

A survey paper on Mobile Cloud Computing Architecture, Challenges and Security Threats

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Abstract- Mobile cloud computing is the combination of both cloud computing and mobile networks to bring benefits for mobile users, network operator, as well as the cloud computing providers. The main issues to be dealt with stem from three essential properties of mobile computing: Communication, Mobility and Portability. Since the technology has been changing day by day and communication and mobile networks application has been increased. Mobile network and its data growth and the use of smart phones are creating extraordinary challenges for wireless service providers to conquer a global bandwidth shortage. The latest trend over mobile cloud computing are the IOT approaches, main-frame bases computed, Mobile cyber security, small businesses developing software apps. Through on this paper, we will study the architecture, analytical view on challenges and threats comprises from the security issues.

Keyword – Mobile Cloud Computing, Mobile Computing, MCC Architecture and Challenges, Security Threats of Mobile Computing.

1.INTRODUCTION - Mobile cloud computing is an on-demand real-time resource service which provides to mobile users, using a wireless network. Cloud computing provides various services such as Software as a service (SaaS), Infrastructure as a service (IaaS), Platform as a service (PaaS). The main agenda of using mobile cloud computing is to protect data, applications and its infrastructure. Mobile data offloading is a major concern nowadays in communication of data transfer. The comparison among the generations are far away discussed which specifies that the technologies are changing day by day in terms of communication whereas the growth of mobile network applications are increasing too. Which is creating huge challenges for wireless services to

avoid the ultra-high bandwidth shortage. The next generation of communication network with 5G, will successfully be the very first network environment to overcome the same infrastructure of wired and wireless communication system. It will provide virtually ubiquitous, ultra-high bandwidth, “connectivity” not only to the individual users but also to connect objects.

A. Mobile Cloud Computing

‘Mobile cloud computing at its simplest, refers to an infrastructure where both the data storage and 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 MC to not just smartphone users but a much broader range of mobile subscribers’[1]

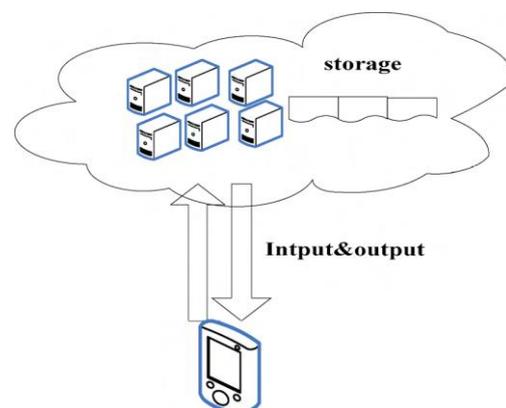


Fig.1: The basic model of Mobile Cloud Computing

II. ARCHITECTURE OF MCC – The operators of mobile network can provide services such as authentication, authorization, and the calculation of data for subscribers and home agents. The data are transferred to the cloud via the Internet service for the subscribers. Cloud controllers will manage the requests and provide the services accordingly. [3] The architecture of mobile cloud computing mainly consist of three layers and they are:

- Presentation layer
- Application Layer
- Database Layer

When we conventionally talk about layers, presentation layer is the layer which is basically use for user interaction with the server whereas application layer consists various business logic through different service providers and Database layer stores the data and mobile communication functionality. It allows a mobile user to initiate transactions from anywhere and anytime which guarantees their consistency preserving execution. The Database layer also provides security, device appliances etc. The database present in this layer is used for proving backup to the users in case of any loss or damage.[4][5]

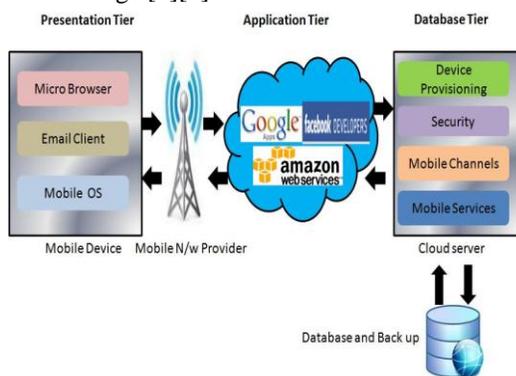


Fig.2:Mobile Cloud Computing Architecture

A. *Presentation Layer* – In mobile cloud computing architecture, presentation layer consists following components:

1) *Micro-browser:* A mobile browser , also called a micro-browser, mini-browser or wireless internet browser (WIB), which is designed for mobile devices such as a mobile phone or PDA.

Mobile browsers are optimized so as to display web content most effectively for small screens on portable devices.

2) *Email Client:* An application which is specifically designed to access remote mail servers, retrieve mails and manipulate them. Popular examples of email clients are Microsoft Outlook, Thunderbird (which is easier to operate, makes email better for user, secure the data) and Eudora.

3) *Mobile OS:* A Mobile operating system, which is also known as a Mobile platform, that controls handheld devices—similar in principle to an operating system such as Linux or Windows that controls mobile subscriber. Database not only stores user’s data instead they provide a desktop computer or laptop.

