CHANDIGARH GROUP OF COLLEGES
Campus : Jhanjeri, Mohali

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

Mobile Cloud Computing Issues, Security,Solutions

Varsha Grover[1]

Abstract

Mobile cloud computing (MCC) is a relatively new concept that leverages the combination of cloud technology, mobile computing, and wireless networking to enrich the usability experiences of mobile users. Many field of application such as mobile health, mobile learning, mobile commerce and mobile entertainment are now taking advantage of MCC technologies. Since MCC is new, there is need to advance research in MCC in order to deepen practice. Currently, what exist are mostly descriptive literature reviews in the area of MCC. In this paper, a systematic literature review (SLR), which offers a structured, methodical, and rigorous approach to the understanding of the trend of research in MCC, and the least and most researched issue is presented. The objective of the study is to provide a credible intellectual guide for upcoming researchers in MCC to help them identify areas in MCC research where they can make the most impact. The SLR was limited to peer-reviewed conference papers and journal articles published from 2002 to 2014. The study reveals that privacy, security and trust in MCC are the least researched, whereas issues of architecture, context awareness and data management have been averagely researched, while issues on operations, end users, service and applications have received a lot of attention in the literature.

Keywords: Mobile Cloud Computing, systematic literature review, security, privacy, interoperability, virtualization.

1. Lecturer at P.M.N College Rajpura

Cloud Computing: Cloud computing is the delivery of computing services over the Internet on the pay-per-use basis. The cloud-computing model allows access to information and resources on anytime and anywhere basis. Cloud services are very useful as it includes online file storage, social networking, webmail, and online business applications etc. By using these services, businesspersons can use software and hardware that are managed by third parties at remote locations. Cloud computing provides a shared pool of resources, including data storage space, networks, specialized corporate and user applications also. Cloud computing

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

related to computer science services and describes a type of outsourcing the computer services, without worrying about from where it is? And from how it is? One has to only pay for what they consumed. The idea behind cloud computing is similar: The user can simply use storage, computing power, or specially crafted development environments, without worrying about its internal working. Cloud computing is usually Internet-based computing which hides complex infrastructure of the internet .It is a style of computing in which IT-related capabilities and services are provided "as a service", allowing users to access their needed technology or services from the Internet without gaining knowledge of it, or control over the technologies behind servers providing services. Cloud computing delivers computing resources over the Internet, instead of keeping data on your own hard drive and offers us freedom to use a service over the Internet, at another location, to store your information or for using its its applications.

Mobile Computing: Mobility has become a very popular word and rapidly increasing part in today's computing area. An incredible growth has appeared in the development of mobile devices such as, smartphone, PDA, and laptops with a variety of mobile computing, networking and security technologies. In addition, with the development of wireless technology and internet it becomes much easier and not limited by the particular office or home or organizations. Thus, more and more people have accepted those mobile devices and gives support to rise in the technology of mobile computing. Mobile computing is described as a form of human-computer interaction by which a computer is expected to be transported during normal usage Mobile computing can be said as the collection of three major concepts: hardware, software and communication. The concepts of hardware is dependendent on mobile devices, such as smartphone and laptop, or their mobile components. The second concept of Software in mobile computing is the numerous mobile applications in the particular hardware devices, such as the mobile browser, anti-virus software and games stored at remote distance on some other servers. Finally, the communication issue includes the infrastructure of mobile networks, protocols and data delivery in their use, which must be transparent to end users. With the use of the cloud-computing concept, it is easier to develop mobile computation somewhat easier.

Mobile Cloud Computing : Mobile cloud computing is the advanced version or it's the combination of the two most important practical computing paradigm describe above i.e. cloud computing and mobile computing. MCC defines by as a

