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Overview on Mobility as a challenge in Mobile Cloud Computing

Oshin Jain¹, Naveen Kumar Bhati², Anjali Kumari³, Dr. Bharti Sharma⁴

⁴Asst. Professor, ^{1, 2, 3}Dept. Of computer Application, National Institute Of Technology(Kurukshetra)

Abstract: *Technology has evolved massively. We see new technology very often in market, and one of major factors behind increasing growth of technology is development of cloud computing. Cloud computing has become very popular in market. A cloud database system works on distributed databases that delivers computing as a services. The resources are dynamic as we can increase the scale of services as per our requirement on our demand the factor which has made cloud computing even more popular is combination of cloud computing with mobile and formation of mobile cloud computing. Our mobile are faster than ever changing the way of work in various ways, the best resource of communication we can do almost anything in our portable devices which are also possible in computer the reason behind it is Mobility concept behind the scene, the challenges and restriction which mobile devices had earlier have been overcome, but the research in this field is still on going to improve the network and communication and to meet the on-going business demand. Our paper has discussed about the cloud computing, its advantages, disadvantages, challenges, issues, mobile cloud computing, and mobility in cloud, we have also throw the light on future scope and on-going research on this arena.*

Keywords: *Cloud computing, features of cloud computing, security issues and challenges, Mobile cloud computing (MCC), features and security issues and Mobility in cloud.*

I. INTRODUCTION

With the inception of Internet many latest technologies have been derived and one of such technology is cloud computing. Cloud computing is accepted widely by business and people within a few decade, cloud computing can be defined as a parallel and distributed computing System consisting of a collection of inter-connected resources based on service-level agreement(SLA) through mutual understanding between service provider and consumer(reference cloud computing security issues and its solution journal) cloud computing provides various type of services like Infrastructure, platform, software etc. On pay per use methodology. The need to store large amount of data, installing high end software and sharing of resources is possible through extensive use of cloud computing, another thing which we would like to discuss about is mobile cloud computing, with the fast growth in wireless and portable devices such as mobile, mobile-ad hock network(MANET) is becoming very famous, and there has been a significant increase in mobile subscription. one of the major reason behind popularity of mobile devices would be enterprise mobility. Cloud computing supports various benefits to mobile users such as infrastructure and platform which gives virtually large-scale computing power with elastic scalability and high resource sharing usage, overcoming traditional limitation in mobile services, mcc objective is incorporating cloud features with mobile in order to utilize the cloud improves performances, reduces resources utilization, or provides robustness, scalability when required In our paper we will be discussing about cloud and mobile cloud and its related issues and challenges such as low bandwidth, network access, Management, pricing, quality of services etc and we will also focuses on mobility concept in mobile cloud and briefly discuss about how to improve mobility in dynamic cloud.(reference Mobile Cloud Computing Research – Issues, Challenges, and Needs)

Literature review- there have been various researches in both areas cloud as well as mobile cloud regarding improving its security enhancing performance or adding new features to give benefits to end users. Cloud computing builds on previous researches in the areas of distributed computing, grid computing, virtualization, utility computing, and networking [10-13]. The basic models of cloud computing are: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). the term cloud is old and is a metaphor which refer to Internet Grid computing is “a model of distributed computing that uses geographically and administratively distant resources, and, thus, users can access computers and data transparently without concern about location, operating system, and account administration”, T-Systems define cloud computing as “the renting of infrastructure and software, as well as bandwidths, under defined service conditions, cloud computing refers to Internet cluster this has well-organized management with extra supplements, consumption and delivery model for IT services like fast, reliable and efficient network access, the next generation of cloud computing is providing mobility in wireless network such as mobile devices, improved access of information in dynamic environment in distributed computing and additional features of cloud in mobile devices this paradigm gave

birth to Mobile cloud computing.(reference A Systematic Literature Review of Mobile Cloud Computing and A Literature Review on Cloud Computing Adoption Issues in Enterprises)

