A SURVEY ON ARCHITECTURE APPLICATIONS &CHALLENGES ON MOBILE CLOUD COMPUTING

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ABSTRACT

The usage of mobile technology has been vast in recent years due to its simplicity, location independence and built in applications. The performance and speed of mobile computing is considerably less when compared to the computers and powerful servers due its limited resources and compatibility issues.Inorder to overcome these obstacles and to make efficient usage of mobile technology the Cloud based Mobile Augmentation (CMA) a latest technique is adopted to increase the storage capacity, resource availability and computational capability of the wireless devices. This led to the development of the latest technology in computer field which addresses all the novel issues in mobile computing known as MOBILE CLOUD COMPUTING (MCC).In this paper let us have a brief survey on MCC which includes the architecture, applications, challenges ,and its future research .

Keywords— Mobile Cloud Computing, compatibility issues, storage capacity, limited resource, cloud based mobile augmentation

INTRODUCTION

Mobile cloud computing is a recent emerging technology in computer field. It is the integration of two major fields namely the mobile computing and cloud computing. Mobile computing is the process of operating many applications via mobile devices whereas cloud computing is the computational process via cloud or internet by provisioning the resources on demand and pay per use. The emergence of MCC has been proposed in order to overcome the major drawbacks in using mobile devices such as capacity, storage, computational speed, limited bandwidth, lifetime, and latency.

MCC provides the solutions for these novel cons of the mobile computation. Despite of the large drawbacks in using mobile devices such as usage of smart phones need to be charged on daily basis and access to the resource-intensive applications can be

done only on computers rather than mobile devices, mobile node plays a vital role in every person's day to day life because of its ease of use and its nature of portability and mobility. According to a recent survey mobile data traffic has been 66.5 % and it is likely to be increased in consequent years.

Cloud computing is the technology that has been emerging from 2009 and it provides services on demand or pay per use. It is just like electricity, and water connection in household activities in which we pay according to our usage. The cloud computing provides application, hardware and software as service through virtualization technique.

Mobile computational devices makes use of cloud computing by using its vast services and overcomes its storage capacity, battery life, and resource scarcity even the computational speed could be attained by using cloud services via mobile phones. Cloud services could be easily used in any device that has an internet connection. Though, there arose many security and privacy issues while using CC which led to the business users to avoid the implementation of MCC for business needs. Since the transmission of data's and information's between mobile and cloud are open air it is more prone to malicious attacks than in wired devices and also the bandwidth is reduced and latency is increased in wireless devices.

The following contents of this paper will discuss about the architecture, applications, security and privacy issues in the mobile cloud computing (MCC) in detail and we conclude this paper with their future works.

A. Advantages of mcc

The major advantages that are vastly discussed in MCC are as follows

- long life battery
- increased data storage and computational power
- reliability
- scalability
- multi-tenancy
- high integration capacity

ARCHITECTURE OF MOBILE CLOUD

The general architecture of mobile cloud computing is given in Fig 1 it depicts the general architecture of mobile cloud computing .It encompasses four broad areas namely

- Mobile device
- access points
- mobile network
- cloud area.

In this architecture the mobile devices requests are submitted to the mobile network centers via mobile access points (i.e. base stations, satellites etc.).The mobile network consists of servers and central processors. The request from mobile devices are processed using their home agents and services are provided such as Authentication,Authorization,Accounting depicted as (AAA).
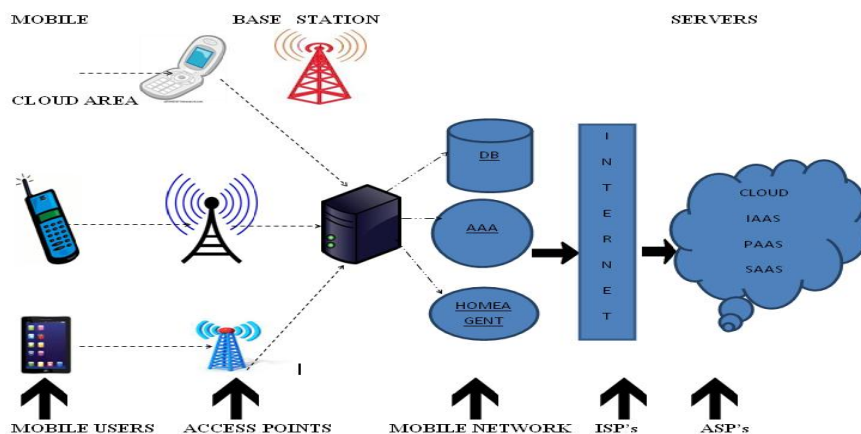