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

new distributed computing paradigm for mobile applications whereby the storage and the data processing are migrated from the Smart mobile devices to resources rich and powerful centralized computing data centers in computational clouds. As MCC is based on the cloud concept the centralized applications, services and resources are accessed over the wireless network technologies based on web browser of the smartphones. Many of the business persons are attracted by MCC as a profitable business option since reduces the development, execution cost of mobile applications, and mobile users are enabled to acquire new technology as a on-demand basis. It enables to achieve rich experience of a variety of cloud services for SMDs at low cost. The objective of MCC is to use the computing potentials of SMDs by employing resources and services of computational clouds. Mobile cloud computing technique try to focus on alleviating resources limitations in SMDs by employing different strategies of augmentation; such as screen augmentation, energy augmentation, storage augmentation and application processing of SMD. There are number of approaches and argue that MCC handles that are needed to high-end hardware, reduces ownership and maintenance cost, and alleviates data safety and user privacy. The MCC model is composed of three major components consisting of smartphones, PDAs, etc., wireless internet technology and computational cloud. This is done as these Devices use wireless network technology protocols or Wi-Fi to access the services of computational cloud in mobile environment. If SMD inherit its nature of mobility, it needs to execute location aware services which consume resources and then Poonam S. turned as a low-powered client. shows a generic model of MCC in which the cloud that provides offdevice storage, processing, queuing capabilities. It also includes the security mechanism integrated with SMD with the use of wireless network technologies. MCC utilizes cloud storage services for providing online storage and cloud processing services for augmenting processing capabilities of our mobile devices.

CHALLENGES AND SOLUTION FOR MOBILE CLOUD COMPUTING

A. Challenges Regarding Mobile Communication:

1) Low Bandwidth Problem: In communication network Bandwidth is one of the important thing as the radio resource for wireless networks are transmitted over

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

networks according to the amount of bandwidth is present for transferring the content in the network. As the bandwidth is limited sharing the limited bandwidth among different mobile users located in the same area or workstation and probably involved in the same content to be transferred. This results in the improvement of the quality and this solution is applied mainly for the case when the users in a certain area are interested in the same contents. It collects user profiles that are using the network periodically and creates decision tables, Based on which the users decide whether or not to help other users download contents that cannot receive by them due to the bandwidth limitation.

2) Lack of Resource of Mobile Devices: Comparing mobile device with older desktop PC shows that how the cost feature of mobility is being achieved. As there is lack of resources makes it hard for the adoption of mobile cloud computing in general conditions. For overcoming this limitation of mobile devices and there resources, they are added to the cloud infrastructure so that they can be used on anytime on anywhere basis makes it easy for most of advanced applications. As the mobile device performances, and the resource constraints of mobile devices going on increasing and fixed devices will remain and must be accounted for the types of application selected for mobile cloud computing.

B. Challenges of Network :

1) Challenges of Wireless Network and Access Control Policies: Wireless network is base for carrying out cloud computing and it has its own intrinsic nature and constraints. For better performance the consistent network bandwidth is important but actually variable data rates, longer latency and connectivity with gaps in coverage are the main problems associated with network in the MCC. Some uncontrollable factors are also responsible like weather for varying bandwidth capacity and coverage. For implementing MCC, accessing the network with heterogeneous access scenario and different access technologies like WiMAX, WLAN, 4G, and so on, having their own policies and restrictions. As the wireless network is an important thing to support MCC functioning there should be the proper mechanism for minimizing the latency, increasing the bandwidth and decreasing the connectivity gap. We should keep different access schemes for avoiding connection failure and connection re-establishment. In order to give faster access for mobile devices, most providers are offering 4G/Long Term Evolution (LTE) services. These services on the basis of data storage capacity, plug and play

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

features, low latency, etc. This provides download peak rates up to 100 Mbps and upload up to 50 Mbps.

2) Seamless Connection Handover: Currently executing application is terminated or it returns error message when one move from one access point of network to another point or one move from Wi-Fi network to 3G-based cellular network. Because this creates the situation of communication failure and connection reestablishment. So, for providing data communication using cellular network mobile operators are trying to set up Wi- Fi Aps on street. This system is helpful to offload traffic of Wi-Fi systems can be reduced, and is to provide seamless in reduced cellular traffic congestion.

C. Challenges Related To Mobile Applications

Interoperability: There are lots of mobile devices running on different platform including iPhone, Android phones, BlackBerry and others also. This variety of devices are used by people in the same organization or a group of people sharing single network. And in such situation interoperability issue becomes a major challenge in pulling/ pushing data across multiple devices. An application that are run on mobile cloud infrastructure should be supported by certain mobile cloud infrastructure that can easily be judged possibly on the basis of its requirements against the cloud infrastructure characteristics. Along with the device, network bandwidth and latency vectors should perform computation intensity, network bandwidth, and network latency properly.