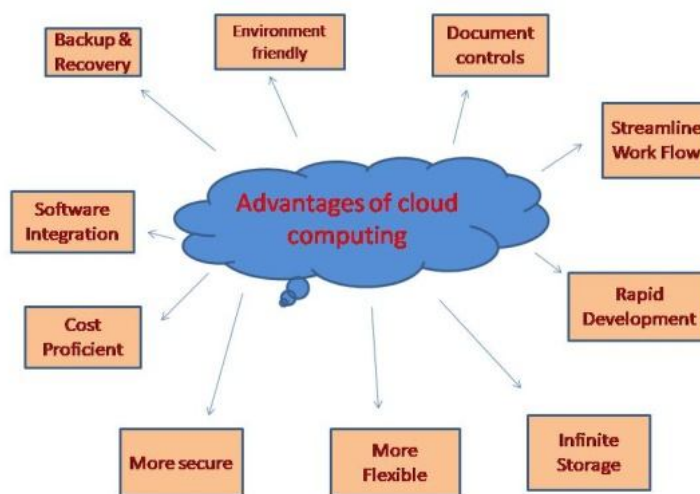
II. WHAT IS CLOUD COMPUTING?

In the simplest terms, cloud computing means storing and accessing data and programs by using a network of remote servers hosted on the Internet instead of your computer's hard drive. The use of hardware and software to deliver a service over a network. With cloud computing, users can access files, store, manage, and process data and use applications from any device that can access the Internet. An example of a Cloud Computing provider is Google's Gmail, IBM, Microsoft Azure, Amazon etc.

A. Characteristics of Cloud Computing

- 1) *Resource pooling*: Resources are allocated physically or virtually as per the user's request, reallocation is allowed, cost efficient and convenient to users.
- 2) *Measured services or billing*: Based on pay per use and Automated billing facility. Usage is monitored and controlled by SLA.
- 3) *Broad network access*- Features are available over internet and other network based on standard protocol.
- 4) *Rapid elasticity*-capability of scale up and down.

B. Advantages of Cloud Computing

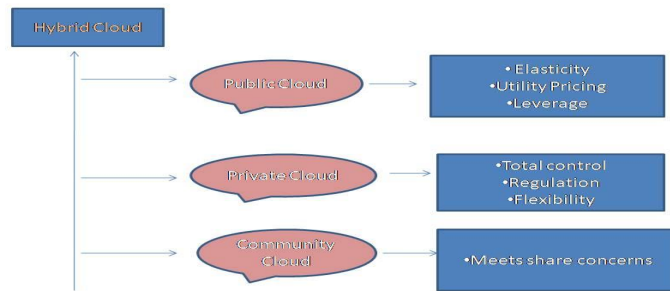


C. How businesses use cloud Computing?

(reference <https://azure.microsoft.com/en-in/overview/examples-of-cloud-computing>)

- 1) We probably use cloud at work also like e-mail, other business uses includes communication, productivity, file storage, backup data analysis, tool for developing etc, many apps are cloud based because people can access it over internet from any internet access device, it is cost effective. Examples are as follow
- 2) *Communication* -gives users easy, web-based access to communication and collaboration tools like email and calendaring. Messaging and voice and video calling apps like Skype also take advantage of the cloud
- 3) *Productivity*-WE can work in your document, presentation or spread sheet software from nearly anywhere. We don't need to worry about data loss if it is stored in cloud , many software are web based and don't need to be installed or download directly accessible.
- 4) *Backup and recovery*-When your organisation relies on cloud services for backup and recovery, it can avoid capital outlay for infrastructure and management. Instead, the cloud services provider is responsible for managing data and meeting legal and compliance requirements.

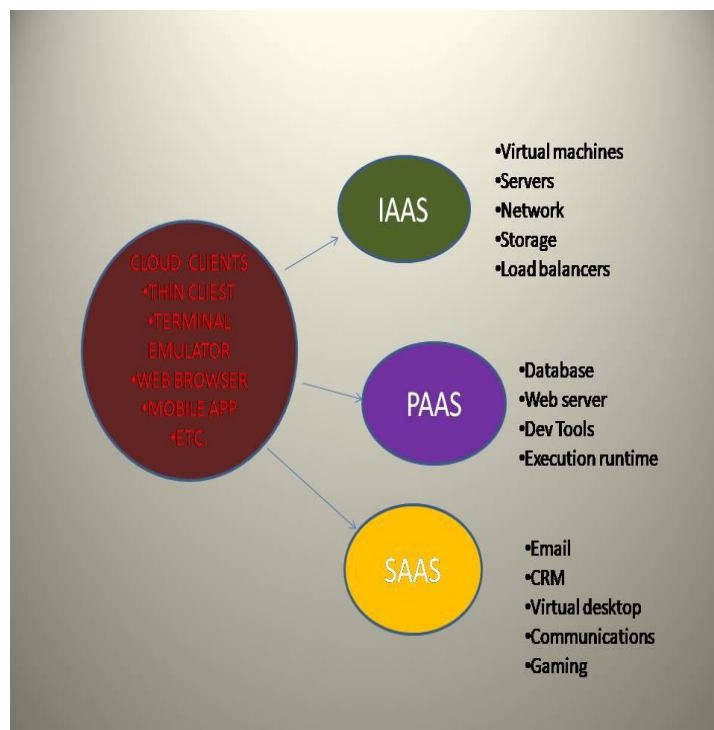
D. Types of cloud?