FIG.1 GENERAL MOBILE CLOUD ARCHITECTURE

APPLICATION OF MOBILE CLOUD

The mobile applications are widely in use nowadays due to their increased global market. The need for mobile cloud computing has been in demand in various areas which we discuss as follows;

A. Image processing

In this area OCR[26] optical character recognition is discussed which is a technique used to capture an image and to translate the wordings on those image into local native language which a person could understand. This has been very useful for foreign travellers who want to know histories of the places he is visiting.

B. Natural language processing

The MCC gets the foreign language from the user which loads on to the apps as discussed in previous application [26] ,in the mobile device and checks for the resource needed for processing the foreign language to the local language. If there is a resource scarcity, low computation then the mobile gets connected to the cloud gets the services on demand and it accomplishes the job.

C. Crowd computing

This area helps in fields where someone is lost in a crowd and they can be easily tracked using the MCC applications[27]. Gathering lot of video clips and recordings from various mobile users in different perspectives and angles and constructing it into a single entire event is the concept over here[28].

D. Multimedia usage

The music, video songs, and other various multimedia applications can be easily shared among different mobile phones using the mobile cloud[27].

E. Mobile commerce

It is an application called as m-commerce which is used to do ticket booking, shopping, mobile transaction, mobile messaging via mobile devices.[16]

F. Mobile learning

It is also called as m-learning where we could read and access all sorts of books via cloud at a high speed and to learn things [29][30].

G. Mobile health care

Here the mobile devices produces all health related information such as monitoring the health conditions like checking BMI ,blood pressure, sugar level etc. and also activating emergency management, patient records and history management[31][32].

H. Mobile gaming

Popularly known as m-gaming, they render services in cloud for gaming by offloading[17] the game engine it is given in the paper[10].

I. Mobile locating service

It is generally used for locating the customers in various geographical locations and to track them via cloud.

J. Mobile searching services

Mobile searching using cloud performs the searching activity on three basis which makes MCC most effective tool for accessing information. The three types of searches are key based search,[11][12] voice based search[13][14], tag based search[15]. These are useful in social networking sites for the users to search for data.

ISSUES IN MOBILE CLOUD

The recent issues in mobile cloud environment can be classified in to five major levels which are as follows:

- computation level
- client level
- application service level
- privacy and security level
- data management level

A. COMPUTATION LEVEL

It is related to technical matters like the method of offloading is the major issue in processing level this takes place when the physical distance between the mobile and cloud gets enlarged. The method offloading takes place at three main levels namely client-server level, virtualization level, and through agent level.

