A Survey On Virtualization Technology and its Security Challenges in Mobile Cloud Computing

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Abstract

Mobile Cloud Computing is made up of three types of technology, in which the first is mobile computing, the second is cloud computing and the third is wireless network or wireless communication. Here we see that in Mobile cloud computing, data is being stored on the cloud, that too with the help of mobile devices. When the data is being stored on the cloud, then another technology is added to it, that is virtualization. In this paper, we have discussed the impact of virtualization on mobile cloud computing and cloud computing and what techniques are being used in it. We have done a survey in which we have also observed the research done in the last few years and it has been found that there have always been problems regarding the security of virtualization in Mobile Cloud Computing and Cloud Computing. Till through this paper, we have study virtualization technology, cloud computing and mobile cloud computing. We study there are many security issues, this type of security challenges can be seen and can be taken for research in the future.

Keywords: Mobile Cloud Computing, Cloud Computing, Virtualization, Techniques.

1. INTRODUCTION

In general, it can be said in today's time that mobile cloud computing has become a very important field. Mobile cloud computing has been made by combining three types of technology, in which the most important role is of cloud computing because mobile device in cloud computing help it. Since when we store the data on the cloud, in this case whatever Issues, benefits, challenges comes in cloud computing, we usually see it as mobile cloud computing. Cloud computing is the computing resources that are given to the clients or users through virtualization and the internet, such a large infrastructure is managed on an online platform, with the help of computing services, it is an on-demand services in which the users want data as per their wish, can store and access and receive the data [1]. So we can say that in mobile cloud computing we use cloud computing and cloud computing virtualization is used, so whatever data or information is being stored on cloud with the help of mobile

devices and internet in mobile cloud computing. Our mobile cloud computing is also affected by the problems arising in the security techniques coming in virtualization because those problems are coming with the operating system, are coming with the virtual networks, are coming with the hypervisor, are coming with the virtual machine etc., So it can be said that whatever security challenges are arising in cloud computing and virtualization technology, it can be said that there is a kind of authorization regarding the privacy and security of mobile devices usages or whatever mobile cloud computing is being used. Problems can arise from unauthorized person or hackers, due to which there is a risk of data theft.

A. Cloud Computing

In today's time, cloud computing is emerging as a very important technology. On cloud computing, we store and receive data through mobile devices or another devices. Cloud computing is a space where a lot of information or data is stored. Cloud computing means that a platform where data or information can be stored and accessed by any users or client with the help of the internet, at present   mobile cloud computing technology in which through mobile devices, users store their data or information on the cloud storage platform [2].
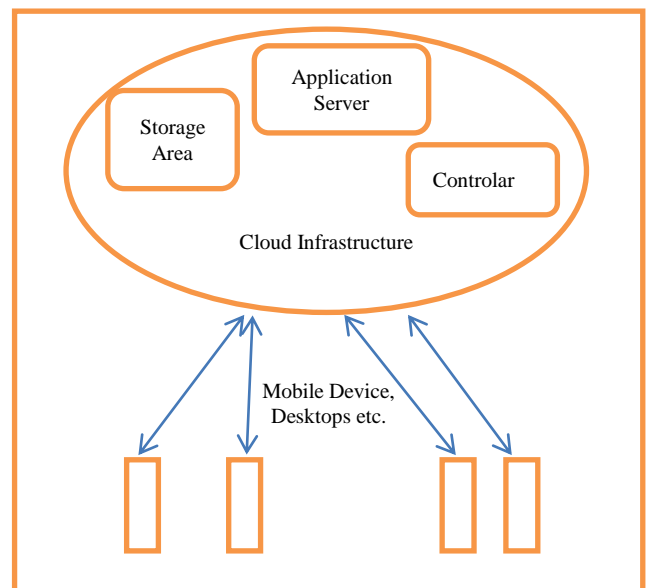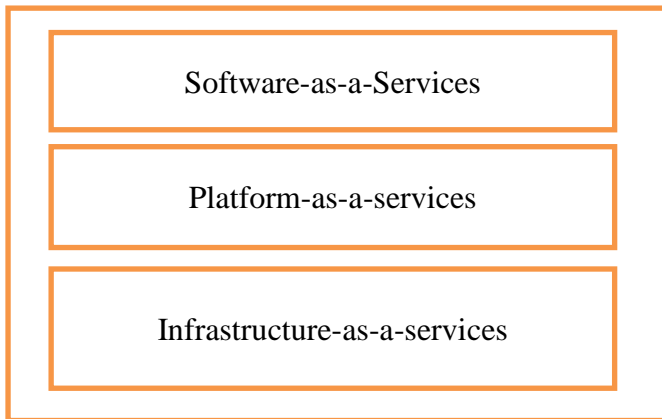

