Mobile Cloud Computing and Issues - A Survey

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Abstract— Together with rapid growth in mobile applications and cloud computing technology, mobile cloud computing has been introduced to be a potential technology for mobile services. In this paper, we present a survey of mobile cloud computing research, highlighting the specific issues in mobile cloud computing. This Paper gives brief introduction of Mobile Cloud Computing and its architecture. It also discusses various different issues in different aspects of Mobile Cloud Computing.

Index Terms— Bandwidth, Cloud Computing, Mobile Cloud, Cloud Computing Issues, Mobile, Mobile Application, Mobile Communication.

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1 INTRODUCTION

The word mobility has become very popular in the world of computing. There has also been a rise in development and sales of mobile devices like smart phones, tablets etc. supporting different kinds of mobile computing and networking technologies.

This brings us to the question of what is mobile cloud computing? Mobile cloud computing (MCC) is introduced as an integration of cloud computing into the mobile environment. "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.

On one hand, the mobile cloud computing is a development of mobile computing, and an extension to cloud computing. In mobile cloud computing, the previous mobile device-based intensive computing, data storage and mass information processing have been transferred to 'cloud' and thus the requirements of mobile devices in computing capability and resources have been reduced, so the developing, running, deploying and using mode of mobile applications have been totally changed. On the other hand, the terminals which people used to access and acquire cloud services are suitable for mobile devices like Smartphone, PDA, Tablet, and iPad but not restricted to fixed devices (such as PC), which reflects the advantages and original intention of cloud computing. Therefore, from both aspects of mobile computing and cloud computing, the mobile cloud computing is a combination of the two technologies, a development of distributed, grid and centralized algorithms, and have broad prospects for application.

As shown in the Fig., mobile cloud computing can be simply divided into mobile computing and cloud computing. The mobile devices can be smart phones, laptops or PDA"s, that are connected to a network through 3G, WIFI or GPRS. Mobile users can send requests to the cloud through web browser and the resources are allocated to the established connection. After the web application is started, the monitoring and calculating functions of the system will be implemented to guarantee that

the QoS is maintained until the connection is completed. This includes accomplishing tasks like sending response rapidly, synchronizing and load balancing to ensure that the resources are allocated to the appropriate clients.
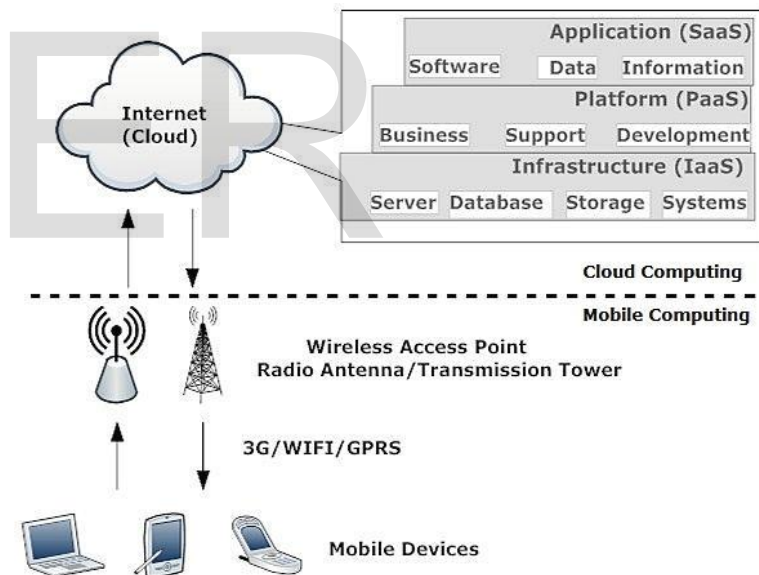
2 ISSUES IN MOBILE CLOUD COMPUTING

2.1 Mobile Communication Issues

1. Low Bandwidth: Bandwidth allocation is a concern due to increase in number of mobile users. 4G network and femtocell technologies are used to overcome low bandwidth.

