RESEARCHERID
THOMSON REUTERS

[Kaur, 4(7): July 2017]
DOI- 10.5281/zenodo.835421

ISSN 2348 – 8034
Impact Factor- 4.022

GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

ROLE OF VIRTUALIZATION IN CLOUD COMPUTING

Avneet kaur[*1], Dr. Gaurav Gupta[2] & Dr. Gurjit Singh Bhathal[3]

[*1]Mtech student department of computer engineering at punjabi university Patiala
[2]Assistant professor department of computer engineering at punjabi university patiala
[3]Assistant professor department of computer engineering at punjabi university patiala

ABSTRACT

Cloud Computing is the fundamental change happening in the field of Information Technology.. Virtualization is the key component of cloud computing. With the use of virtualization, cloud computing brings about not only convenience and efficiency benefits, but also great challenges in the field of data security and privacy protection. .In this paper, we are discussing about virtualization, architecture of virtualization technology as well as Virtual Machine Monitor (VMM). Further discussing about technique of virtualization, reasons to use virtualization, Pros and Cons of Traditional Server Concept and Virtual Server Concept and lastly discuss about the application virtualization and its techniques .This paper show importance of virtualization technology that can simplify IT operations as well as allow IT organizations to respond faster to changing business demands.

Keywords: Cloud Computing, virtualization, Application Virtualization.

I. INTRODUCTION

Cloud computing has improved computation's efficiency while reducing its cost for users.Virtualization is the key component of cloud computing for providing computing and storage services. Although most readers should be familiar with sharing CPU and storage facilities, the memory leak and hard disk leak have not been described as well. This paper introduces cloud computing, application virtualization technologies.

Cloud computing in the simplest terms, cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive.cloud computing is a type of computing that refers to sharing computing resources rather than having local servers or personal devices to handle applications. The word cloud is used as a metaphor for "the internet"so the cloud computing means "a type of internet-based computing" where different services- such as servers,storage and applications are delivered to an oragnisation's computers and devices through the internet.

Types of cloud computing

IT people talk about three different kinds of cloud computing, where different services are being provided for you. Note that there's a certain amount of vagueness about how these things are defined and some overlap between them.

- **Infrastructure as a Service (IaaS)** means you're buying access to raw computing hardware over the Net, such as servers or storage. Since you buy what you need and pay-as-you-go, this is often referred to as utility computing. Ordinary web hosting is a simple example of IaaS: you pay a monthly subscription or a per-megabyte/gigabyte fee to have a hosting company serve up files for your website from their servers.
- **Software as a Service (SaaS)** means you use a complete application running on someone else's system. Web-based email and Google Documents are perhaps the best-known examples. Zoho is another well-known SaaS provider offering a variety of office applications online.
- **Platform as a Service (PaaS)** means you develop applications using Web-based tools so they run on systems software and hardware provided by another company. So, for example, you might develop your own ecommerce website but have the whole thing, including the shopping cart, checkout, and payment mechanism

ISSN 2348 – 8034
Impact Factor- 4.022

running on a merchant's server. App Cloud (from salesforce.com) and the Google App Engine are examples of PaaS