E. Based on Cloud Location And Type of Data ,we Classify Cloud an Following Cloud

- 1) **Public cloud:** cloud provider provides a common public storage space in cloud and provide u the link which can be downloaded or link can be shared.,It includes Software as a Service applications such as Salesforce.com or Google’s Gmail, software development Platforms as a Service, such as Microsoft’s Azure, and Infrastructures as a Service from a wide range of vendors.data is universally accessible, automatically backed up ,highly scalable and resource cost is reduce
- 2) **Private cloud:** cloud-company gives a storage space on rent, making data confidential by giving id and password facilities. Built for single organization company can host website, application it provide data security and control
- 3) **Communication Cloud:** Group of community need some space like for college websites or a membership group or a group on what’sapp. Get space on a cloud ,only members of that associated group can use the service
- 4) **Hybrid Cloud-**websites like railways are partially public and partially public like seats available are under public but passenger info and ticket info are private.A hybrid cloud is generally best-of-breed. It combines the comfort level of a private cloud with the flexibility and versatility of the public cloud.(reference <https://e-com.com/wp-content/uploads/Cloud-Computing-Public-Private-and-Hybrid-DynaSis.pdf>)

F. Services provided by Cloud computing



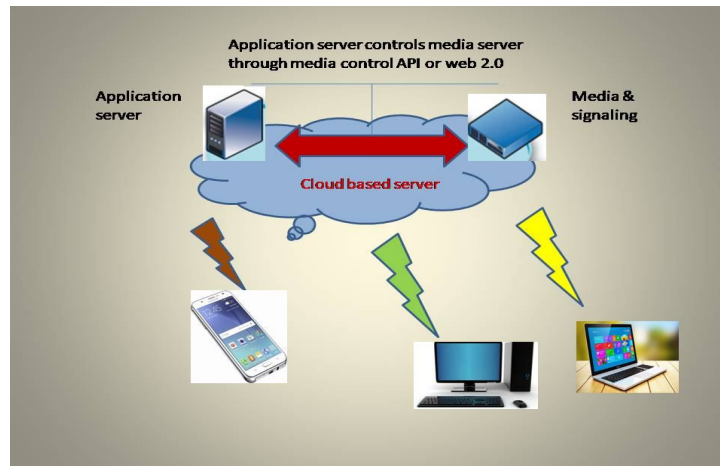
Types of cloud Services	characteristics or features	Issues and challenges
Infrastructure as a service(IaaS)	<ol style="list-style-type: none"> 1.it provides elasticity means easily scalable 2.transfer the risk of data loss 3.the cost of operation is reduced to some level 4. provide latest infrastructure. 5.inter-operability 6.recovery is possible 	<ol style="list-style-type: none"> 1.temperature control inside cloud is needed 2.power failure and short circuit should be able to handle 3 .high network connectivity should be provided between cloud and hardware. 4. cloud should be able to fulfil changing demands. 5. loss of control.
Software as a Service(SaaS)	<ol style="list-style-type: none"> 1.minimize cost 2. saves lot of time. 3. high output. 4.availability of high tech services 5.reduced cost of administration 6.Gaming facility. 	<ol style="list-style-type: none"> 1.data security 2.Authority and Authentication 3.Data Integrity 4.Data Privacy 5.Network Security 6.Data Backup 7. Data Confidentiality 8.Web application Security 9. Deployment of cloud resource in another country is difficult.
Platform as a Service(PaaS)	<ol style="list-style-type: none"> 1.Provide different platforms and high level infrastructure 2 Database provider 3.provides Scalability 4. provide tools. 5. make complex task simple . 	<ol style="list-style-type: none"> 1 .Limited API. 2 .Data Lock-in 3. Unpredictable performance. 4. Lack of control over security.