2. Limited Resources: Having limited resources in mobile device make use of cloud computing in mobile devices difficult. In order to overcome this limitation of mobile devices, resources are added to the cloud infrastructure and can be used anytime on requirement, providing a seamless user experience for advanced applications.

2.2 Network Issues

1. **Inherent issues of Wireless Network:** wireless connectivity is characterized by variable data rates, less throughput, longer latency and intermittent connectivity due to gaps in coverage.

2. **Network Access Schemes:** Mobile world has heterogeneous access scenario with their own schemes and policies. Due to the existence of different access schemes we need seamless connection handover schemes when we move from one network access point to another network access point.

3. **Connection Handover:** Currently executing application is terminated or returns error when we move from one access point of network to another access point of network or we move from Wi-Fi network to 3G-based cellular network due to occurrence of communication failure and connection reestablishment situation.

2.3 Security Issues

1. **Information Security:** Since cloud computing basically deals with data storage and its processing so security is of paramount importance. Now days various cloud platforms offer robust built-in security measures. Some common information security issues of cloud computing like:
   a. System Security of Server and Database
   b. Networking Security
   c. User Authentication
   d. Data Protection
   e. System and Storage Protection

2. **Privacy and Data Security:** There are various policies and schemes (such as Fair Information Practice Principles (FIPP)) being proposed which require rigorous controls and procedures to protect the privacy of individuals. Data security is the one of the major issue which is main obstacle for the users to move their data to the cloud. Some common data concerns in the cloud are:
   a. Data theft risk
   b. Privacy of data belongs to customers
   c. Violation of privacy rights
   d. Loss of physical security
   e. Handling of encryption and decryption keys
   f. Security and auditing issues of virtual machines

   In addition to the data security threats on cloud side, there are some attacks which are possible at end user mobile device as well.
   a. Device Data Theft
   b. Virus and Malware Attacks via Wireless Devices
   c. Mis-use of Access Rights

3. **Compliance and Enforcement:** For now there is no formal set of standards that should be followed for events and policies of cloud computing implementation. It may be difficult or unrealistic to use public clouds if our data is subjected to legal restrictions or regulatory compliance.

2.4 Cloud Service Delivery Models Issues

The cloud computing service delivery model has its own issues which are highlighted below-
   IaaS model security issues:
   a. Virtual Machine Security
   b. Virtual Machines images repository security
   c. Virtual network security

PaaS model security issues:
   a. Structured Query Language related
   b. Application Programming Interface Security

SaaS model security issues:
   a. Data Security Management
   b. Web Application Vulnerability and Scanning

2.5 Mobile Applications Issues

1. Interoperability: It's possible that there is an assorted mix of mobile devices including iPhone, Android phones, BlackBerry and others being used by employees in an organization or a group of people sharing a network. And in such situation according to the nature of cloud applications being used and operating system of mobile device interoperability issue can prove to be a major challenge in pulling/ pushing data across multiple devices.

2. Mobile Cloud Convergence: In order to achieve advantage of mobility by integrating cloud computing to mobile world, Data distribution is the key issue. Mobile cloud convergence provides performance improvement, longer battery life, and a solution to the computation power problem.

2.6 Other Issues

1. **Quality of Service**: When a mobile user need to access any services or resources then he need to request to servers located in a cloud. Inthis case, the mobile users may face some issues such as congestion due to wireless bandwidths, network

   Disconnection, and the signal attenuation caused by mobile users' mobility.

2. **Utilize Multiple Clouds in a Unified Fashion**: Mobile Cloud computing needs to find out some potential solu-

tion for service convergence, that is which helps to enable provider to support a cross-cloud communication and allow users to implement mobile services and applications.

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3. CONCLUSION

Mobile cloud computing aims to empower the mobile user by providing a seamless and rich functionality, regardless of the resource limitations of mobile devices. This paper present an overview of mobile cloud computing in with its definition, and architecture. We have given a survey of current mobile cloud computing research in this paper. Mainly it discuss about the various issues in different aspects of Mobile Cloud Computing.

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