

OVERVIEW OF VIRTUALIZATION IN CLOUD COMPUTING

Thanushree Gowda*¹, Vanishree S*², Varshitha M S*³, Yashaswini K*⁴,
Nethravathi B*⁵

*^{1,2,3,4}Student Department Of Information Science And Engineering, JSS Academy Of Technical Education, Bangalore, Karnataka, India.

*⁵Asst.Professor, Department Of Information Science And Engineering, JSS Academy Of Technical Education, Bangalore, Karnataka, India.

ABSTRACT

Cloud computing is a useful technology and it has been emerging fastly by delivering different types of services via internet. It includes several tools and application like data storage, database, software and network service. In the Cloud users get an opportunity to store and retrieve their files from any web enabled services. With the help of cloud computing the IT cost can be lowered. The users can share the data and they can access the services according to their requirement. Cloud Computing is the preferred solution for companies extending the infrastructure or invocations. Virtualization and virtual environment are the main key components for data sharing, computing and storage services in cloud computing. Virtualization is in the IT industry from past many years and it's super relevant to building the cloud services. With this technology it is possible to run multiple operating systems and applications which is completely isolated from each other. It is commonly used in storage area network which allows to share the resources among multiple customers or organization at a time. This paper has a detailed review on virtualization technology and its role in cloud computing is explained.

Keywords: Cloud Computing, Virtualization, Network Virtualization, IaaS, PaaS, SaaS.

I. INTRODUCTION

Cloud computing is a system which provides on-demand services via internet connected off-site data centers. It is a prominent technology which is widely used all over the world. Cloud computing is named as such because users can use a remote application which are present outside the working site through internet connection devices. There are several advantages in cloud computing such as democratizes access to easier maintenance, reduced IT costs, versatility, reliability, security, and scalability.

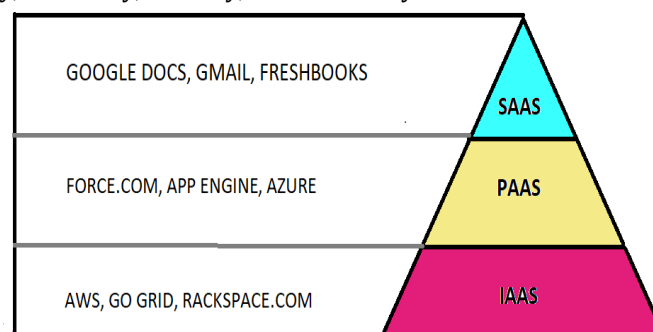


Figure 1: Cloud Computing Services.

The cloud application is controlled by the user while the infrastructure is controlled by the cloud provider. Cloud computing has three-tier services, such as Software as a Services (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). In SaaS, Applications are offered by the cloud provider to the user through a pay-as-you-go model or on-demand. Before using the services, there is no need for the user to buy the license or to install the application. This model includes platforms like Microsoft office 365, Google document and Dropbox. In PaaS, the third-party provider supplies the hardware and the software application platforms. PaaS vendors provides development tools, middleware, operating system, database management system and infrastructure. This model includes platforms like Heroku, SAP cloud and Aneka. In IaaS, the public cloud providers deliver everything from operating systems to servers on a pay-per-use basis. This model includes platforms like Amazon Web Services (AWS) and Microsoft Azure.

Cloud Deployment model has four types namely Publiccloud, Private cloud, Community cloud and Hybrid cloud. The Public cloud provides both services and infrastructure which are shared by all customers and it is less secure. The Private cloud infrastructure is used by a single organization. It is also called as corporate model or internal model. The server can be hosted on the premises of the owner company or it can be doneexternally and it is considered as more secure. Community cloud is the hybrid form of the private cloud. Community cloud enables services and systems which are shared by several organizations with shared common interest. It is managed by athird-party or an organization. The composition of public cloudand private cloud is called hybrid cloud. Cloud computing has five vital characteristics, they are On-demand self-service, Broad network access, Resource pooling, Rapid elasticity and Measured service.