Fig 1. Cloud Computing

Cloud Computing is a type of network group, which is being used very fast in today's time in every field, whether it is in the field of IT industries, health care or in the field of education etc., Cloud computing provides us three types of services first is Software-as-a-Services, Second is Platform-as-a-Services and third is Infrastructure-as-a-Services and by using this cloud computing we are able to use mobile cloud computing in mobile devices, Cloud computing generally there are three types of public cloud, private cloud and Hybrid cloud [3].
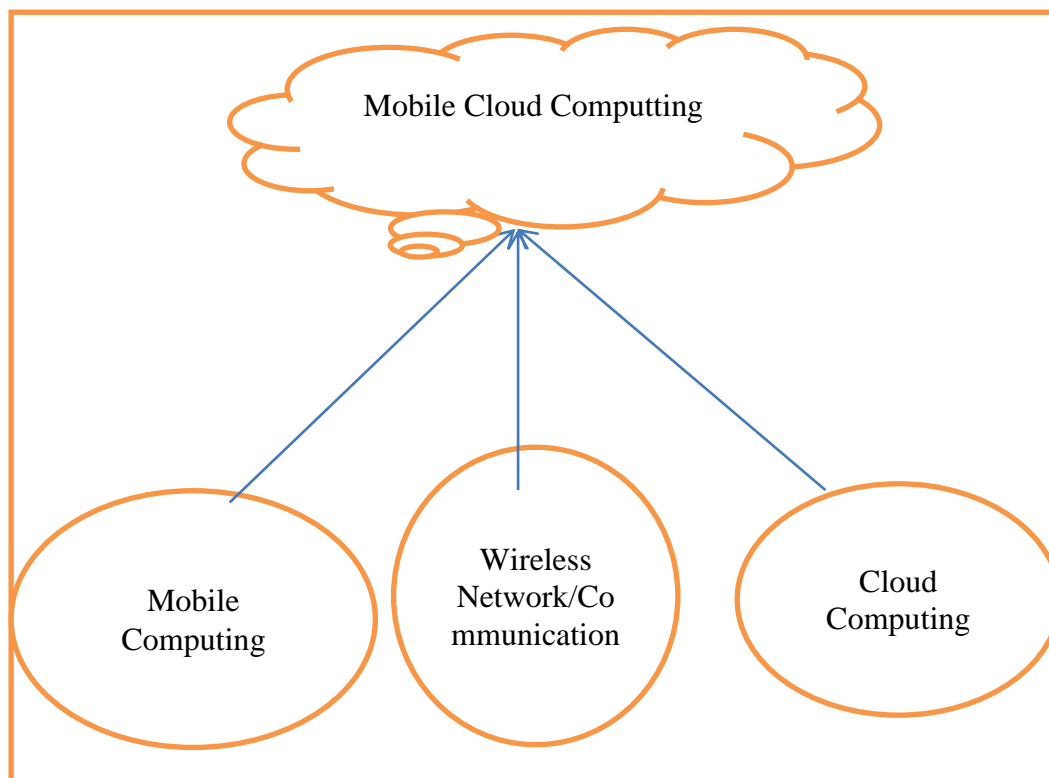