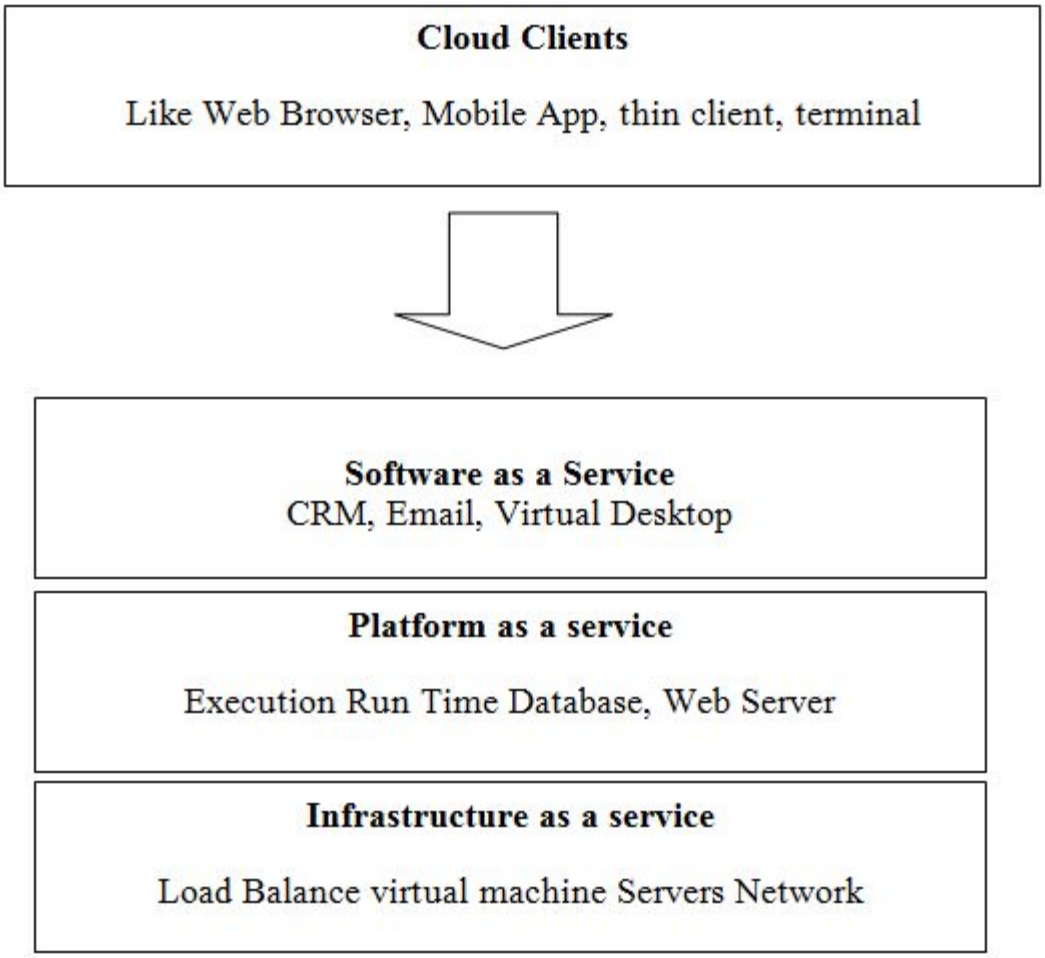


Fig1: Cloud Computing Services

II. VIRTUALIZATION

Basically the term virtualization refers to the emulation of hardware within a software platform. This allows a single computer to take on the role of multiple computers. Now the need of virtualization is that in a file or a web server purchase, maintenance, depreciation, floor space & energy usage is high or we can say double. But when we create a virtual web or file server than all of our objectives are fulfil like maximum use of hardware resources, reduce cost, increase flexibility in business environment and improvement in security. There are many benefits of virtualization like easier manageability, elimination of the compatibility issues, fault isolation, increased security, efficient use of resources, portability, problem free testing, rapid deployment, reduce costs etc. Virtualization in cloud computing is many types like data storage virtualization for combining local & network resources, storage virtualization for grouping physical storage devices into a single unit, improving availability using virtualization for reaching high level of availability, improving performance using virtualization using stripping and caching and also capacity improvement.

Virtualization is seen in a central computer hosting an application to multiple users, preventing the need for that software to be repeatedly installed on each terminal. Data from different hard drives, USB drives, and databases can

be amalgamated into a central location, both increasing accessibility and security. Physical computer networks can be split into multiple virtual networks, allowing a company's central IT resources to service every department with individual local area networks. Virtualization is a collection of technologies that allow simulated computing resources to be substituted for more costly physical resources.

III. VIRTUALIZATION IN CLOUD COMPUTING

virtualization in computing is creation of virtual (not real) of virtual something such as hardware, software, platform or a operating system or a storage or a network device[8]. In a virtualized environment IT enterprise has to manage many changes as the changes occur more quickly in virtual environment than in a physical environment. Because of virtualization clouds are scalable and agile.