Mobile Cloud Convergence: Data distribution is an important issue for achieving advantage of mobility by making integration with cloud computing with mobile world. As for using this cloud computing application services with mobile devices there some issues with computation of data, battery life and performance of this devices in distributed platform. Mobile cloud convergence is the technique that provides performance improvement and solution to the computation power problem. For this there is a partition of application takes place such that parts that need more computation run on the cloud and run on the mobile device. Wireless technologies, advanced electronics and internet are important to achieve pervasive and ubiquitous computing

Challenges Regarding Security

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

Information Security Devices Privacy: As cloud computing basically deals with providing all type of services, data storage and processing. As all this is done remotely, so security is an important concern for all who are using these services. We are concerning here with Mobile Cloud Computing hence its necessary to check the security related to mobile devices along with cloud computing platform, which is the key concern in this area. This is because there is possibility of device stolen or misplaced, which leads to crucial data to be compromised. Now days as various security threats are born, cloud platforms also offers many robust built-in security measures like SSL and digital certificates provides as to enable external security. Misuse of data from stolen/ misplaced mobile devices can be avoided by wiping of these mobile device remotely. For detecting security threats on any mobile device is done by installing and running security software's programmers called "Antiviruses" which are readily available in the market.

Security Attacks and Hacking: All networking activates are susceptible to one or other type of malicious attacks. As there is more use of Web sites that are sometimes accessing malicious code sites, for accessing the network and operational data of that particular person or organization. There are some event at that time after implementing best measures for providing the best security policies to data and information trained attackers with best surfing May creates incidents that normally inescapable as: There are various policies and schemes are now days available such as Fair Information Practice Principles (FIPP) which require rigorous controls and procedures to protect the privacy of individual persons data as well as organizations information

SECURITY IN MOBILE CLOUD COMPUTING

Security framework in Mobile Cloud Computing

Mobile cloud computing is growing day by day due to the popularity of cloud computing and increasing uses of mobile devices. Many researchers are showing their interesttowards this technology. There are many issues in mobilecloud computing due to many limitations of mobile deviceslike low battery power,

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

limited storage spaces, bandwidthetc. Security is the main concern in mobile cloud computing. Security in mobile cloud computing can be
explained by broadly classifying it into 2 frameworks .

Security of data/files

The main issue in using mobile cloud computing issecuring the data of mobile user stored on mobile cloud.The data/file of a mobile user is very sensitive; any
unauthorized person can do changes in it, to harm the data.So the main concern of cloud service provider is to providethe security of data/files created and manipulated on a
mobile device or cloud server. The data/file security is veryessential for owner of the data/file as it can contain anyconfidential information of his.

Security of mobile applications or applicationmodels

Securing the mobile applications or application model isalso important because these provide better services to
mobile users by utilizing cloud resources. These mobileapplication models use the services of the cloud to increasethe capability of a mobile device. In this paper we are going
to discuss the security of data or files of mobile users storedon mobile cloud.

Why data storage security is needed

The data of owner is stored on the cloud server; once the data is stored the owner does not have that data on his own device. Thus, there is risk related to data security and
Confidentiality of the data. It is not accepted by the owner that his data/file is disclosed to someone who is not an authorized person. Before discussing why data security is
needed there is a need to discuss the security threats to the data stored on the cloud. There are following security risk related to data stored on the cloud server. These attacks
Affect the data stored on the cloud. For owner the integrity of the data is very important. If any unauthorized person performs changes in data of other person then it can harm
sAny person after finding confidential information of other person can harm that person. So, data confidentiality is also a concern of data owner. Authentication of user is also important to verify who the originator of the file is.

