

AN OVERVIEW ON MOBILE CLOUD COMPUTING

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Abstract - Given the advances in mobile telephones, users start to consider a mobile phone a personal information processing tool. So users wanted various operations be performed on the top of mobile devices. Researchers have long acknowledged that mobile hardware is necessarily resource-poor on static client and server hardware. Mobile cloud computing (MCC) Which combines mobile computing and cloud computing is a good result for this problem and has become one of the industry buzz words and a major discussion topic since 2009. This paper presents a review of the background, security and open issues in mobile cloud computing.

Key Words: mobile cloud computing, partitioning, augmentation.

1. INTRODUCTION

The increasing use of mobile phones is clear from the study from Juniper Research, which states that the consumer and enterprise market for cloud-based mobile applications expected to increase to \$9.5 billion by 2014. In recent years, applications targeted at mobile devices have started becoming abundant with applications in various categories such as amusement, social networking, travel, health, games, business and news. The popularity in the mobile computing are clear by browsing through mobile app download centers such as Apple's iTunes or Nokia's Ovi suite. The ground for the mobile cloud computing is that mobile computing is able to offer a tool to the user when and where it is a needed irrespective of user movement, hence supporting location independence. Indeed, 'mobility' is one of the important features of a permeating computing environment where the user is able to continue his/her work flawless careless of his/her cause. These place the problem of executing many useful programs that could aid the user and create a pervasive environment. According to Tim O'Reilly 'the future of mobility belongs to services that respond in real-time to information that are supplied either by nonhuman sensors or by their users. Real time application demands intensive computing resources to one character of mobile applications that demand high levels of reactivity. Location-based social networking process in mobile applications makes use of the phone's various sensor data. Nevertheless, extensive use of sensors, such as obtaining a GPS reading, is expensive in terms of energy and this limits the mobile phone in providing the user a better service through its embedded sensors. Furthermore, consider applications that call for extensive processing -

image processing for video games, speech synthesis, natural language processing, augmented reality, wearable computing-all these demand high computational capacities thus restricting the developers in implementing applications for mobile telephone sets. problems will be solved in the future by considering the trends in mobile phone architecture and battery. This is, in fact, not merely a temporary technological deficiency, but intrinsic to mobility, and a barrier that needs to overcome to actualized the full potential of mobile computing. [2].

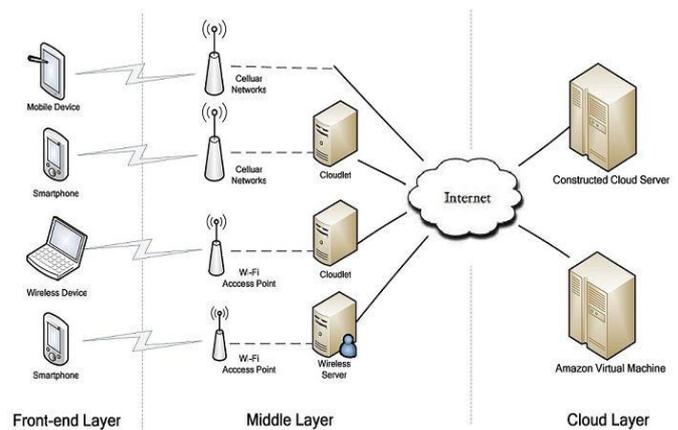


Fig:1 Mobile cloud computing architecture

2. MOBILE CLOUD COMPUTING BACKGROUND

Today, both hardware and software of mobile devices get more capital improvements than before, some smart phones such as I Phones, Android serials, window mobile phones and blackberry, are no longer just traditional mobile phones with the conversation, SMS, Email and website browser, but are daily necessities to the user. Still, at any given cost and level of technology, considerations such as weight, size, battery life, ergonomics and heat dissipation exact a severe penalty in computational resources such as processor speed, storage size, and disk capacity. Thus, three approaches are aimed for mobile cloud applications:

1. Extending out the access to cloud services to mobile devices. In this approach users use mobile devices often through web browsers, to use software/applications as services extended by cloud. The mobile cloud is most often viewed as a Software-as-a-service (SaaS) Cloud and all the computation and data treatment are usually performed in the swarm.

2. Enabling mobile devices to act collaboratively as cloud resource providers. This approach makes use of the resource at personal mobile devices to give a virtual mobile cloud, which is useful in an ad hoc networking environment without function of internet cloud.

3. Portable devices using cloud resources are augmented by the execution of mobile applications. This attack uses the cloud storage and processing for applications working on mobile devices. The mobile cloud is thought as an Infrastructure-as-a-Service (IaaS) or Platform-as-a-Service (PaaS) cloud. In this partial offloading of computation and data warehousing is done to cloud from the mobile devices [1].

services. These services originated based on the concepts of utility computing, virtualization and service-oriented architecture. The major use of a cloud computing system is storing data in the cloud and using technology on the client to use that data. Various business models rapidly evolved to harness this technology by providing software applications, programming platforms, data-storage, computing infrastructure and hardware as services. [3]