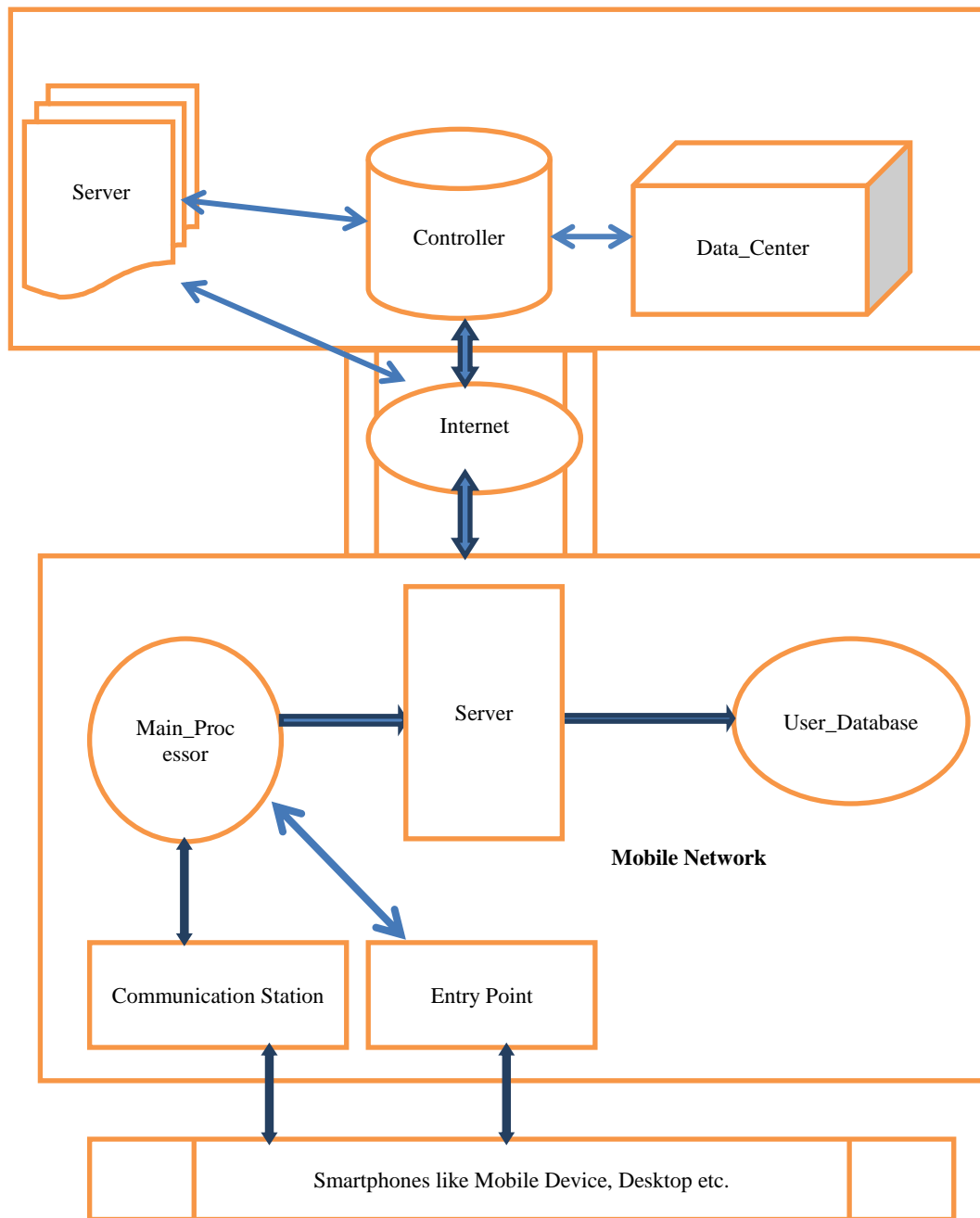**Fig 2.**Services of Cloud Computing

B. Mobile Cloud Computing

Mobile Cloud Computing is made up of three types of technology, which includes mobile computing, cloud computing and wireless networks, whose main function is to increase the computational capacity with the help of mobile device and internet [4].

Mobile cloud computing works on the platform of cloud computing, because of this cloud computing. But whatever technology of virtualization works, in a way, it also works on mobile cloud computing because on cloud we store our data and information stored through mobile device and with the help of internet. A new technology is born from the combination of mobile computing and cloud computing, which we are knowing todays as mobile cloud computing, but there are problems with different types of security because low security is provided to us, in mobile cloud computing is type of technology in which we store our data with the help of internet and mobile devices [5]

Fig 3. Mobile Cloud Computing

Fig 4. Architecture of Mobile Cloud Computing

The Mobile Cloud Computing Architecture is Consisting of three parts first is Mobile Network second is Internet and the third is cloud services. In Mobile cloud computing, users data is stored on the cloud through mobile devices or laptops or desktops, there are three ways in which we transfer our data to the cloud and it is an on-demand service [6]
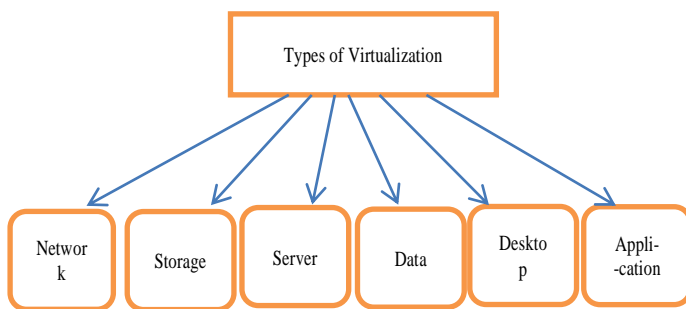
2. VIRTUALIZATION