B. *Application Layer* – These layer basically focuses on various services provided by a group of service providers like SaaS , IaaS , PaaS .Which allows the user to perform their task of computing as per the user has no authority to handle the backend processes in the cloud infrastructure. Some of the important cloud service providers are Google Apps, Amazon webservices , facebook developers , IBM, Windows azure etc.[4]

C. *Database Layer* –In Mobile Cloud Computing, When we combine the concept of cloud computing in mobile environment both the data storage and the data processing occurs outside the mobile device. Here, scenario of all the computing power and data storage move into the mobile cloud. They not only provide benefits to the smart phone users but also helps them in broader range of them back up facilities.[4]

III. CHALLENGES

The cloud allows user to swap devices and retain to access the information, which makes the cloud apps to cover whole cross-device mobile infrastructure.[6] Communication networks creates several complex challenges such as mobile computation offloading, seamless connectivity, long WAN latency, Mobility management , Context-processing, Energy constraint, security and privacy.[7]



The following sections will present the issues which are mainly linked up in mobile communication. [5]

A. Resource poverty of devices –The mobile devices have very low capacity in terms of computational power, storage, limited battery power and poor visibility in comparison to a computer. Nevertheless, security, privacy, reliability and handling issues need to take into consideration the issue of cost of energy as well.

B. Network Bandwidth –The networks that are wireless are aligned with low bandwidth, intermittent, and less-reliable transmission space compared to networks that are wired.

C. Network Availability– They should ensure that there is fast and continuous Internet connectivity. The mobile device should always be linked to the cloud from any place and time that the user needs to be in the fold. A new technology that offers a solution for data caching utilizing a mobile device is the HTML5; this lets the cloud application to continue performing even if there is some interruption in the connection.

D. Computer Offloading –One of the key features of MCC is offloading which increases battery life and improves performance of the applications.

E. Heterogeneity –It is used in highly heterogeneous networks based on the interfaces on the wireless network.

F. Data Access Efficiency –Data access is an important element in cloud computing as the cloud services quantity is increasing on a daily basis. There are major concerns regarding how to manipulate the data resources on the cloud with the resource limitations, low bandwidth and mobile devices mobility.

G. Data Ownership –The issues are derived from the knowledge that cloud is connected to the purchased digital media ownership. This gives rise to the issue of true ownership of the concerned files. When a given service is utilized to buy the media and is kept remotely, there is a potential of losing access of the bought media.

H. Security and privacy –The boundary of the security aspects realizes the hidden parts in the security of the mobile app models in the cloud environment. These security aspects involve issues related to data security, data integrity, identity privacy, location privacy, risk management, authentication, secure routing.

IV. SECURITY IN MOBILE CLOUD COMPUTING

Since Security issues in cloud computing are shown to be the biggest obstacle that could lower the wide benefits of the cloud systems. [8]

A. Types of Security

1) Data Storage Security -The cloud has different architecture based on the services they provided. In cloud computing, customers store their data in the cloud and no longer possess the data locally. Data security protection cannot be directly adopted due to users' loss of control of data under cloud computing. Therefore, verification of correct data storage in the cloud must be conducted without explicit knowledge of the whole data. Secondly, cloud computing is not just a third party data warehouse. The data stored in the cloud may be frequently updated by the users, including insertion, deletion, modification, appending, reordering, etc. To ensure storage correctness under dynamic data update is hence of paramount importance.

2) Data Transmission Security -Internet is communication infrastructure for cloud providers to transfer their data. Providing secure and efficient transmission of data is an important component of cloud computing and forms the foundation for information management and other operations.

3) Application Security - Application security is the use of software, hardware, and procedural methods to protect applications from external threats. Security is becoming an increasingly important concern during development, as applications become more frequently accessible over networks and are, as a result, vulnerable to a wide variety of threats. Some of the required security on this layer are as follows:

- Low and High level confidentiality,
- Server and Client Authentication,
- Creation of Security Domain,
- Cryptographic Separation of Data, and



- Certificate-Based Authorization.

*B.Security Issues:*In these cloud environment , security has to be maintained in two tiers : the physical host security and the virtual machine security. [10]

1)Instance Isolation: Isolation ensuring that different instances running on the same physical machine are isolated from each other. Virtualization efficiencies in the cloud require virtual machines from multiple organizations to be co-located on the same physical resources.

2)Host Operating System: Administrators with a business need to access the management plans are required to use multi-factor authentication to gain access to purpose-built administration hosts. These administrative hosts are systems that are specifically designed, built,

administrative control over accounts, services and applications.

V.THREATS

Securing computer networks and data center that has never been an easy task. Shared on-demand nature of cloud computing makes it an even more challenging job. Selecting an appropriate security procedure requires correct judgment of the threat environment[11]configured, and hardened to protect the management plane of the cloud.

Guest Operating System: Virtual instances are completely controlled by the customer. Customers have full root access or administrative control over accounts, services and applications.

Security threats are categorized into following ways:

- Data Control
- Account Control
- Multitenancy Issue
- Malicious Insiders
- Management Control Security

VI CONCLUSION – However, we adopt the cloud-based technologies so deeply that even the lack of security of our data isn't affecting us anymore. Through this paper we get to know about the architecture of mobile cloud computing in brief. The challenges that the cloud environment is facing is much more recognizable. The access and management of storing data getting improve. Encrypting the data and storing it on virtual cloud Infrastructure as a Service (IaaS).

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