Role of Virtualization and Its Techniques in the Field Of Information Technology

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Abstract: The term virtualizations play very imperative role in the field of information technology. With the increasingly enhancement in technology virtualization and cloud computing are become the hottest research area because of number is reasons such as reducing cost, maintaining multiple data on a single node and improve the flexibility of application. The virtualization is a fundamental technological innovation that permits to developed creative solution for every field. The virtualization is also used to describe the usage of cloud computing for faster work. Virtualization gives us huge amount of benefits like central environment control management; enhance disaster recovery capability, central control of the desktop, reduce power consumption. In the process of virtualization we divide the single server into multiple servers for increase the working compatibility of the computer system. By this paper we explore the server, client and storage virtualization .This paper explains the basic system of virtualization and its benefits in different areas. This paper also introduced the concept of cloud computing collaborating with virtualization. This paper will also explore the future use of virtualization in the cloud computing

Keywords : Virtualization, cloud computing, server virtualization, client virtualization and storage virtualization.

INTRODUCTION

Virtualization is very useful platform in today’s time in IT industry. Virtualization is process by which we could share one operating system for different module at a same time. The process of virtualization is act with the help of virtual machine (VM). The virtual machine is an intermediate between hardware components and end user. The VM is very supportive for humanizing the execution speed of system. The concept of virtualization was introduced in the year 1960-1970. The working scenario of virtualization is depend upon on virtual environment for any program to run on an client machine as guest without interrupting and interfering any interaction from services and programs of host machine. After introduction of this process we would capable for using multi programs simultaneously without any disturbance. In modern era the cloud computing is very vital concept which is introduced with the help of virtualization. According to NIST (National Institute of Standard and technology) Cloud computing is a model for facilitating expedient, on demand network access to a shared pool of configurable computing resources such as networks management, server’s management and applications management. Virtualizations provide us facility to run two environments on same machine and these two environments are completely isolated with each other.

Fig1- Working Scenario of Virtualization

There are number of aspects where we considered the virtualization as a beneficiary in the terms of security, reliability, availability and cost. In this paper we described why virtualization is very necessary in the field of computer science and technology.

Firstly security is very initial hand on aspect of virtualization. If we want to run different software on two different platforms than they don’t interrupt the working of each other that we ought to put in shell. For example if we may want the run the Apache server on the Linux and similarly MS SQL on the Window platform so there is no chance of interruption between the working of those two platform on a same node. The security play very important role for manage the interruption process.

Secondly system reliability and availability of software, in this there is no chance if some failure
occurred in one machine that may not cause the working of other machine. This feature also manage the redundancy of data, means if we have been save any information on one virtual machine so don’t replace the information of another virtual machine.

Thirdly cost reduction by combined smaller servers into more powerful server, because of that feature we could share many modules at a very low cost for each virtual machine for performing operations in the term of personnel, floor space and software licenses. Virtualization is used to decrease the cost ranging from approximately 30-50 percentage.

Forth is legacy application which is used to describe the migration of module from one operating system on a single virtual machine, legacy application is used to manage previous data on the previous operating system working as a guest in virtual machine. It is also used to reduce the migration cost.

The term virtualization is described in the earlier days in the form of server, desktop (client) and storage virtualization. In which we explain how data storage is managed in between the client and server nodes.

VIRTUALIZATION TYPES

The virtualization is categorized into three parts and each part having their descendants.

**SERVER VIRTUALIZATION**

Server virtualization is most prevailing type of virtualization in today’s era. In this technique we concern with host and guest operating system. In this each virtual machine is run its individual system act as guest operating system and this guest operating system is runs onto another operating system act as host (server) operating system with the help of virtualization software. In this method a special console is used to manage the working of all application at administrator level is called as Virtualization Management Console (VMC). Server virtualization is defined by different types which are given below.

**Guest OS/ Virtual Machine Model**

This type is most commonly used type of server virtualization. In this model each virtual machine works as an individual instance of operating system. The software of virtualization is runs automatically on the another operating system and this operating system is referred as Host Operating System because it endow with the execution milieu for virtualization. In this method it is not mandatory when we works with host computer, does not required any alteration in the guest operating system. The most popular examples of this method are Parallels Workstation, VMWare Workstation, VMWare GSX (Ground Storm) server and oracle virtual box. The following diagram shows this method.

**Hyper based virtualization**

In this type of virtualization a special interaction layer is called as Virtual Machine Monitor and it’s also popular by Hypervisor. The hypervisor is fall between the hardware and virtual machine. This method provides the necessary features and services required for smooth operation and execution of virtual machines. Hypervisor is also indicated ensnare and respond to protect CPU instructions generate by virtual machine. According to below diagram a special VM administrative console is used to manage the whole working of each virtual machine. Hypervisor is execute directly on their hardware and it is also used its own separate CPU, storage unit and other processing elements without any interaction form other machine. In this machine there is no restriction on the access of its hardware. With the help of diagram we show the structural view of Hyper based Virtualization.
Para Virtualization
This is very important server virtualization technique. This model is based on the hypervisor virtualization. In this model the trapping and emulation is eradicates which is associated with software implementation virtualization. Before installation of this model we must recompiled and modified the guest operating system. Due to this modification the working of guest operating system is enhanced and have got opportunity to communicate directly with the hypervisor and eliminates overhead occurred from emulation. This technique is widely used because of two factors one for cost flexibility and another one is security. The very big example of this model is Xen, which works on the Linux platform. The diagram show its structural view.

