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A Study on Mobile Cloud Computing

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ABSTRACT: Mobile devices are becoming need of human life as they provide most effective and convenient communication tools not bounded by time and place. Mobile users have a rich experience of using various services from mobile applications (e.g., iPhone apps, Google apps, etc), which run on their devices and/or on remote servers via wireless networks. The field of mobile cloud computing (MCC) is growing day by day in the development of IT technology as well as commerce and industry fields. However, the mobile devices are facing many problems in terms of battery life, storage, and bandwidth. Today we have number of mobile applications connected to the cloud, such as Apple iCloud, Google's Gmail for Mobile and Google Goggles, Dropbox, Amazon Cloud Player.

KEYWORDS: mobile cloud computing, mobile applications, cloud computing

I.INTRODUCTION

The IT industry is everyday coming with revolutionary inventions since the very first computer came into the picture. The purpose of the computer to perform different tasks which human can't perform easily and over the last decades. The only difference is that now these tasks can be performed in an easier, cheaper, and faster manner than in previous era. A group of computers or servers are attached together to form a system called as Cloud Computing or cloud. Cloud Computing is the new technology in the era of internet and it has become the hot topic of research in industrial and scientific communities.

One of the foremost advantages of cloud computing is reducing period of time and wasted expenditure for servers and different laptop instrumentation. A given company is needed to get the minimum quantity of hardware necessary to handle the utmost points of stress on their system. Given things wherever the strain and traffic are extremely variable this ends up in wasted cash. as an example, Amazon.com, a pioneer in cloud computing, sometimes used as very little as 100% of their capability so they'd have enough capability to take care of those rarer high strain times. In the case of mobile cloud computing an extra vital profit is delivered to the table. several mobile devices have vital constraints obligatory upon them thanks to the importance and desirability of smaller sizes, lower weights, longer battery life and different options. This usually severely constrains hardware and software system development for these devices. Cloud computing permits devices to avoid these constraints by material possession the additional resource intensive tasks be performed on systems while not these constraints and having the results sent to the device. Thus, cloud computing for mobile devices may be a terribly appealing and probably remunerative trend. Several strategies exist by that this trend will notice itself. First, strategies are projected that aim to construct general systems for utilizing the cloud to help boost phone performance. This family of solutions are usually mentioned as all-purpose mobile cloud computing (GPMCC). Second, several individual applications used nowadays with mobile devices like smartphones use cloud computing to a bigger or lesser extent. There are multiple strategies used and projected by that the cloud may be leveraged. this will be spoken as application-specific cloud computing (ASMCC). every of these 2 approaches has benefits and disadvantages which they don't seem to be reciprocally exclusive. In addition to mobile cloud computing wherever mobile devices function the shopper and non-mobile devices function the server or mainframe, many papers are written proposing associate opposite model. during this model, mobile devices perform the cloud which can be drawn upon. This paper can define some work exhausted this space. Finally, this paper can contemplate privacy and different considerations related to cloud computing, usually specifically to MCC. These problems may cause a barrier to widespread use of mobile cloud computing and strategies for resolution these problems may accelerate its adoption.

II. WHAT IS CLOUD COMPUTING?

Cloud computing is the provision of computing resources as a service, which means that the resources are owned and managed by the cloud provider rather than the end user. Before the widespread proliferation of cloud computing, businesses and computer users in general typically had to purchase and maintain the software and hardware they wanted to use. The shift from on-premise software and hardware to remote and networked resources means cloud users