B. CLIENT LEVEL: In client level issues, the end users are directly involved like cost for usage and incentives in interoperability and participation cost
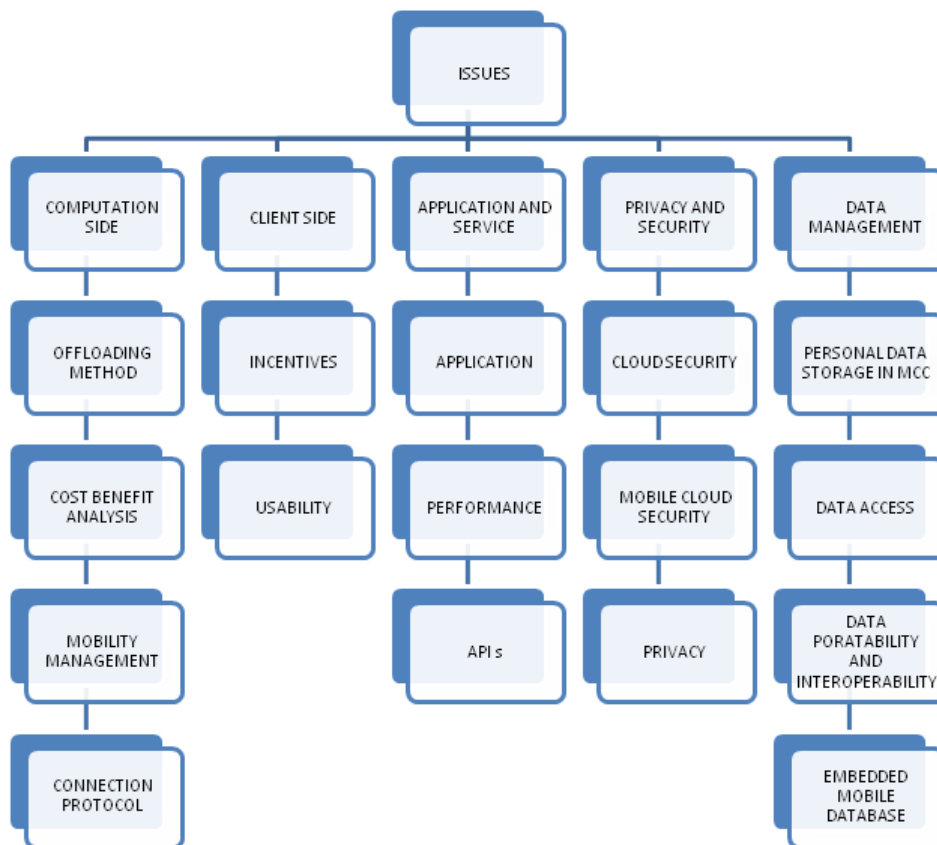

Fig 2 ISSUES IN MCC

C.   PRIVACY AND SECURITY LEVEL

The privacy and security issues arise in the MCC due to its storage and battery life i.e nowadays clients started storing their data such as contacts and messages in cloud due to its vast storage facility and they are prone to potential attacks when the services gets disconnected .All the cloud attacks are applicable to the mobile cloud environment. The privacy and security issues are categorized as follows;

1)   Novel cloud security
2)   Mobile cloud security
3)   Privacy

1. Novel cloud security

The novel cloud security is the general security issues that are prevailing for years and they fall on the following classifications they are;

Authorized user access:

Here the offloading of sensitive data may lead to disconnection between physical and logical elements leading to the threat of exposing data to unprivileged users.

Compliance:

The cloud service providers should constantly go for certifications and audits based on security.

Data location and segregation:

The location of the data stored in the cloud environment is difficult to trace so if any conflicts

occurs it is hard to track and recover users data. Since the space in which data stored is shared in cloud environment it is tedious to separate the information from one user to another which is the segregation threat.

Recovery:

It is the tendency to retrieve all the data when system failure occurs and this is a threat in cloud environment

Viability:

It is the assurance given to users that their information are safeguarded even when the service providers go out of their business.

1)   Mobile cloud security

Thee mobile cloud security include the issues related to both mobile and cloud which includes the following three challenges namely;

- Authentication
- Authorization
- Establishment and verification of cloud

2)   Privacy

The privacy issue is booming in the mobile cloud environment. Since the mobile cloud environment needs to connect with many nodes (mobile) in order to perform its operations there is a high risk of connecting to a malicious nodes which cannot be tracked easily. This problem is not traceable since mobile cloud computation is an adaptive dynamic environment where at each and every second old nodes leave the connection and new nodes get joined into the connectivity.

PKI is a technique involved in providing security in such a circumstance, but this method cause a lot of operational overhead, and in terms of implementing this method in resource constrained mobile devices is almost impractical. This problem is solved by introducing a new method PKASSO which provides authentication to public key infrastructure.

D.DATA MANAGEMENT LEVEL

Mobile cloud is an environment in which the mobile data are stored in the cloud environment due to its resource and energy scarcity. We all know that the mobile data can only be viewed and modified by the mobile owner in mobile computing but in case of mobile cloud environment the users data are stored in a place where many users and device share their data and locations to another party. So privacy and

security issue arise over here, and also the data processing is carried out in distributed file environment where more users participate over here. In the mobile cloud environment geographical location is not fixed and bandwidth has to be conserved.