CHANDIGARH GROUP OF COLLEGES
Campus : Jhanjeri, Mohali

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

DATA STORAGE SECURITY WITH VARIOUS AVAILABLESOLUTIONS

For the last few years Mobile Cloud Computing has beenan active research field, as mobile cloud computing is ininitial stage, limited surveys are available in variousdomain of MCC. In this paper our main focus is onsecuring the data storage in mobile cloud computing.Significant efforts have been devoted in researchorganizations to build secure mobile cloud computing. Thispaper explores the various methodologies for data securityin Mobile Cloud Computing. proposed anEnergy efficient framework for integrity verification ofstorage services using incremental cryptography and trustedcomputing. In this paper the authors provided a frameworkfor mobile devices to provide data integrity for data storedin cloud server. Incremental cryptography has a propertythat when this algorithm is applied to a document, it ispossible to quickly update the result of the algorithm for amodified document, rather than to re-compute it fromscratch. In this system design three main entities are
involved:Mobile User (MU): Mobile user/client is a personwho utilizes the storage services provided by Cloud serviceprovider (CSP).Cloud Service Provider (CSP): CSPprovides storage services to client. CSP is also responsiblefor operating, managing and allocating cloud resources
efficiently. Trusted Third Party (TTP): TTP installscoprocessors on remote cloud; who is associated with anumber of registered mobile user/client. Coprocessorprovides secretkey (SEK) to mobile user and is alsoresponsible for generating message authentication code formobile client.There are a number of operations involved inthis scheme shown by

1) Updating File on the Cloud: Before uploading file oncloud, mobile user is required to generate an incrementalMessage Authentication Code (MAC file) using SEK.

MACfile = Σ HMAC (Filek , SEK). (1)Where, n is totallogical partitions of file and Filek is kth part of the file.After generating MAC file, mobile client uploads the fileon the cloud and stores MAC file on local storage.

2) Inserting or deleting a block: At any time mobile clientcan insert (delete) a data block in file stored on cloudserver. For this client sends request to CSP, in its responseCSP sends requested file to mobile client as well as totrusted coprocessor (TCO) associated with that client. TCOgenerates MACtco and sends it to client to match this MACgenerated by TCO (MACtco) with MAC stored in client'slocal storage (MACfile). If these two MAC matches , theclient can perform

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

insertion/deletion in the file and againcomputes MACfile with help of old MACfile, SEK andinserted/deleted block. For avoiding communication overhead only updated block is uploaded on cloud server.

3)Integrity Verification: At any time mobile client can verifythe integrity of data stored on cloud server by sendingrequest to cloud server, on receiving request cloud serversends file to TCO for integrity verification. TCO generatesincremental authentication code and sends it to mobileclient directly. Now mobile client compares this MACtcowith stored MACfile to verify integrity. If these twomatches then integrity is verified.

Where,

(1) MC generate MACfile and stores MACfile in localmemory
(2) MC uploads file on server
(3) CSP stores file on cloud
(4) MC sends request to CSP for performing
(5) Insertion/deletion in the file
a) CSP sends requested file to MC
b) CSP forwards requested file to TCO
(6) TCO sends MAC to MACtco directly
(7) MC compares MACfile and MAC tco for verifying

Cryptographic Approach

The encryption algorithm is most commonly used technique to protect data within cloud environment. The datarelated to a client can be categorized as public data and private data. The public data is sharable among trustedclients that provide an open environment for collaboration. Private data is client's confidential data that must betransferred in encrypted form for security and privacy. We propose a suitable method that cryptographic algorithmswith different key lengths are used in various environments. The number of mobile devices such as smart phones and smart pads grows rapidly recently. End users can access easily to cloud computing environment thought thesemobile devices we define that mobile cloud computing is one of specific services of cloud computing and it is am obile service

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

which is added a cloud computing service.According to key characteristics, modern cryptosystem can be classified into symmetric cryptosystem,asymmetric cryptosystem and digital signature. For a symmetric cryptosystem, the sender and receiver share anencryption key and decryption key. These two keys are the same or easy to deduce each other. The representativesof symmetric cryptosystem are DES (Data Encryption Standard), AES (Advanced Encryption Standard). For anasymmetric cryptosystem, the receiver possesses public key and private key. The public key can be published butthe private key should be kept secret.
The representatives of asymmetric cryptosystem are RSA (Rivest Shamir Adleman) and ECC (Elliptic Curve Cryptosystem). For Digital signature the representatives is MD5 and SHA1.

Implemented Algorithms

The cryptographic algorithms used are Symmetric key algorithms, Asymmetric key algorithms and Combinationof these algorithm as a Hybrid Approach. Evaluation metrics for these algorithms are studied based on variousprevious research work. Encryption techniques will make the data more secure in the local system as well as on theremote cloud.