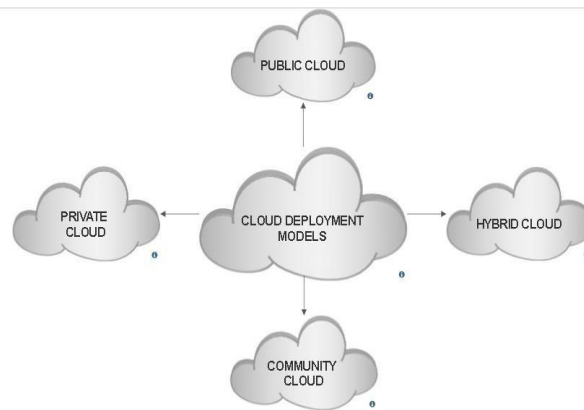


Figure 2: Types of Cloud Computing

Virtualization plays a major role in cloud computing. Virtualization allows single machine to run multiple platforms simultaneously. so, virtualization enables us to use same computer to work on various environment. In virtualization allvirtual environments is arranged to ensure its own security andintegrity. Virtual Machine is the one which enables to run multiple platforms in the single machine concurrently. Virtual machine is created using both hardware and software engineering. Cloud computing system is bringing a tremendousfundamental change in Information Technology. Virtualization improves capacity and lowers the cost of IT infrastructure in cloud computing.

Virtualization technology provides an abstract environment about the underlying resources and simplifies their use, supports replication and separates users from one another, which increases elasticity of the system. The cloud often includes virtualization software which manipulates the hardware as a part of their service package. With the help of virtualization multiple operating system and applications can run at a single time on the same machine and a same hardware,by this we can increase the flexibility of the hardware.

II. ROLE OF VIRTUALIZATION

Virtualization plays significant role in cloud computing, which helps to use one system separately by multiple users. This technique is done by giving a logical name to all the physical resources and based on demand it provides a pointer to those physical resources. To share data and information virtualization technique is very important in cloud. From underlying hardware virtual machine is logically separated. A machine called host by which the virtual machine is created and this virtual machine is known as guest machine. The hypervisor is a firmware which user a combination of different types hardware virtualization. The main objective of virtualization is improvement in security, energy saving, flexibility andreduction in cost.

III. HISTORY OF VIRTUALIZATION

Concept of virtualization was first introduced in late 1950s. Since there were no personal computers at that time virtualization did not become successful until 1990s. IT companies realized that they could save money and time by moving from physical to virtual environment. In 1964 IBM began to explore virtualization on mainframes, it released an operating system called VM running on mainframes 1972. In the development of robust time-sharing solution system IBM had invested a lot of effort and in 1999 VMware is launched.

In 2004 Intel engineers began adding hardware virtualizationsupport to Xen to prepare the necessary software

for the upcoming new processor. Under their efforts Xen 3.0 was released in 2005, which began to officially support Intel's VT technology. Between 2006 and 2010 major traditional IT vendors introduced their own products in terms of virtualization. In 2007 HP introduced HP-UX Integrity virtual machines and Microsoft joined Hyper-v in Windows Server in 2008. Since then, virtualization has become very successful in today's IT world.

IV. TYPES OF VIRTUALIZATIONS IN CLOUD COMPUTING

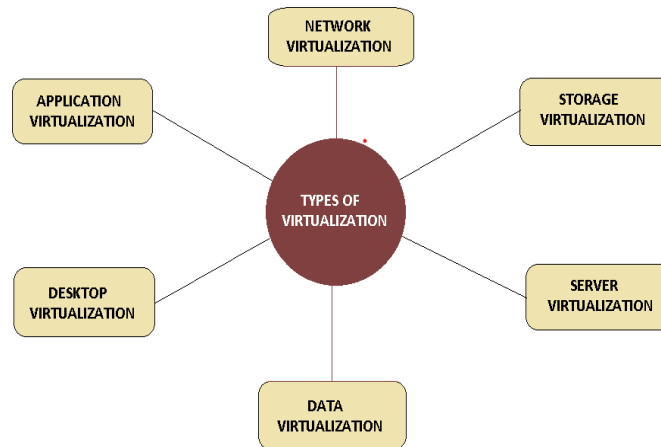


Figure 3: Types of Virtualization

1. Network Virtualization:

Network virtualization helps user to create multiple individual networks from one physical area network (LAN). In this type of virtualization, all physical networking tools and other resources are combined into a single software-based resource. Network virtualization improves overall network's productivity and efficiency, flexibility, reliability, security and scalability. Few examples of network virtualization are JunosV App Engine, Cisco Nexus and 6WIND Virtual Accelerator.

2. Storage Virtualization:

A virtual storage system manages multiple physical storage arrays which appears to be a single storage device. The resources needed can be increased by the centralized virtual storage system by increasing availability and flexibility. This virtualization software provides various advantages such as maintaining smooth operation, better work flow is created, downtime is reduced, load balancing, cheaper storage and the performance and speed are better optimized. Few examples for storage virtualization are the transitional of physical disk address: CHS—Cylinders, Heads and sectors—addresses and Logical Block Addresses (LBAs), logical unit number and RAID groups.

