

VIRTUALIZATION IN CLOUD COMPUTING AND ITS BENEFITS WITH CHALLENGES

Omkar Gujar, Prof. Darshana Wajekar

Abstract- Cloud computing is a fresh technology that increase application potentialities in terms of function- ing, flexible resource management and collaborative execution approach. The fundamental part of cloud com- puting is virtualization which enables industry or academic IT resources through on demand allocation active- ly. The resources have special forms such as network, server, storage, application and client. This paper focus as on how virtualization helps to improve flexibility of the resources in cloud computing context. In extension to, this paper gives a detailed review on open source virtualization techniques, challenges and future research direction.

Index Terms— challenges, cloud computing, elasticity, hypervisor, virtualization.

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INTRODUCTION

Cloud computing is one of the most useful technology that has been broadly used all over the world. It usually provides on demand IT services and products. Virtualization plays an important part in cloud computing as it provides a virtual storage and computing services to the cloud clients which is only potential through virtualization. This paper discusses about cloud computing, how virtualization is done in cloud computing, virtualization basic architecture, its advantages and effects. Cloud technology enables the reusability of IT resources for potential large databases, developing and hosting complicated applications, and expanding computational power and other services on demand. Eliminating or reducing investments on large-scale infrastructure and software, coupled with the pay-per-use model, considerably reduces IT costs. The most common and widely adopted cloud computing services are Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

CLOUD COMPUTING

Cloud computing technology is based on 3 factors: grid computing, utility computing and automatic computing.

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The most common and broadly adopted cloud computing services are Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

IaaS is a cloud computing model where virtualized framework is offered to, and managed for, businesses by external cloud providers. With IaaS, companies can outsource for storages, servers, data center space and cloud networking components connected through the internet, offering identical functionality as that of an on-premises infrastructure.

Some examples of the wide usage of IaaS are automated, policy-driven operations such as backup, recovery, monitoring, clustering, internal networking, website hosting, etc.

PaaS builds on IaaS. Here, cloud vendors

computing resources, both cloud software and hardware framework components like middleware and operating systems, required to establish and test applications. The PaaS environment enables cloud users to install and host data sets, development tools and business analytics applications, apart from building and maintaining necessary hardware. Some key players offering PaaS are Bluemix, CloudBees, Salesforce.com, Google App Engine, Heroku, AWS, Microsoft Azure, OpenShift, Oracle Cloud, SAP and OpenShift.

SaaS is major in that it incorporates both IaaS and PaaS. Here, the cloud service provider delivers the entire software suite as a pay-per-use model. SaaS lets users readily access software applications -- such as emails -- over the internet. Most common examples of SaaS are Microsoft Office 360, Adobe Creative Cloud, Google G Suite, Zoho, Salesforce, Marketo, Oracle CRM and SAP Business ByDesign.

VIRTUALIZATION

Virtualization is basically making a necessary im-

age or version of something such as server, operating system, storage devices or network resources so that they can be used on numerous machines at the same time. The main intention of virtualization is to coordinate the workload by transforming traditional computing to make it more scalable, efficient and economical. Virtualization can be enforced to a wide range such as operating system virtualization, hardware-level virtualization and server virtualization. Virtualization technology is hardware reducing cost saving and energy saving technology that is quickly transforming the fundamental way of computing.

TYPES :-

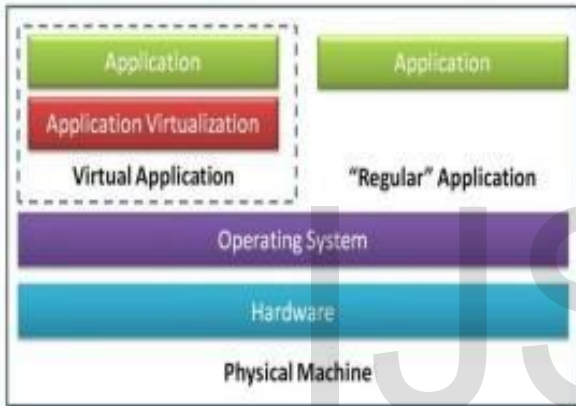
Software Virtualization :-

Software Virtualization comprises of the power to the first system to make and run more virtual environment. It enables automatic data processing system to permit a guest OS to run for instance, Linux could run as a guest to run a Microsoft Windows OS. Software Virtualization is additionally of three types which incorporates software package, Application Virtualization and Repair Virtualization.