Virtualization is a combination of hardware and software engineering that creates Virtual Machines (VMs) and enables multiple operating systems to run on the same physical platform.

Storage virtualization is the pooling of physical storage from many network storage devices into what appears to be a one storage device that is managed from a central console. Storage virtualization is usually implemented via softwareapplications as well ascommonly used in SAN (storage area networks).Storage virtualization creates the abstraction layer betweenstorage and applications running on the servers. General benefits of storage virtualization include Migration, Utilization as well as Management and some of the disadvantages includeLack of Standards and Interoperability, Metadata as well as Backout.

Server virtualization easily enables different operating systems to share the same hardware as well as make it easy to move operating systems between different hardware.Server virtualization is the partitioning of a physical server into smaller virtual servers to help maximize your server resources (containing the identity and number of individual physical servers, operating systemsand processors).Server virtualization has a large number of benefits such as Increased Hardware Utilization, Security as well as Development.

Network virtualization (NV) is a method of combining the resources in a network by splitting up the available bandwidth into channels, each of that is independent from the others, as well aseach of that can be assigned or reassigned to a particular server. NV is using resources (network) through alogical segmentation of a single physical network and it is often used to describe many things containing network management, storage virtualization and grid computing.In general benefits of network virtualization include Customization of Access and Consolidation.

Application virtualization (AV)allow computing resources to be distributed dynamically in real time as well as with AV, each application brings down its own set of configurations on-demand, and executes in a way so that it sees only its own settings. Application virtualization has a large number of benefits such asSecurity, Management, Legacy Support and Access.Application virtualization has some disadvantages include Resources. Compatibility and Packaging.

Memory Virtualization involves sharing the physical system memory as well as dynamically allocating it to virtual machines (VMs). Virtualmachine memory virtualization is similar to the virtual memory support provided by modernoperating systems.

Platform or Hardware virtualization is the concept of creation of a virtual machines (VMs) which acts like a real computer with an OS. Host machine is the actual machine on that the virtualization takes place, as well as the guest machine is the virtual machines (VMs).

Desktop virtualization refers to the separating the logical desktop from the physical machine.

ISSN 2348 – 8034
Impact Factor- 4.022

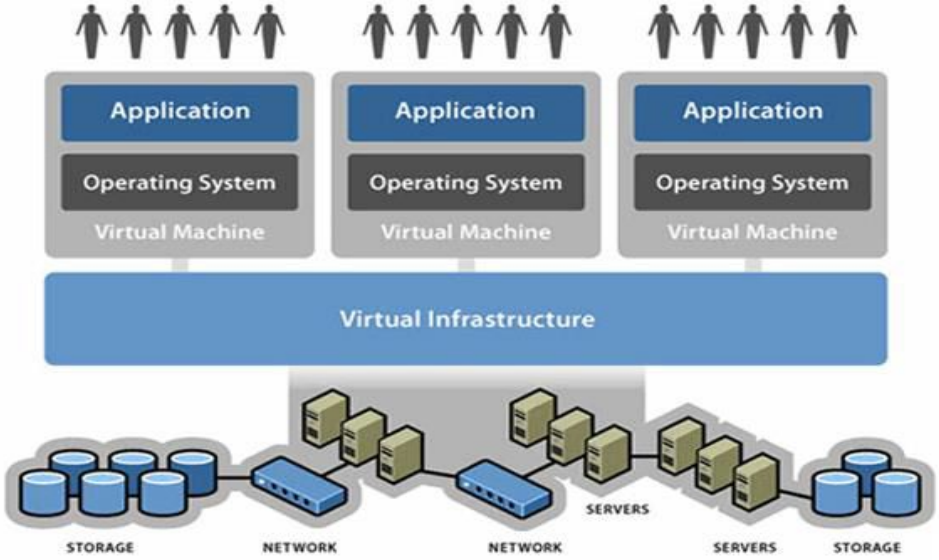


Fig2: Virtualization architecture

IV. IMPORTANCE OF VITRUALIZATION

Virtualization technology makes cloud computing environment easily to manage the resources. It abstracts and isolates the underlying hardware, and networking resources in a single hosting environment. It increases the security of cloud computing by protecting both the integrity on guest virtual machine and cloud components virtualized machines can be scaled up or down on demand and can provide reliability. It provides resource sharing, high utilization of pooled resources, rapid provisioning, workload isolation.