G. There are Various Types of Cloud Services Like

- 1) IaaS- Provide hardware and tangible computing resources over the internet ex-Digital Ocean, Linode, Rackspace, Amazon Web Services
- 2) PaaS-Platform as a service (PaaS) is a cloud computing services that provides a platform allowing customers to develop, run, and manage applications without the complexity of building and maintaining the infrastructure typically associated with developing and launching apps.Ex- Google App Engine, Apache Stratos
- 3) . SaaS-Software as a service is a software licensing and delivery model in which software is licensed on a subscription. It is sometimes referred to as "on-demand software". EX- Google Apps, Salesforce, Workday, Concur, Citrix GoToMeeting, Cisco .
- 4) NASS-(Network as service) is a category of a cloud computing where user is to use network or private connecting services like VPN(virtual private Network).
- 5) Communication as a service-Sells communication ex What 'sapp And Skype.

H. Challenges In Cloud Computing

There are various Challenges with cloud computing



- 1) *Cost of Bandwidth* - As we know that sufficient bandwidth is required for transferring complex and intensive data so the cost for such delivery increases considerably
- 2) *Need Continuous monitoring and supervision*-Cloud mostly suffers from frequent outages,so it is important for cloud providers to monitor cloud services and supervise its performance on a regular basis
- 3) *Security issues*-It's the biggest issue and most challenging maintaining data security from third party while the cloud is being shared by many companies is most challenging thing in cloud computing
- 4) *Data Access and Integration*-Companies often worry about data ownership and loss of data control while moving to cloud important decisions such as where and how data should be stored is challenging. Another challenge is integration of existing application with cloud smoothly is quite challenging.
- 5) *Proper Utilization*-companies are still not sure how this technology is good for their business and how they can utilize it judiciously and earn revenue
- 6) *Migration Issue*-it is risky to migrate data from one cloud to another if not handled properly data could be lost or leak ,their a need to develop a technique to resolve such issues
- 7) *CostAssesment*-Scalable on demand, budget issues arises with incese of usability ,hence costly

I. Various security related issues in cloud-

- 1) *Data Breaches*-Chance of sensitive data can be used by unauthorized users
- 2) *Hijacking of Accounts*-Attackers have ability to login to remotely access sensitive data stored on the cloud. Attackers can easily manipulate information.
- 3) *Insiders Threat*-Attackers from inside organisation,employee with authorized access can misuse information.
- 4) *Malware Injection*-Malicious code can be injected into cloud Services and viewed as part of the software or services that is running within the cloud server themselves.
- 5) *Abuse of cloud Services*-Its easy for hacker to spread illegal, software and malware over cloud.
- 6) *Insecure API's*-API provides customized features but also provide authentication, provide access to data, and effect encryption could become a thread if controlled by attackers.
- 7) *Denial of Service Attack*-Attempt to make your websites and server's available to legitimate user's. Take down Security such as web application firewall
- 8) *Insufficient Due Diligence* - Pose Security Risk when organization migrate cloud frequently..

III. WHAT IS MOBILE CLOUD COMPUTING ?

Mobile cloud computing is the combination of cloud computing and Mobile cloud computing ,Both data processing and data Storage will take place outside the mobile devices, ITgives us all those services which we can perform through laptops and cloud, but it has it's additional feature's and benefits.IT gives us portability ,bringing applications and technology to a border range. Basically a way to

shift a workload from our Mobile device to a cloud, which gives an advantage of high power computation, sharing data capability, more user access, long battery life and various other cloud based services. Various applications based on mobile cloud computing have been developed and served to user's, such as Google's Gmail, Maps and Navigation System for mobile etc, Mobile cloud computing applies are in trend and hold 88% of market since 2009 to 2014.