no longer have to invest the manpower, capital or expertise to purchase and maintain these themselves. computer resources. This unprecedented access to IT resources has spawned a new wave of cloud-based businesses,
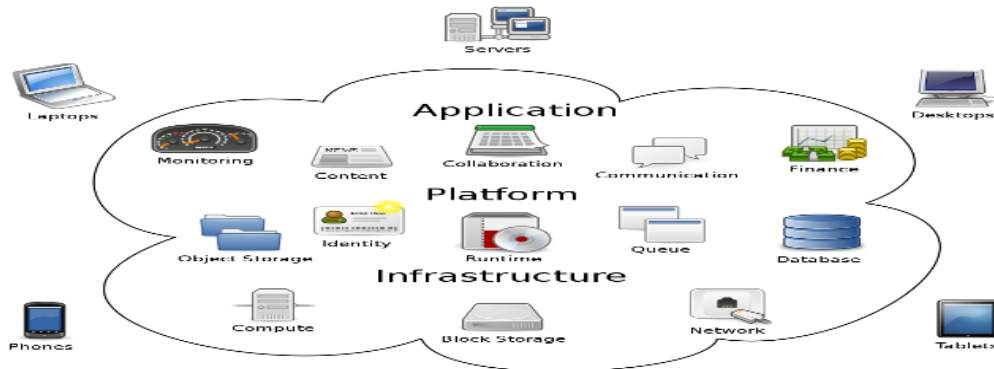

Fig.1. An Overview of cloud computing Model

There are completely different service models in Cloud computing. With the advancement of technology, newer service model areas are evolving however there are 3-unit major service models for Cloud Computing. These are Iaas, Paas, and SaaS. Iaas – In Infrastructe as a Service, users will access the infrastructure needed to run their applications, storage, in operation systems, etc. The infrastructure will be servers, storage, and virtualization infrastructure then on. shopping for and putting in these infrastructures will be terribly costly method for the organizations. And additional expense would be there on the upkeep half. therefore, the IaaS model may be a reliable and price effective methodology for the users to run their businesses. for instance, if in a company, virtualization infrastructure is needed for a brand-new project with less funding, effort the costly infrastructure won't be potential. Here IaaS is that the most suitable choice.Platform as a Service (PaaS) provides users with a platform on which to develop and run their applications. PaaS makes it possible to dynamically change the platform, upgrade to a newer version, and maintain uniformity across the platform used by all employees of a company at a lower cost.For instance, if you're performing on associate degree experimental project wherever you wouldn't wish to pay additional on the event, you'll select PaaS. This way, you economize and energy by not having the requirement to shop for the platforms and rent folks to keep up them. There are platform operators United Nations agency can assist you once in want of facilitate. The user needn't manage any of the underlying cloud infrastructure, however will manage the applications needed for the work. SaaS – In computer code as a Service, user will access computer code applications from the cloud. You not would want to shop for the costly computer code. you'll access the computer code through a skinny shopper interface, sort of a application program. kind of like the opposite service models, you can't management the underlying infrastructure. you'll run the applications within the cloud and also the cloud administrator manages the parts. Some of the newer service model area units are XaaS (Anything as a service), CaaS (Communication as a service), and MaaS (Monitoring as a service). A user will select the specified model or models, supported business necessities and prices concerned.

III. MOBILE CLOUD COMPUTING

Mobile cloud computing is a technology that delivers applications to mobile devices by using cloud computing. In simpler terms it is an infrastructure where the data processing and data storing is done outside of the mobile device. The goal of MCC is to create execution of wealthy mobile applications on an excess of mobile devices, with a fashionable and simple user expertise. Together with associate augmented in range of the mobile applications and cloud computing construct, mobile cloud computing (MCC) has been introduced to be a possible technology for mobile services. Mobile cloud applications can be developed or revised quickly using cloud services. They can be used on different devices with different operating systems, computing tasks, and data storage. Thus, users can access a variety of applications that could not otherwise be supported.