Virtualization is a type of very important technology that is used by cloud service providers, in which the resources of many users are shared on different operating systems which work on a physical machine, this is a very effective area in which the expenses can be reduced in the field of our information technology [7]. In virtualization, different types of operating systems can be run simultaneously, in this we use different types of virtual machines on a single physical machine platform [8]. In a way, we can say that virtualization is a technology that shows the hardware of different types of operating systems on cloud computing how to work and virtualization has such capabilities that it can perform any single resources in a multiple virtual resources. It inspires us

to work on multiple physical resources, it is proving to be very beneficial for any of organization usages.[9].

Hypervisor is a very important area in virtualization which provides layer or interface between virtual server and hardware, it reads the instructions of central processing Unit or memory and provide this instruction to the agent or user which is hardware and external device manages or controls.[10]

In virtualization we see that there are many types of it which are based to implement its technology properly like its types are as follow :

Fig 5. Types of Virtualization

3. VIRTUALIZATION TECHNIQUES

In the field of virtualization technology, we get to see that there are many techniques through which virtualization can work easily on the cloud, further we will try to know about these techniques which are as follows

A. Hypervisor (VMs Monitor)

Generally, Hypervisor or Virtual Machines Monitor is a type of thin layer software that provides the ability to the virtual machine to work efficiently on the hardware, it also manages many operating systems, that the operating system provides whatever it needs [11]

B. Full Virtualization

Full Virtualization is a type of virtualization techqiues in which virtual machines work on the operating system of any underlying hardware and In full vritualization no modification is possible in the host operating system [12]

C. Para Virtualization

Para Virtualization is type of virtualization technique that establishes a kind of connection between the hardware and the vitual machines. It further improves the efficiency of the guest

operating system and the hypervisor, or it is better than full virtualization provide convenience. [13]

4. LITERATURE REVIEW

Mobile cloud computing is a technology related to cloud computing. Due to this mobile cloud computing also faces the technology of virtualization and its security challenges. The issue has emerged, so after understanding the previous papers of various research, we are providing their review so that whatever security challenges are coming, they can be worked on which are as follows :

According to Lei Chen et al. [14] Virtualization plays a very important role in cloud computing because it increases the suppleness of hardware (mobile devices) and also reduces its cost, so we can say that cloud computing can meet any type of security challenges or threats, virtualization also in a way imposes those security threats on itself such as hypervisor, security separation in virtual machine, control in virtual machine etc.

B. Asvija et al. [15] has told that Virtualization is an important technology for cloud computing technology to use cloud computing to the virtualization and Information technology of today's state-of-the art time there is a lot to expand in the field of technology, it is receiving a lot of security to the security of the hardware, such as the hypervisor attacks, memory duplicity attacks, firmware attacks etc. Virtualization technology many benefits in cloud computing are also available to see us but security threats are also a serious problem because in the cloud environment or infrastructure Virtualization technology is very broadly used.

According to Vimlesh Kumar et al. [16] The concept of cloud computing without virtualization technology is incomplete because virtualization makes cloud computing perfect, so whichever is the security attachment or Issues or privacy in cloud computing there are also a challenges to present the virtualization because cloud computing and virtualization are supplemented by each other, they have given information about several types of security attachments such as cloud attacks operating system hosts on the infrastructure Guest, on the attacking networks of the hypervisor and also have some measures to avoid them, such as secure programming to provide a good security of networks we can reduce the incoming problems from the security.

Nadiah M. Almutairy et al. [17] has told that Security Challenges in cloud infrastructure in cloud computing and virtualization technology it is getting complicated as our data

is being stored in virtual environment which is getting vulnerabilities in hypervisor and increasing security risk.

Yuping et al. [18] has pointed out that there are many types of security risks being seen in cloud computing from the point of view of virtualization because there is a need to improve the security services of cloud environment virtualization so that our data on the cloud can be secure. That the security and integrity at the virtualization layer is in a way the complete security of the cloud so that our virtualized data on the cloud can be protected.