3. Server Virtualization:

In Server virtualization' masking of server resources takes place. Instead of assigning one task to one server, in server virtualization multiple tasks run from one server. This causes an increase in performance and the operating cost is reduced. Few examples of server virtualization are FreeVPS, LinuxVserver and OpenVZ.

4. Data Virtualization:

In Data virtualization, data is collected from various sources and it manipulates, segregates, delivers and retrieves data without any data specification. The on-demand integration is delivered to the users by using data virtualization, which also removes latency. The technical details of the data are arranged logically so that its virtual view can be accessed by its interested people and users through various cloud services remotely. Few examples of data virtualization are JBoss, TIBCO Data Virtualization and Denodo.

5. Desktop Virtualization:

The other name for this type of virtualization is client-server computing model. Desktop virtualization enables to store the users' operating system on a server in a data center (this basically gives someone an entire computing platform without the hardware). Through this type of virtualization, employees can work conveniently from their homes. The data transfer is secured, and any risk of data theft is minimized. Few

examples of desktop virtualization are VMware ThinApps Citrix XenApps, VMware View and Microsoft Remote Desktop Services.

6. Application Virtualization:

Application virtualization helps a user to run an application on a computer, without relying on the computer hardware or software. Updating, maintaining and fixing the applications will be easier for an organization by using application virtualization. Admin without entering in to the user's desktop, they can modify and control access permissions to the application. Another benefit of this type of virtualization is portability. Few examples of application virtualization are XenApp, VM Thinapp, Zenworks and Microsoft App-V.

V. BENEFITS OF VIRTUALIZATION

- Virtualization reduces work load.
- Virtualization is cost predictable and it is cheaper.
- Whenever there is a need for more resources, it can be obtained from available pool of resources and this is known as scalability.
- It promotes digital entrepreneurship and offers a better uptime.
- Through virtualization the managing of resources is much easier.
- Virtualized infrastructure can prevent entire system from failure.
- Virtualization allows automatic update to both hardware and softwares by installing on their third-party provider.
- It improves the efficiency of the resources in the virtual environment.
- The energy can be used efficiently through virtualization.
- The IT operations can be done more smoothly.
- There is an easy transfer of machine or data.
- Faster deployment of resources can be done when virtualization is being used.

VI. DRAWBACKS OF VIRTUALIZATION

- The cost of implementation can be very high and may require powerful machine.
- The scalability issue is created.
- Several links in chain is required which must work together cohesively.
- Virtualize environment is often questioned for data security since the servers are managed by third party providers.
- Virtualization takes time - It costs uses time over the long run when compared to local system.
- Some IT infrastructures might not be compatible with virtualized solution since all servers and application are not virtualization friendly.
- There is a issue of availability when virtualized servers go offline and every website they host would also fail.

VII. RELATED WORKS

In [1], The Developments and Trends related to virtualization is proposed. The published papers in reputable magazines are examined and the trends in cloud virtualization is identified in this paper. In [2], Virtualization technology and its importance in cloud computing is studied and a detailed review on role of virtualization is presented in his paper. In [3], Virtualization security, its requirements and its solutions for cloud computing service is addressed in this paper. In [4], Virtualization in Cloud Computing is discussed. This paper also explains about virtualization, benefits, future scope and its challenges. In [5], Challenges on Virtualization Security in Cloud Computing Environment is proposed. This paper addresses about providing security to virtualization layer by using several security vulnerabilities and various algorithms.

In [6], A detailed study on virtualization and its concerns in cloud is done. In [7], A detailed review on open-source techniques used in virtualization, its challenges and the future scope is explained. It also focuses on the improvement of elasticity of the resources using virtualization. In [8], Explained on Virtualization Network Security in the field of Cloud Computing. The main focal point is on Cloud Network Security. It discusses about

the benefits of cloud computing. In [9], Research and representation on the topic of Virtualization Technology in the field of Cloud Computing. In this paper the cloud computing platform architecture based upon virtualization is put forward and also performance estimation in server virtualization is discussed.

VIII. CONCLUSION

One of the most emerged technology in IT industry is cloud computing. It is used for various number of activities but conspicuous among them are storage and computation. Cloud computing is secured if and only if virtual machines are secured. Cloud computing provides many services including storage, databases, server, networking and software analytics over the internet. The services of cloud help in lowering the operating costs in the infrastructure more efficiently. Virtualization plays main role cloud computing, Cloud computing is inseparable from virtualization, which is the heart of the Cloud computing. Virtualization allows an organization to make use of its IT resources effectively. This technology which enables us to run multiple platforms by sharing a single machine concurrently, so in a simple way we can say that creating the virtual version of server, storage device, a desktop or an operating system is virtualization. Virtualization is in the IT industry from past many years and it's super relevant to building the cloud services. With virtualization it is possible to run multiple operating systems and applications which is completely isolated from each other. This paper briefly explains regarding cloud computing and how virtualization emerged in cloud computing. We have discussed the review of virtualization in cloud computing and how the virtualization has been evolved in IT industry, pointed out some of the important roles of virtualization, their benefits and drawbacks in the present world. Virtualization also has various types which increases its importance in the present IT world. As virtualization is adopted in a largest rate in the present industry, research is still going on to push the boundaries of virtualization in the future.