Mobile Cloud Computing makes it possible for the mobile applications to be executed on a different number of mobile devices. The purpose of MCC is to alter wealthy mobile applications to be dead on an outsized range of mobile devices with an expensive user expertise.For example, from a business standpoint, people often view MCC as a rich mobile computing technology that uses "from the combined flexible resources of various clouds and network technologies to unlimited functionality, storage and mobility." The Internet, regardless of heterogeneous environments and platforms based on pay-as-you-go principles. The virtual system is essentially a mobile cloud application based on

virtualized interfaces and APIs on top of a physical system that includes computing, networking, and storage devices as well as humans.
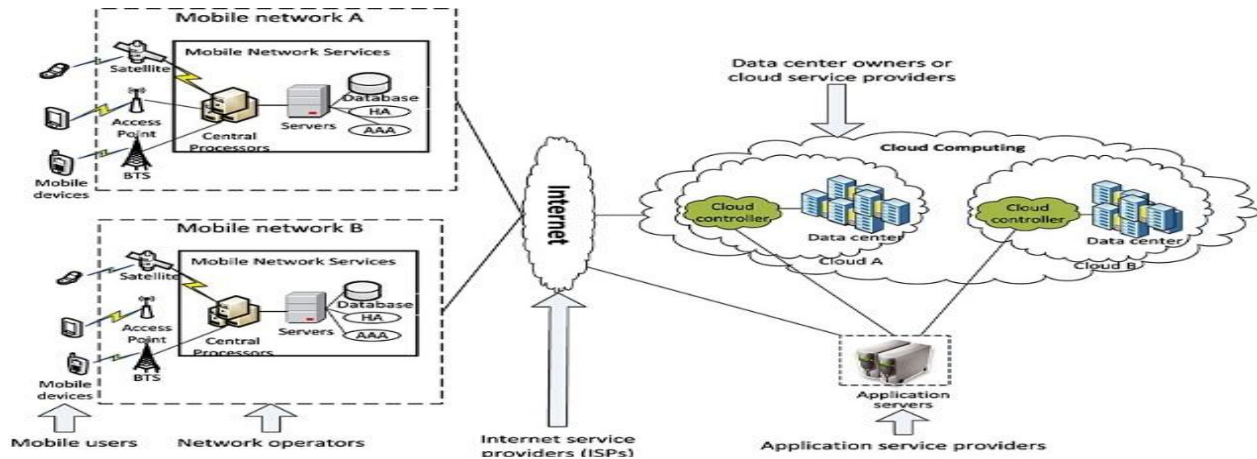
How it works

Fig.2.Mobile Cloud Computing Architecture

The architecture of Mobile Cloud Computing can be seen in Figure. In the figure given above we can see that the devices (smart phones) are connected to the mobile networks via base stations (e.g., base transceiver station, access point, or satellite) that connects and manages the connections and useful interfaces between the networks and sensible phones. Mobile device users' send requests and information (e.g., ID and location) are sent to the CPU's that are connected to servers providing mobile network services. Here, mobile network operators can provide services to mobile users as authentication, authorization, and accounting supported the house agent and subscribers' data stored in databases. After that, the subscribers' requests are delivered to a cloud through the web. In the cloud, cloud controllers process the requests to supply mobile users with the corresponding cloud services. These services area unit developed by exploitation the ideas of utility computing, virtualization, and service-oriented design (e.g., web, application, and info servers).

The details of cloud architecture might be different in several contexts. For example, a four-layer architecture is explained to match cloud computing with grid computing. Alternatively, a service-oriented design, known as Aneka, is introduced to change developers to make.Microsoft.NET applications with the supports of application programming interfaces (APIs) associated multiple programming models presents associate design for making clouds and proposes an design for web-delivered business services.

IV. APPLICATIONS OF MOBILE CLOUD COMPUTING

In Mobile Computing, several applications store knowledge in Mobile virtual, commerce for e-banking and in e-shopping. we have a tendency to area unit seeing several applications like mobile mails, Mobile sensing, Mobile health care, Mobile recreation, mobile social networking, Mobile commerce for banking functions, Mobile learning, etc.

i)   Multimedia Sharing:

By seeing the name, we will simply perceive this helps in sharing of knowledge from one mobile to a different mobile. Mobile users will share all kinds of knowledge. once more here MCC helps in sharing all kinds of knowledge and security.

ii)   Mobile Healthcare:

M-healthcare is to attenuate the restrictions of ancient medical treatment (e.g., little storage, security/privacy, medical errors).M-healthcare provides mobile users a convenient way to access to resources (e.g., medical records)

M-healthcare offers hospitals and attention organizations a spread of on-demand services on clouds.

iii)   Mobile Gaming:
         M-game could be a high potential market generating revenues for service suppliers.Can fully offload game engine requiring giant computing resource (e.g., graphic rendering) to the server within the cloud.Offloading can even save energy and increase game taking part in time (e.g., Maui permits fine-grained energy-aware offloading of mobile codes to a cloud).Rendering adaptation technique will dynamically regulate the sport rendering parameters supported communication constraints and gamers' demands.

iv)   Mobile Learning:
         Mobile learning is trading one in all smartphones. Now a days many schools and colleges are encouraging students to learn through mobile. Teachers can upload the study material on the application and students can view and download it for preparing for exams. Here Data is scalable and as per the usage of the scholars or teacher's application process owners will request for money.

V. BENEFITS OF MCC

We have a number of advantages of MCC as it's the combination of both mobile computing and cloud computing. Its benefit allows the users to have a user-friendly experience with the applications and it supports different development approaches.

a) Flexibility:
It allows users to access the info and this enables easy exchange of knowledge between two devices.

b) Cost efficiency:
 As we're using cloud computing, the most advantage is that you're paying for your setup. We will only buy the info we use. We will not get any additional charges the sole thing we'd like to require care of is when taking the service first we'd like to ascertain all the services provided by the corporate then get later quotes extra charges.

c)Disaster recovery:
 As we are storing the info within the multiple locations as a backup it helps the user to access the information. Once the disaster comes it'll automatically change to other servers and users won't get any problem.

d)Multiple platform support:
 Any platform can be used while using mobile cloud computing. The application can be executed on a variety of systems.

e) Integrated data:
It helps the users to access the combined data easily and with security.

VI. CHALLENGES IN MCC

a) Limitations of the loss of the battery and network flow:
If an application needs tons of battery and network flow, it'll become difficult to deploy that application on the mobile device. To overcome this problem, there'll got to be a discount within the data rate of exchange and therefore the reform the amount of knowledge exchanged between the mobile device and the cloud end, by optimizing the cloud end.

b) Quality of service:
The data transfer rate in mobile cloud computing environment is changing and therefore the association is discontinuous since the web service supplier is often far away from the mobile device users. The latency delay period in an exceedingly wireless network is also two hundred milliseconds compared to fifty milliseconds in wired network. Some other issues like dynamic alteration of application turnout, mobility of users and even weather can cause variations in bandwidth and network overlap. Therefore, the relinquishment delay in mobile network is above in wired network.

c)Privacy:
It is a serious concern in cloud computing because all data or we will all the knowledge of the user stored remotely. In this scenario, companies can sell the knowledge of the user and may share the knowledge with the govt without the

user's permission. In mobile cloud computing, it's also a general concern. Location-based applications and services uses user's current location access to perform the task. If a user wants to understand about the nearby hospital's information, then he/she got to share his/her location. Location cloaking method works here.

d)Data Access and Security:
It is also a prominent concern in mobile cloud computing. If a user stores all mobile data remotely (Memo, calendar, reminders etc) and need to access but particular service may have downtime. If it occurs, it locks the info into a specific service and user won't be ready to access that data.

VII. CONCLUSION

Mobile Cloud Computing could be a developing technology that has the potential to vary the computing situation. general MCC Solutions (GPMCC) has the potential to create mobile devices a lot of powerful computing devices while not ever-changing their hardware. Application-Specific MCC Solutions (ASMCC) has the potential to produce entirely new varieties of applications. If any technology has their blessings, it conjointly has some limitations further. Mobile cloud computing conjointly has some limitations or problems like – Mobile communication problems, Computing problems etc. it's a wide used technology that makes work easier by permitting access anytime, anyplace and anyhow.

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