1) Sensitive data storage in mobile cloud:

In mobile cloud the personal data such as contacts, text messages,images,videos which are stored in cloud possess threat to attackers however this is not a big issue when compared to cloud security challenge as the latest smart phones are possessing applications like Apple s iCloud,Google drive and drop box make use of cloud storage .The issue here is how efficiently we are able to handle those situations

Data access issue:

Accessing data via mobile is constrained due to the bandwidth limitation in mobile devices and also it is constantly moving changing the interfaces with the cloud. As the distance increases the accessing of data may delay which is one of the issue.

Data portability and interoperability:

Since various mobile devices including various operating system is involved in the cloud accessing circumstance, the mobile cloud should be able to support multiple platform and should be able to interoperate with each other this is one of the data issue.

FUTURE RESEARCH

The open issues are addressed in the above section whereas there are still some more issues that has to be met in future research directions they are as follows

A. Low bandwidth

The core issue in the mobile computing is the low bandwidth .Since many solutions have been proposed for increasing the efficiency of the bandwidth of mobile by many authors let us see about the two emerging technologies in providing solution to overcome this issue.

1) 4G network

The 4G network increases the bandwidth to a considerable amount when compared to the 3G network as they provide the bandwidth range from 100Mbps to 128 Mbps whereas 3G provides the bandwidth ranges from 14.4 mbps. Furthermore the

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4G network also provides many advantages such as extending the coverage area, quicker handoff etc.[18][19]

2) Femtocell

Femtocell[20] is a base station for smaller areas .HSL[21] is a technique that has been provided for combining the femtocell with the cloud environment so that the requested resources by the mobile users can be extended or removed as per the demand of the customers. This technique provides ease of usage of the small cellular base station.

B. Network access management

The cognitive radio [22] method Acts as a solution for the efficient network access management in the wireless network. It is a technology where the service requests are allocated to the channels that are available and rejects the requests when the channels are fully occupied. This technology improves the efficient usage of the spectrum for the unlicensed users. They can use the spectrum used by the licensed users. However it is a wireless communication technology where the MCC users got to be kept in mind.

C. Quality of service

Since the MCC users need to connect to the servers in the cloud for their services and requests, the process of requests may delay due to the network congestion, network disconnection, bandwidth etc. Hence the QoS has been reduced in these kind of situations. This issue led to the path of two research directions namely clone cloud and cloudlets.

1) Clone cloud

It is the process of duplicating all the data and applications of the smartphones to the cloud and performing high level processing since the resources are available in cloud rather in the smart phones[23]. After the desired processing is done with the clone in the cloud environment the results are integrated back to the smart phones.

2) Cloudlets

It is the trusted site where cluster of computers are interconnected with each other with availability of the internet so that the nearby mobile users could make use of the internet and could continue to proceed their processing of services[24]. If there are no cloudlets then the mobile users could connect to the cloud at a distant area, else the mobile could

process the applications with its limited resources in worst case.

D. Pricing

The MCC technology makes use of many service providers such as mobile service providers (MSP) and cloud service provider (CSP).Thus the customer management, service management, method of payment and cost varies differently according to various service providers. For example when a game application is run in cloud via mobile then the player has to pay the cost to three different provider's game, mobile and cloud service providers. Thus the business model of MCC has to be designed efficiently.

E. Standard interface

The mobile user and the cloud are linked via web interface which is not an efficient solution to enhance the interoperability among them since the web interface does not support various mobile devices and platforms. This led to a research of developing an efficient interface to explore the interoperability property. At present HTML 5 provides a considerable link between the mobile user and cloud.

F. Service convergence

A single cloud could not satisfy all the requirements of the mobile users. So the customers demand resources and services from various cloud service providers. Moreover due to the growing users of MCC the competitions among multiple CSP 's has been increased. So a schema has to be developed in order to compose all the services from various clouds and to integrate them to a single environment. Sky computing[25] is the emerging technology that converges all the services from various clouds and integrates them into a single infrastructure. Mobile sky computing is the platform where cross-cloud services are supported in a single mobile environment.

CONCLUSION

The mobile cloud computing is an interesting emerging technology in the computer firm which encompasses all the capabilities of two major divisions of information technology environment. In near future the numbers of mobile cloud users are expected to shoot out rapidly due to its attracting facilities and features which has been discussed in

this paper initially. And finally the issues and the future research are discussed in this paper.

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