IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Vol. 10, Issue 7, July 2021

DOI 10.17148/IJARCCE.2021.10773

A Survey on Virtualization in Cloud Computing

Misbah M. Pathan, Prof. Riddhi Patel

Dept. of Computer Engineering, LDRP Institute of Technology & Research, Gandhinagar, India

Abstract: Cloud computing is a rapidly emerging technology. This technology offers access of services, software, applications, database storage and required resources for infrastructure computing to any user from anywhere. Virtualization is also a key feature in cloud computing. Many organizations uses virtualization for cost savings, to reduce power consumption, Server Consolidation, Testing and Development, Dynamic Load Balancing and Disaster Recovery, Virtual Desktops and Improved System Reliability and Security. This paper will be focused on emerging virtualization technology, classification of virtualization, applications, advantages and disadvantages of virtualization.

Keywords: Virtualization, Cloud Computing, Classification of Virtualization.

1. INTRODUCTION

According to Wikipedia, Virtualization refers to the act of creating a virtual version of something, including but not limited to a virtual computer hardware platform, operating system, storage device, or computer network resources [1].Virtualization includes server virtualization, network virtualization, storage virtualization, application virtualization and desktop virtualization. In recent times, Virtualization techniques has recorded many advantages such as reducing costs and power, simplified administration and deployment, improving mobile applications, enabling cross platform support, etc [2].

A key question about virtualization and cloud computing is: How to build the architecture of cloud computing platform based on virtualization, and how to give the evaluation of the impact of server virtualization on the performance of a cloud network [3]. One possible way to solve this problem is to build a cloud computing platform with the existing virtualization products on the market. Furthermore, the evaluation results are given on the performance of server virtualization by comparison to several application examples [3].

2. CLASSIFICATIONS OF VIRTUALIZATION

The list below shows the major classifications of virtualization [4][5].

1) Hardware Virtualization
2) Software Virtualization
3) Data Virtualization
4) Memory Virtualization
5) Desktop Virtualization
6) Storage Virtualization
7) Network Virtualization

Hardware Virtualization

Hardware virtualization is also known as hardware-assisted virtualization or server virtualization runs on the concept that an individual independent segment of hardware or a physical server, may be made up of multiple smaller hardware segments or servers, essentially consolidating multiple physical servers into virtual server that run on a single primary physical server. Each small server can host a virtual machine, but the entire cluster of servers is treated as a single device by any process requesting the hardware. The hardware resource allotment is done by the hypervisor. The main advantages include increased processing power as a result of maximized hardware utilization and application uptime.[8]

Software Virtualization

Software Virtualization involves the creation of an operation of multiple virtual environments on the host machine. It creates a computer system complete with hardware that lets the guest operating system to run. For example, it lets you run Android OS on a host machine natively using a Microsoft Windows OS, utilizing the same hardware as the host machine does.[8]

Data Virtualization

It lets you easily manipulate data, as the data is presented as an abstract layer completely independent of data structure

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and database systems. Decreases data input and formatting errors.[8]

Network Virtualization

It lets you easily manipulate data, as the data is presented as an abstract layer In network virtualization, multiple sub-networks can be created on the same physical network, which may or may not is authorized to communicate with each other. This enables restriction of file movement across networks and enhances security, and allows better monitoring and identification of data usage which lets the network administrator's scale up the network appropriately. It also increases reliability as a disruption in one network doesn't affect other networks, and the diagnosis is easier.[8]

Storage Virtualization

Multiple physical storage devices are grouped together, which then appear as a single storage device. This provides various advantages such as homogenization of storage across storage devices of multiple capacity and speeds, reduced downtime, load balancing and better optimization of performance and speed. Partitioning your hard drive into multiple partitions is an example of this virtualization.[9]

Memory Virtualization

Memory virtualization decouples volatile random access memory (RAM) resources from individual systems in the data center, and then aggregates those resources into a virtualized memory pool available to any computer in the cluster. The memory pool is accessed by the operating system or applications running on top of the operating system. The distributed memory pool can then be utilized as a high-speed cache, a messaging layer, or a large, shared memory resource for a CPU or a GPU application.[12]

Desktop Virtualization

Desktop Virtualization with Cloud provides us with the solution. It helps to resolve many concerns such as Cost reduction, Data Security and Efficient use of storage and technology. Cloud Computing helps to provide maximum storage with low computational cost. Hence the Institutions find this method more affordable and promising. which reduces the total hardware with software. [11]

3. ADVANTAGES AND DISADVANTAGES OF VIRTUALIZATION

The advantages of switching to a virtual environment are abundant, saving cost and time with this advance in technology providing much greater business continuity and ability to recover from disaster;[6] following may be included as advantages of virtualization [7]:

Advantages of Virtualization:

- It is cheaper and reduces the workload.
- It offers better uptime and faster deployment of resources.
- It promotes digital entrepreneurship.
- It provides better disaster recovery solutions.
- It allows efficient and economic use of energy.

Disadvantages of Virtualization:

- It can have a high cost of implementation and may require powerful machines.
- It still has limitations.
- It creates a security risk and creates an availability issue.
- It creates a scalability issue and takes time.
- It needs several links in a chain that must work together cohesively

4. APPLICATIONS [10]

1) XEN
2) KVM
3) OpenVZ

CONCLUSION:

In this analytical article, we've covered what's virtualization in cloud computing, sorts of virtualization, different techniques and the way to know that it's very promising so you actually need this technique in your IT infrastructure. Virtualization in cloud provides a simple process to line up environment within the cloud, so you don't need to manage tons of them. By this system user of cloud shares the info present within the cloud which may be application software etc. Mainly Virtualization technique helps us to supply the pool of IT resources so as that we will share these resources

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in order get various benefits within the business. Usually, it's done by centralizing the executive parts to enhance scalability, productivity and workloads, and lots of businesses derive tons of advantages from it. Thus, virtualization is continuously gaining popularity.

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