also allows other enterprises to outsource their services to such cloud providers, thus reducing costs and effort to build up their own infrastructure. As noted in the context of cloud *types*, the scope of functionalities thereby may differ.
Example: Amazon, Google Apps, Windows Azure.
Hybrid Clouds:
Hybrid cloud computing is the combination of private cloud and public cloud computing. Hybrid offered in one of two ways: vendor has a private cloud and form a partnership with a public cloud provider, or a public cloud provider forms a partnership with a vendor that provides private cloud platforms.

(F) Delegation of MCC

Infrastructure as a Service (IaaS): IaaS is built on top of the data center layer. IaaS enables the provision of storage, hardware, servers and networking components. The client typically pays on a per-use basis. Thus, clients can save cost as the payment is only based on how much resource they really use. Infrastructure can be expanded or shrunk dynamically as needed. The examples of IaaS are Amazon EC2 (Elastic Cloud Computing) and S3 (Simple Storage Service).
Platform as a Service (PaaS): PaaS offers an advanced integrated environment for building, testing and deploying custom applications. The examples of PaaS are Google App Engine, Microsoft Azure, and Amazon Map Reduce/Simple Storage Service.
Software as a Service (SaaS): SaaS supports a software distribution with specific requirements. In this layer, the users can access an application and information remotely via the Internet and pay only for that they use. Salesforce is one of the pioneers in providing this service model. Microsoft's Live Mesh also allows sharing files and folders across multiple devices simultaneously

III. SWOT ANALYSIS

SWOT analysis is a strategic planning method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project.

(A) STRENGTH

Extending battery lifetime: Battery is one of the main concerns for mobile devices. Several solutions have been proposed to enhance the CPU performance [5], [6] and to manage the disk and screen in an intelligent manner [7], [8] to reduce power consumption improving data storage capacity, Computation *offloading technique* is proposed with the objective to migrate the large computations and complex processing from resource-limited devices (i.e., mobile devices) to resourceful machines (i.e., servers in clouds). This avoids taking a long application execution time on mobile devices which results in large amount of power consumption.
Processing power: 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 (Amazon S3) which supports file storage service.
Improving reliability: Storing data or running applications on clouds is an effective way to improve the reliability since 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 device
Scalability: The deployment of mobile applications can be performed and scaled to meet the unpredictable user demands due to flexible resource provisioning. Service providers can

easily add and expand an application and service without or with little constraint on the resource usage.

Multi-tenancy: Service providers (e.g., network operator and data center owner) can share the resources and costs to support a variety of applications and large number of users.

Ease of Integration: Multiple services from different service providers can be integrated easily through the cloud and the Internet to meet the users' demands.

Some of other Strength :

- Mobile cloud computing offers access to a wide range of applications on a need basis.
- It eliminates the need of being tied up to a single cell phone service provider.
- Mobile devices do not have sufficient storage capacity. Mobile cloud computing enables users to store/access large amounts of data in cloud. So, computing and storage will be in the cloud and the presentation of product and/or service will be on device.
- Running applications in the cloud is an effective way to improve reliability. When the mobile device is lost or destroyed, the data stored in cloud is preserved.
- Service providers can easily add and expand an application. Other benefits include mobile commerce, mobile learning, mobile healthcare, mobile gaming, photo sharing, keyword and video searching.
- Advanced reservation of resources.

(B) WEAKNEES

Resource-poor: Mobile devices are resource-poor compared to other client devices. Even as mobile devices continue to evolve and improve, basic mobile related properties such as weight, power and size will always put a limitation on computational resources such as processor speed, memory size, and storage capacity. In mobile cloud computing, mobile device needs to be able to cooperate with the cloud to overcome the resource limitation.

Network: Mobile network is characterized by lower bandwidths, higher error rates, and less reliable connections. Requirements on latency and delay are different per each application through mobile network.

Internet dependency: Although the quality of service rendered may be good network and internet outages are an issue with regards to continuous availability of the SaaS service.