Memory Virtualization:-

When physical memory around different servers is combined to create one storage as a pool it's called as Memory Virtualization. With this, you'll be able to get the good thing about bigger remembering. a number of you will be accustomed to this term as Microsoft Windows allows one in every of your stor- age portion to figure as an extension of your RAM. There are two subtypes of Memory Virtualiza- tion, i.e. Application-Level Control and softwar package Level Control.

- i) Application-Level Control
- ii) Operating System Level Control



Storage Virtualization:-

Storage Virtualization is that the process which helps within the grouping of physical storage from variety of network storage devices. Therefore, it works as one device. It also has many advantages with this be- cause it has the capacity to cut back downtime, speed, performance and cargo balancing.

It has two subtypes including Block virtualization and File virtualization.

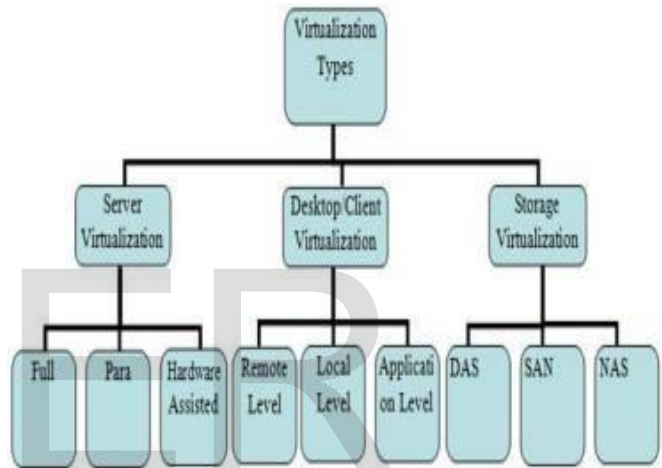
Emulation:-

It's a virtualization technique which converts the be- havior of the pc hardware to a software program and lies within the software package layer which lies on the hardware. Emulation provides enormous flexibil- ity to guest software package but the speed of trans- lation process is low compared to hypervisor and re- quires a high configuration of hardware resources to run the software.

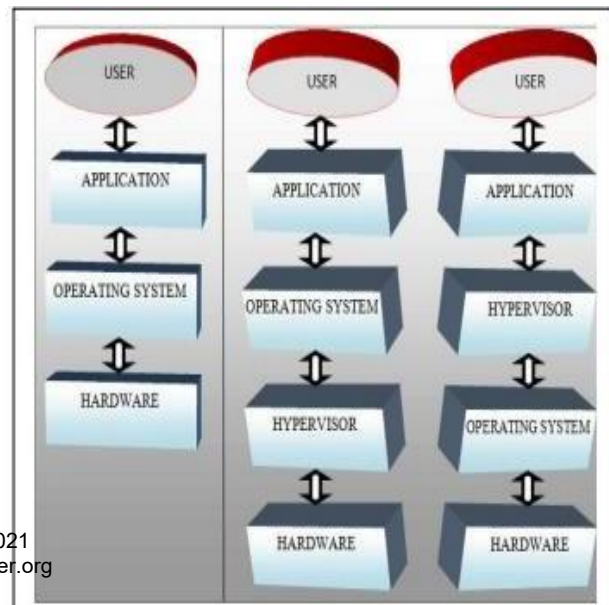
WHY VIRTUALIZATION?

With the assistance of virtualization we will increase the employment of resources available to us in many to urge more benefits. We must always virtualize due to the subsequent reasons: a. Isolation among users: one user should be isolated from the opposite users so he/she might not get information about the others us- er's data and usage and can't even access other's data.

b. Resource sharing: an enormous resource is frag- mented into multiple virtual resources so it is utilized by multiple users using virtualization technique. c. Dynamical resources: reallocation of resources like storage and computational resources is incredibly dif-



ficult but if they're virtualised then they will be easily re- allocated. d. Aggregation of resources: the little re- sources available is increased at an outsized extent with the assistance of virtualization.