Full Virtualization
This model is almost similar to the Para virtualization model. The very big positive end of this model is, it could imitate the underlying functionality of hardware when it is necessary. Full virtualization model affect the hypervisor to trap the operations of machine such as operating system uses to read and execute the instructions and perform input/ output operations. Because of this modification feature of this model unmodified operating system is not eligible to run on the hypervisor. This technique is used by VMWare ESX server to achieve virtualization. In this model the customized version of Linux is used and popular as Service Console. This model is slow than Para virtualization.

CLIENT VIRTUALIZATION
The client virtualization is also referred as Desktop virtualization that is used to separate a computer desktop environment from the physical computer. In the client virtualization the client machine is act as centralized remote machine and can easily handle all operations perform in the client machine. The client provides a special feature for user that user can remotely login in the computer without any interruption from any location. The client virtualization is mostly used in data center where images for all personal desktop is hosted on data center server and every user can easily interact with this server. The client virtualization is defined with the help of three basic approaches (types).
Fig7-Client virtualization

Virtual Desktop Infrastructure (VDI)

Virtual Desktop Infrastructure is defined as remote display protocol which is used to manage virtual machine in centralized manner and ensure that client PCs are connected in point to point network and interact easily with each other.

Virtual Desktop Infrastructure is a discrepancy of client server computing model and in some situation it’s called as server based computing model.

The basic two approaches followed by Virtual Desktop model one is persistent VDI and another one is non-persistent VDI. In persistent VDI each client works with his or her own desktop image will be used for future purpose. But in other word non persistent VDI endow with a puddle of homogeneous desktops that user can access when he/ she will required. After used by any user non persistent VDI are revert back to their original state.

The advantage of this method is saving money because its software licensing cost is not much and also it takes less manpower to manage and troubleshoot problems. It also facilitate the maintenance of desktop after last logging of the system can be reset wiping and clean any kind of downloading.

Presentation virtualization

It is also defined as terminal services or Remote Desktop Services (RDS) is most popular and mature client virtualization architecture. In this type of virtualization all applications run on shared window servers whose are hosted in a remote data center only for those application whose are presented on the desktop of user.

The dedicated remote display protocol is used to redirect the user input over the network to the server. The client can be either dedicated a thin client or a software client that runs on a converted pc, tablet and Smartphone.

Application virtualization

Application virtualization is also referred as Application Streaming; it is the combination of presentation virtualization and virtual desktop infrastructure virtualization. With the help of this virtualization application run locally on the computing device but not installed on that device.

In addition applications are enclosed so because of that feature they run inside a virtualization layer that controls via operating system. Many system dependencies and compatibilities problem removes in this virtualization. A single application virtualization package can be used transversely presentation virtualization, VDI, IDV and other conventional systems.

User profile virtualization

User profile virtualization is also popular as simply user virtualization is used to delivers a standard client configuration not only to user’s desktop PCs. In this virtualization user have not any needs to configure on desktop PCs, he/ she would be easily interacting with application on Smartphone and tablets. With the help of user profile virtualization what a user sees on one device is what is seen on all devices. This is used to generate transition settings from one operating system to another operating system.

STORAGE VIRTUALIZATION

The storage virtualization is very secure virtualization because in this we used the concept abstraction and information hiding. This is refers to the abstraction of physical storage and its presentation is extremely different from reality. For example, multiple physical layers may be represented in a single layer but actually it is not feasible. In addition it is divided into following types.

Host based storage virtualization

In this storage virtualization all working of machine is controlled with the help of host machine. That means if any user wants to communicate with guest operating system so it should take the permission from host machine, without acceptance from host machine user can not be able to access the guest machine.
The very famous example of this virtualization is expanding virtual hard disk. With the help of this method user could saves lot of time and also increase the availability of storage resources.

**Array based virtualization**

In this virtualization a single array is used for handling the all input output requests and their operations on the machine. This type of virtualization is very popular for centralized management and data migration.

The array storage virtualization is facilitating to user to for storing data into grouped form. The array virtualization allows storage to be grouped into tiers, for example solid-state drives are placed into a high-speed tier and HDDs in a standard tier.

**File system virtualization**

File system virtualization is playing an imperative role in the storage virtualization. The very popular example of FSV is Distributed file system (DFS) which is introduced by Microsoft. The DFS is used to provide the consolidate view of an organization’s file data. Users are given an illusion that all the data exists on a single file server, but actually it is spread over the number of different shared file servers. Because of increasing its storage capacities it is not mostly in used, but still it is in use.

**Network based virtualization**

Network virtualization is attaining by the installing software and services to manage the sharing of storage, computing cycle and applications. Network virtualization is works with the server and clients in the network as a single unit of resources that can be accessed without regard for its physical components. The network virtualization is used to describe many things such as network management, storage virtualization and grid computing.

**VIRTUALIZATION FOR CLOUD**

Virtualization technology is used to aware the utilization of it resources from physical to logical. The main goal of virtualization is collaboration of different it resources which are already discussed in above section. In this section we go through from some basic technique which are used for introduced the cloud computing environment in by using virtualization.

**Emulation**

Emulation is a virtualization technique which is used for convert the behavior of hardware into software program and deceit in the operating system layer which is work upon on hardware. Emulation endow with massive flexibility to the guest machine but because of low translation speed as compared to hypervisor it need high configuration hardware to run the specific software for translation process.
CONCLUSION

This paper discussed number of virtualization techniques, virtualization types, and hypervisor method and cloud virtualization. Those above techniques are used to reduce the costs and saves time for performing any kind of operation and process in the field of information technology. In future Virtualization will be very helpful to reduce the human efforts and increase the availability of resources over the network. This paper also consoles the basic structure of cloud services. We also aim to develop new method and techniques to maintain elastic resources and data availability to improve the performance of cloud virtualization.

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