Specificity: An organization that has a very specific computational need might not be able to find the application available through SaaS.

Vendor "Lock-in": A customer might pay a provider to use an application, but once they do, they may be unable to port that application to a new vendor or a hefty fee may be charged for the same.

Dependency: The customer is totally dependent on the know-how of the service provider and is limited by the capabilities of the service provider

Complexity: The company has to make the tough decision on how much can they afford to store their sensitive data at a physically distant location.

Integration: Even though most of the hardware is online, the firm would require a few components like printers, local network devices, etc, to be at the company premises. The integration of these devices with IaaS is cumbersome

(C) OPPORTUNITIES

Sensor Integration: Smartphone's are equipped with myriad of sensors. These sensors play a vital role in developing intelligent applications. The sensor will improve the applicability of Mobicloud.

Power and connectivity aware processing: Mobile devices have limited storage, processing power and connectivity. Applications can be made to make smarter use of the battery power and connectivity by dynamically changing the behavior of the application. This however, takes significant effort in programming. MobiCloud can automatically generate the required code to efficiently manage the communication. For example, it can store content locally when the connectivity is via 3G and the data size is large, and complete the transfer when Wi-Fi is available, thereby saving power and bandwidth.

Mobile cloud is an opportunity for free software providers: With so many new mobile devices hitting the market, billions of new users have the issue of freedom for the software on the device and freedom in the mobile cloud. The Free Software community has the opportunity to participate in the mobile cloud debate and shape this new environment.

Flexibility: Systems can be changed and modified without harm to the entire IT system.

Management: With IaaS offerings, IT management can be provided as part of the service for a much lower fee.

(D) THREATS

Integrity: It may be difficult to maintain the integrity of a database if it is too complex or changes too quickly

Open source software: If companies are inclined, they can put their open source applications on hardware that performs better and costs less than SaaS.

Security: The threat of security remains the topmost concern for service consumers of the internet for the data and applications.

IV. CURRENT MARKET ANALYSIS

According to a recent study by ABI Research, a New York-based firm, more than 240 million businesses will use cloud services through mobile devices by 2015. That traction will push the revenue of mobile cloud computing to $5.2 billion, and a recent study by the international Data Corporation(IDC)predicts that nearly 14 million new jobs will be created worldwide by 2015[9].

V. CONCLUSION

This article has provided an overview of mobile cloud computing (MCC) in which its definitions, architecture, and some features have been presented and by doing SWOT analysis it is concluded that the MCC users can get the optimal services.

REFERENCE

[1] M. Satyanarayanan, "Mobile computing: the next decade," in Proceedings of the 1st ACM Workshop on Mobile Cloud Computing & Services: Social Networks and Beyond (MCS), June 2010.
[2] M. Satyanarayanan, "Fundamental challenges in mobile computing," in Proceedings of the 5th annual ACM symposium on Principles of distributed computing, pp. 1-7, May 1996.
[3] http://www.smartdevelopments.org/?p=8
[4]http://www.readwriteweb.com/archive/why_cloud_computing_is_the_future_of_mobile.php
[5] R. Kakerow, "Low power design methodologies for mobile communication," in Proceedings of IEEE International Conference on
Computer Design: VLSI in Computers and Processors, pp. 8, January 2003.
[6] L. D. Paulson, "Low-Power Chips for High-Powered Handhelds," IEEE Computer Society Magazine, vol. 36, no. 1, pp. 21, January
2003.
[7] J. W. Davis, "Power benchmark strategy for systems employing power management," in Proceedings of the IEEE International
Symposium on Electronics and the Environment, pp. 117, August 2002.
[8] R. N. Mayo and P. Ranganathan, "Energy Consumption in Mobile Devices: Why Future Systems Need RequirementsAware Energy
Scale-Down," in Proceedings of the Workshop on Power-Aware Computing Systems, October 2003
[9]Times of India –march 20-2013