Edren Dacaymat et al. [19] has tolds that In today's present time, cloud computing and virtualization are playing a very important role in the computer world, with the help of them, we are restoring our information to the cloud, which is also stealing our data by unauthenticated person or hackers. Due to

which the information of our organization or users is not able to remain secure, it includes dos attack, operating system attack etc. Virtual machines which work in virtualization which are used to make many virtual systems work on a single hardware unit. The machine provides services to the users and this is where unauthorized attacks are also possible.

S Mahipal et al. [20] describe that In order to improve the cloud computing quality of services, there is a need to work on the security of the virtual machine because the virtual machine on the cloud platform acts like a physical and there are different types of patches on it, which can improve the quality of the virtual machines. Make the services unsecure, including hypervisor attacks, they have told that there are different types of attacks on the cloud like virtual machine side channel attacks, hypervisor attacks, virtual machine migration attacks etc.

TABLE 1. SUMMARY OF LITERATURE REVIEW AND VIRTUALIZATION SECURITY CHALLENGES IN MOBILE CLOUD COMPUTING

REFERENCES NO.	PUBLICATION YEAR	PAPER TITLE	SECURITY CHALLENGES/PURPOSE OF RESEARCH
[4]	2019	Research on Virtualization Security in Cloud Computing	security threats on itself such as hypervisor, security separation in virtual machine, control in virtual machine etc.
[5]	2019	Security in Hardware Assisted Virtualization for Cloud Computing – State of the Art Issues and Challenges	security of the hardware, such as the hypervisor attacks, memory duplicity attacks, firmware attacks etc.
[6]	2018	Security Issues With Virtualization in Cloud Computing	cloud attacks operating system hosts on the infrastructure Guest, on the attacking networks of the hypervisor
[7]	2019	A taxonomy of Virtualization Security Issues in Cloud Computing Environments	Security Challenges in cloud infrastructure in cloud computing and virtualization technology it is getting complicated as our data is being stored in virtual environment which is getting vulnerabilities in hypervisor and increasing security risk.
[11]	2018	Exploring Problems with Virtualization in Cloud Computing	stealing our data by unauthenticated person or hackers. Due to which the information of our organization or users is not able to remain secure, it includes dos attack, operating system attack etc.
[12]	2021	Virtual Machine Security Problems and Countermeasures for Improving Quality of Service in Cloud Computing	Make the services unsecure, including hypervisor attacks, they have told that there are different types of attacks on the cloud like virtual machine side channel attacks, hypervisor attacks, virtual machine migration attacks etc.

According to Boubakeur Annane et al. [21] Mobile Cloud Computing is an on-demand technology by using which users feel themselves confidently secure, but cloud virtualization services are not a secure platforms, due to which the users in mobile cloud computing also have to face problems in virtualization. Key attacks that affect mobile cloud computing and make them unsecured, such as hypervisor attacks, resident attacks, distributed attacks etc. In this, we secure our sensitive and private data with the help of virtual machines, but still the cloud data being stored, the virtualized based data storage services has security issues.

According to Zohreh Sanaei et al. [22] At present, mobile cloud computing has emerged as a very new technology that establishes the relationship between cloud mobile users and cloud providers, Mobile Cloud Computing is a very powerful technology in which many bulk data is transferred to the cloud with the help of mobile devices. In this, different types of service providers provide different types of facilities to the infrastructure users but due to the use of virtualization technology in the cloud, various types of problems related to network, privacy and security are being seen.

5. CONCLUSION AND FUTURE SCOPE

In this paper, we studies What is Mobile Cloud Computing, What is Cloud Computing, What is Virtualization and its types and we also study virtualization technologies. According to the research done in the last years, we have found that cloud computing is using Virtualization Technology, there are many problems in it, we found that in virtualization technology attacks on Virtual Machine Migration attacks, Hypervisor attacks, Memory Duplicacy attacks, Distributed data attacks etc.

Therefore, there is a need to improve the security of virtualization technology because in mobile cloud computing, mobile users store their data on the cloud platform with the help of mobile devices using virtualization technology. According to the research done ther are many security issues in Virtualization. Through this paper we look at the security issues in the future research area and need to work on it and we proposed work on its security in virtual machines, hypvisors, virtual networks and vitual storage etc.

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