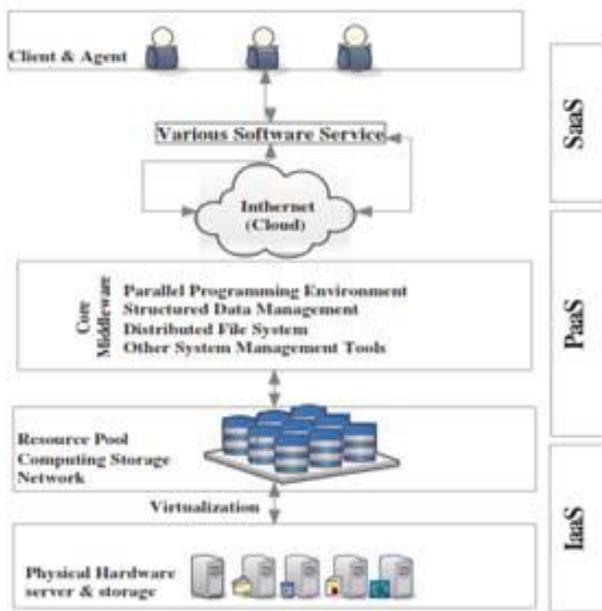


Fig:2 Cloud Computing Framework

3. ARCHITECTURE

With mobile cloud computing, mobile network and cloud computing joined, thereby providing an ideal service for mobile customers. Cloud computing exists when tasks and data retained on each device. Applications run on a remote server and then shipped to the client. Here the mobile devices connect to the mobile networks through the base stations; they will set up and manipulate the connections (air interface) And functional interfaces between the mobile networks and fluid devices. Mobile users send service requests to the cloud through a WWW browser or desktop application. The information is transmitted to the central processors that tied to the servers providing mobile network services. Here, services like AAA (Authentication, Authorization and Accounting) can store subscriber data in databases and can offer the users based on Home Agent (HA). The request of the subscriber is then saved to the internet. Cloud controllers present in the cloud, provides the request to the mobile users with the corresponding cloud

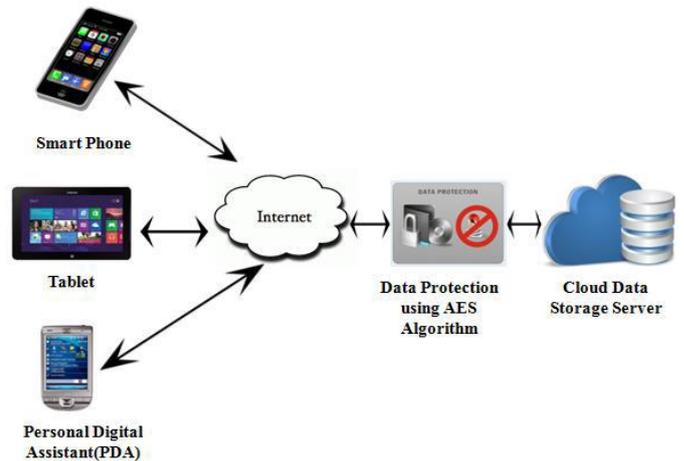


Fig:3 Mobile Cloud Computing Architecture

4. SECURITY ISSUES

Many sources have presented classifications of security issues in communication networks. There are five central goals of security of information system.

- Confidentiality: preventing unauthorized users from gaining admission to critical information of any particular user.
- Integrity: Ensures unauthorized change, destruction or creation of information cannot take space.
- Availability: Ensuring authorized users getting the access they need.
- Legitimate: Ensuring that only authorized users receive access to services.
- Accountability: Ensuring that the users are held responsible for their security related activities by arranging the user and his/her body processes linked if and when necessary. The way these goals achieved depends on the security policy adopted by the service providers.[4]

5. SECURITY COUNTERMEASURES

Secure mobile computing is critical in evolution any application of wireless networks.

5.1 Security Requirements

Similar to traditional networks, the goals of securing mobile computing can be delimited by the following attributes: availability, confidentiality, integrity, authenticity and non-repudiation.

- **Availability:** ensures that the intended network services are available when the intended parties required.
- **Confidentiality:** ensures that the intended receivers can use the data and is never revealed to unauthorized entities.
- **Authenticity:** allows a user to find out identity of the entity it is communicating with. Without certification, an adversary can masquerade a legitimate user, thus gaining unauthorized access to resources and sensitive information and interfering with operation of users.
- **Integrity:** guarantees that data is never corrupted during transmission. But the authorized parties can change it.
- **Non-repudiation:** ensures that an entity can prove the transmission or reception of information from another entity, i.e., a sender/receiver cannot falsely deny having received or sent certain data. [4]

6. OPEN ISSUES IN MOBILE CLOUD COMPUTING

There are some issues occurred while implementing the cloud computing for mobile. These topics can be related to networking, related to limited resources, related to security of mobile users and clouds. Some subjects explained as follows:

- **LIMITED RESOURCES:** having limited resources in mobile devices makes use of cloud computing in mobile devices difficult. Basic limitations related to limited computing power, limited resources, limited battery, and low of quality display.
- **NETWORK RELATED ISSUES:** All processing in MCC performed along the network. Thus there are some issues related to the network like bandwidth, latency, availability and heterogeneity.
- **SECURITY:** Mobile devices also have to face a number of troubles related to security and privacy. To master this problem threat detection services is now performed at the clouds, but this also has to face many challenges. There are so many security threats like, hacking, viruses, Trojan horses in mobile devices also. The role of global positioning

system (GPS) in mobile devices gives birth to the privacy issues.

- **LOW BANDWIDTH:** Bandwidth is one of the big events at MCC since the radio resource for wireless networks is much scarce as compared with the traditional wired networks.
- **AVAILABILITY:** In MCC service availability becomes more important issue than that in the cloud computing with wired networks. Mobile phone users may not be able to link up to the cloud to get service due to network failures, traffic congestion and the out-of-signal. [5]

7. CONCLUSION

Mobile Cloud Computing is one of the technology trends in the fourth coming process as it unites the advantages of both cloud computing and mobile computing, and hence providing optimal services. MCC offers more possibilities for access services in a convenient way. It is anticipated that after some more years the number of mobile users will be using cloud computing on their mobile devices. This report has provided an overview of mobile cloud computing in which its definitions, architecture, existing work application, advantages and challenges have presented. [5]

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