BENEFITS OF CLOUD COMPUTING

Cloud computing provides many benefits to the users and makes the work much easier and a few of the key benefits are mentioned below:

- a. Pay only for service
- b. On demand self service
- c. Resources are shared
- d. Business is that the main focus
- e. Accessible everywhere the globe
- f. Data is secured

FUTURE SCOPE

Data loss, data security and inconvenience to access the data are some of the major problems that users face but with the use of cloud computing these problems can be resolved easily. Some of the major future aspects are:

- a. Migration time will become negligible
- b. Data is secured and data loss is minimised
- c. One user-many devices relationship
- d. Good service quality for computational resources
- e. Good service quality for computational resources
- f. Problem of geographical distance between clients and servers can be avoided
- g. Band width will be sufficient for the users
- h. Data redundancy is reduced.

CHALLENGES

One of the key problems which might be faced by using this technology are mass data loss, infected application and data integrity.

- a. mass data loss: if some calamity hits the information centres then it'd destroy the data stored within the datacentres or might shutdown servers.
- b. Infected application: if a pandemic is infects one file then it should corrupt whole system.
- c. Data integrity: the integrity of knowledge may be affected as anyone can access it from anywhere.

RELATED WORKS

In storage virtualization still the management of the information which may be distributed among the network is that the one amongst the important issues in cloud storage [14]. Vendors promise to the scalability and on-demand of their cloud make the foremost important challenges for cloud providers. Performance and transfer rate became important issues not just for the cloud

providers, but it'll affect the user experience. To beat this type of problems, the bandwidth has to be increased otherwise it is a bottleneck for data transfer [8]; and it becomes a significant problem for the providers which affect the value of services if they are doing not face the bandwidth limitation.

Security threats [12] in virtualization are classified into virtual machine threat, hypervisor threat, virtual infrastructure and virtual network threat. The virtual machine threat surfaces while processing status of virtual machine, software updates, resource contention, patching and virtual machine conurbation. Hypervisor threat rivets Virtual-Machine-Based Rootkit (VMBR) attack and Blue Pill [13] Attack where hypervisor plays the vital role of Virtualization. Virtual infrastructure threats are concerted on physical access threat and single point of control threat. Virtual network threats is effectively addressed by the safety tools of intrusion detection, prevention mechanism, virtual switches and networks conferring to the necessities.

This client virtualization technology makes the computer user to virtually monitor and update the client machines like workstation desktop, laptop and mobile devices. It improves the client machines management and enhances the safety to defend from hackers and cybercriminals. There are three sorts of client virtualization [10]. First, remote or server hosted virtualization which is hosted on a server machine and operated by the client across a network. Second, local or client hosted virtualization within which the secured and virtualized operating environment runs on local machine. Third, application virtualization [11] that gives multiple ways to run an application which isn't in traditional manner. During this technique an isolated virtualized environment or partitioning technique is employed to run an application.

Organizations are in high risk of knowledge leakage when an employee secures the access to its data stored in cloud system. Data leakages [9] are happens

through hacking data location, securing remote access, third party storage and unsecure multitenant environment in hypervisor level. Cloud provider or broker can enhance the prevention and detection mechanism and implement the collaborative security policy in hypervisor level to safeguard data from data leakage.

CONCLUSION

This paper discussed various virtualization techniques, virtualization types, hypervisor techniques and challenges in cloud computing system to reduce IT costs and effective utilization of cloud resources such as rapid elastic provisioning of virtual machines, elastic application programming model. In addition, the virtualization techniques get universal support when users consider elastic resource management issues and security issues before moving into cloud. In future, we aim to develop new policies, framework and techniques to maintain elastic resources and data availability, as a result, the performances of cloud services could steps into next higher level. This study paper discussed various issues pertaining to cloud services which can be used to design strong framework for effective elastic resource management in cloud.

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