Securing Mobile Cloud Using Finger PrintAuthentication

The combination of the cloud computing and mobile computing creates mobile cloud computing
and also introduce security threats such as unauthorized users access. The focus in this researchis
on the mobile cloud and protecting mobile cloud resources from illegitimate access. Biometric
recognition will be used in the near future in mobile devices. The proposed solution for
authenticating mobile cloud users using the existing mobile device camera as a fingerprint sensor
to obtain a fingerprint image, and then process it and recognize it. Results show that the proposed
solution has added value to keep performance at an accepted level.
For future work, accessing log file will be used to help identifying unauthorized attempts to

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

access data by third parties–the cloud provider or any intruders. Based on these logs, cloud
security policies will be modified and re-configured.

References:

[1]Satyanarayanan, "Mobile computing: the next decade," in Proceedings of the 1st ACM Workshop on Mobile Cloud Computing & Services: Social Networks and Beyond (MCS), June 2010.
[2] Han Qi, Abdullah Gani, "Research on Mobile Cloud Computing: Review, Trend and Perspectives", pdf.
[3] Kemp, R., et al., Cuckoo: a Computation Offloading Framework for Smartphones, in Proceedings of the Sixteenth annual conference of the Advanced School for Computing and Imaging 2010. 2010: Veldhoven, the Netherlands. p. 70-77.
[4] Zhang, Q., L. Cheng, and R. Boutaba, Cloud computing: state-of-the-art and research challenges. Journal of Internet Services and Applications, 2010.1(1): p. 7-18.
[5] M. Satyanarayanan, "Fundamental challenges in mobile computing," in Proceedings of the 5th annual ACM symposium on Principles of distributed computing, pp. 1-7, May 1996.
[6] M. Cooney. (2011, Oct) Gartner: The top 10 strategic technology trends for 2012. [Online]. Available: http://www.networkworld.com/ news/2011/101811-gartner-technology-trends-252100.html.
[7] Soeung-Kon, J. -H. Lee and S. W. Kim, "Mobile Cloud Computing Security Considerations", Journal of Security Engineering, no. 9, (2012) April.
[8] A. N. Khana, M. L. M. Kiaha, S. U. Khanb and S. A. Madanic, "Towards secure mobile cloud computing: A survey", Future Generation Computer Systems, vol. 29, Issue 5, (2013) July.
[9] M. R. Prasad, J. Gyani and P. R. K. Murti, "Mobile Cloud Computing: Implications and Challenges", Journal of Information Engineering and Applications, vol. 2, no. 7, (2012).
[10] Morshed, M. S. Jahan, M. M. Islam, M. K. Huq, M. S. Hossain and M. A. Basher, "Integration of Wireless Hand-Held Devices with the Cloud Architecture: Security and Privacy Issues", International conference on Cloud Computing, July-2012.
[11] "White paper, mobile cloud computing solution brief, aepona," November 2010.

International Journal Of Business Management
Available at www.ijbm.co.in
ISSN NO. 2349-3402
VOL. 2(2),2015

[12] H. Dinh, C. Lee, D. Niyato, and P. Wang, "A survey of mobile cloud computing: architecture, applications, and approaches," Wireless Communications and Mobile Computing, 2011.
[13] (Accessed on 20th July 2011) Amazon s3. [Online]. Available: http://status.aws.amazon.com/s320080720.html
Poonam S. Sharma et al, International Journal of Computer Science and Mobile Computing, Vol.4 Issue.5, May- 2015, pg. 287-293 © 2015, IJCSMC All Rights Reserved 293
[14] X. Zhang, A. Kunjithapatham, S. Jeong, and S. Gibbs, "Towards an elastic application model for augmenting the computing capabilities of mobile.devices with cloud computing," Mobile Networks and Applications, vol. 16, no. 3, pp. 270–284, 2011.
[15] Muhammad Shiraz, Abdullah Gani, "A Review on Distributed Application Processing Frameworks in Smart Mobile Devices for Mobile".
[16] "Cloud Computing", IEEE COMMUNICATIONS SURVEYS & TUTORIALS, VOL. 15, NO. 3, THIRD QUARTER 2013.
[17] Kyung Mun, Corporate Technology Strategist, Mobile Cloud Computing Challenges?http://www2.alcatellucent.com/blogs/techzine /2010/mobile-cloud-computing-challenges.
[18]IrmeeLayo., "Overcoming Challenges in Mobile Cloud Computing?" http://cloudtimes.org/2011/07/11/overcoming- challengesin-mobile-cloud-computing/ July 11th, 2011.