A. How MCC WORKS?

MCC clients includes

- 1) Sync-keep the track of state changes made to the mobile application with cloud server's.
- 2) Push-check for the new info from user and sent notification from the cloud server's.
- 3) Offline App-Create coordination between Sync and push and do management.
- 4) Network: Manages the communication channels needed to receive push notification.
- 5) Database: Manages local data storage. Mobile Server's Side
- 6) Sync-Provide plugin framework to Mobilize the backend data and Synchronizes the changes with backend services.
- 7) Push-Send update notification connects back the devices to cloud when disconnected.
- 8) Server Socket Based Data Services: provides both side SSL-Based Socket Servers.
- 9) Security-Provide authority and authentication services to access data over cloud.
- 10) Management Console-Provide additional functionalities.

B. Advantages of MCC

- 1) Extending Battery Life-large computation are migrated to cloud thus mobile devices have large Battery life.
- 2) Improved data storage capacity and Processing Power-Mobile System have limited Storage capacity so in order to store large amount of data it was hard earlier but now we can store and access as many data as we want without worrying about limited storage because of MCC.
- 3) Improving Reliability-Improves reliability as data is stored in cloud and backed up in multiple computers. Remotely provides security services such as virus scanning, authentication etc.
- 4) OTHERS Advantages are same as cloud computing like
- 5) Dynamic Provisioning
- 6) Scalability
- 7) Resource sharing Ability
- 8) Different services can be integrated together etc.

C. Features of MCC

- 1) Mobility: Provide services in heterogeneous network while moving.
- 2) Diversity of networks
- 3) Low Bandwidth
- 4) Virtualization
- 5) Autonomy
- 6) Large-Scale

D. Challenges in MCC

- 1) Mobile computation offloading-It is difficult to offload mobile computation to cloud due to heterogeneous environment of Network. Cloud resources such as latency, security, code portability and cloud mobile interpretability intensifies the situation.
- 2) Mobile limitation-Mobile have less computation power than laptops, complex data and application cannot be deploy in cloud and operate with mobile and if technology in this field improves still battery life is low.
- 3) Seamless Connectivity-Maintaining connection for long time in heterogeneous environment is a tough task. Cause disconnection and low Bandwidth problem.
- 4) Long Wan Latency-Wan latency affects efficiency thus raises transmission delays.
 - a) *Mobility Management: Integration of dissimilar wireless Network is a challenging task, due to heterogeneity in access technology, architecture, protocol, user mobility patterns and user service requirement.*
- 5) Context Processing
- 6) Vendor/Data Lock in

- 7) Elasticity
- 8) Cloud policies for mobile users
- 9) Energy constraint
- 10) Security and privacy
- 11) Late in service delivery

E. Future scope in cloud computing

- 1) The impact of cloud computing market is high all the time. people now a days do not prefer desktop but most of their work is done through mobile internet ,smart phones holds 80% of the market .Cloud computing can become the majority in IT in coming future .growth in SAAS and IASS is increasing very quickly
- 2) House hold services-lot of household appliances, cars,electronics will be cloud based ,can be controlled remotely,and data will be stored in cloud
- 3) *Efficient mobile Application* -Mobile built application's which will not be bound by operating system and storage problem
- 4) GOOD Data Flow and improved Security
- 5) *Access data any time*-the users can remotely access the store applications and their associated data anytime on the Internet by subscribing to the cloud servicesmobile
- 6) *Android based cloud Application's*-Dropboxprovide file hosting and data storage access file through android devices which can be synced to computer.same goes for Amazon Cloud Player which do same for mp3 files.
- 7) Storing information in cloud will be cheaper than hard disk, moreand more sharing of information ,communication on internet will improve.
- 8) In mobile the problem with low bandwidth, low battery, low processing speed will be resolved
- 9) Data syncing technology will improve.

IV. CONCLUSION

In conclusion, cloud computing is recently new technological development that has the potential to have a great impact on the world. It has many benefits that it provides to it users and businesses. For example, some of the benefits that it provides to businesses, is that it reduces operating cost by spending less on maintenance and software upgrades and focus more on the businesses it self. But there are other challenges the cloud computing must overcome. People are very skeptical about whether their data is secure and private. There are no standards or regulations worldwide provided data through cloud computing. . Users also worry about who can disclose their data and have ownership of their data. But once, there are standards and regulation worldwide, cloud computing will revolutionize the future.

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