FUTURE SCOPE

Technology is developing faster than ever before, cloud computing can accelerate the future. The virtual services holds the promising future across the IT sectors, the changing of consumer thinking patterns and growing of business demands there is a rapid transformation in the market and virtualization will expand further to meet the ever growing demand.

- With increasing in flexibility, agility and portability across IT infrastructures, there is a need for more software refined environments, automation and integration, virtualization will play a core part in the future.
- Security for the data in virtual cloud computing is getting more complicated because when compared to physical technologies virtual machines and servers are more secure and with the use of compliance technique the security of virtual environment can be tightened up against the new security threats.
- Migration time and data loss might be minimized.
- The characteristics like reduction in energy consumption, improvement of hardware efficiency and boosting of sustainability will be helpful in transforming the organization by the virtualization software market.

IX. REFERENCES

- [1] Isaac Odun-Ayo, Olasupo Ajayi, Chinonso Okereke (2017) "Virtualization in Cloud Computing : Developments and Trends", ICNGCIS.
- [2] Virendra Tiwari, Dr.Akhilesh A. Wao, Balendra Garg (2020), "Study on virtualization technology and its importance in cloud computing environment", IJCRT.
- [3] Shengmei Luo , Zhaoji Lin , Xiaohua Chen, Zhuolin Yang, Jianyong Chen (2011), "Virtualization security for cloud computing service", International Conference on Cloud and Service Computing.
- [4] Malhotra L, Agarwal D and Jaiswal A (2014), "Virtualization in Cloud Computing", Journal of Information Technology & Software Engineering.
- [5] Anitha H M, P.Jayar (2018)," Security Challenges of Virtualization in Cloud Environment", International Journal of Scientific Research in Review Paper .Computer Science and Engineering Vol.6, Issue.1, pp.37-43, Feb .
- [6] T.Swathi, K.Srikanth, S. Raghunath Reddy, "Virtualization In Cloud Computing", International Journal of Computer Science and Mobile Computing.

-
- [7] Durairaj. M, Kannan.P (2014), "A Study on Virtualization Techniques And Challenges In Cloud Computing", International Journal Of Scientific & Technology Research Volume 3, issue 11, November.
- [8] Junjun Sun, Ying Zeng, Guowei Shi, Wei Li and Zhihong Li Xinjiang (2018), "The Research for Virtualization Network Security on Cloud Computing", ICAITA.
- [9] Weimin Ding, Benjamin Ghansah and Yanyan Wu (2016),"Research on the Virtualization Technology in Cloud Computing Environment", International Journal of Engineering Research in Africa ISSN: 1663-4144, Vol. 21,pp 191-196 Trans Tech Publications, Switzerla.
- [10] Manisha Thakur and Dr. Neeru Bhardwaj ,"A Review Paper on Cloud Computing & Security Issue", IJCSMC.
- [11] Gurmeher Singh Puri , Ravi Tiwary and Shipra Shukla, "A Review on Cloud Computing",2019.
- [12] Karan Handa and Preeti,"A REVIEW PAPER ON CLOUD COMPUTING",2017.
- [13] Samaher Al-Janabi and Ibrahim Al-Shourbaji,"Mobile Cloud Computing: Challenges and Future Research Directions", 2017.
- [14] Kamyab Khajehei,"Role of virtualization in cloud computing", April 2014
- [15] Ruay-Shiung Chang and Jerry Gao,"Mobile Cloud Computing Research – Issues, Challenges, and Needs ", 2013.
- [16] Michael Kretschmar and S Hanigk, "Security management interoperability challenges for collaborative clouds", 2010.
- [17] Loganayagi, S. Sujatha" Creating virtual platform for cloud computing||", IEEE International Conference on Computational Intelligence and Computing Research (ICCIC 2010), 28-29 Dec. 2010, pp.1-4.
- [18] Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi Mastering Cloud. Computing McGraw Hill Education.
- [19] Dan C. Marinescu, Cloud Computing Theory and Practice, Morgan Kaufmann, Elsevier 2013.