There are many effective reasons to take into account as to why you would want to use virtualization technology:

- Saves money
- Resource optimization
- Decreased power consumption and Data center consolidation
- Reduces system administration work
- Testing of live CD's without first burning them onto disks or having to reboot the computer
- Management is simplified
- Maximizing Uptime
- Software installation easier
- Increased CPU utilization from 5-15% to 60-80%
- Better use from hardware
- Good for the environment
- Virtual machine can run on any x86 server

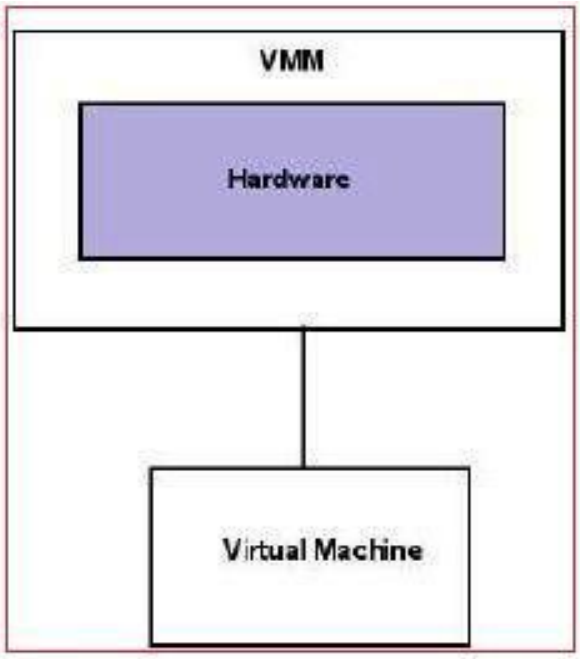
ISSN 2348 – 8034
Impact Factor- 4.022

V. PROS AND CONS OF TRADITIONAL SERVER CONCEPT AND VIRTUAL SERVER CONCEPT

Traditional Server Concept		Virtual Server Concept	
Pros	Cons	Pros	Cons
Easy to conceptualize	Expensive to acquire and maintain hardware	Resource pooling and Easy to deploynew servers	Slightly harder to conceptualize
easy to backup and deploy	Redundancy is difficult to implement and Not very scalable	Highly redundant and available	Slightly more costly
Virtually any application/service can be run from this type of setup	Difficult to replicate and processor is under-utilized	Reconfigurable while services are running	

VI. VIRTUAL MACHINE MONITOR

Virtual Machine Monitor (VMM) is the control system at the core of virtualization that acts as the control as well as translation system between Virtual Machines (VMs) and hardware.Main challenge of VMM is the efficient controlling of physical platform resources (memory translation and I/O mapping).Virtual machines (VMs) are created as well as managed by virtual machine monitors (VMM).



ISSN 2348 – 8034
Impact Factor- 4.022

VII. APPLICATION VIRTUALIZATION

Application virtualization can make applications available to desktops, laptops, server-hosted VDI and Remote Desktop Session Host (TS-Terminal Server) platforms. The applications are executed and often isolated on the target platform, without needing to make any persistent modifications to the platform. The advantages of application virtualization include: installation, upgrade, roll-back, delivery speed and the ease of application support and management. The physical installation of applications is no longer necessary, eliminating the possibility of conflicts. The result is a dynamic application delivery infrastructure.

The primary reasons for implementing application virtualization are:

- Applications are quickly and easy delivered.
- It is simple and easy to upgrade applications.
- The rollback to prior application versions is simple.
- There is no need to "install" applications anymore.
- Elimination of application conflicts.
- Reduce regression testing time.
- Allow multiple versions of the same application to be run simultaneously on multiple versions of Windows Operating System, greatly reducing the number of server silos.
- Allow non-multiuser versions to run simultaneously in a session virtualization environment.
- There is no need for application load managed groups, or so called 'silos' allowing consolidation of remote desktop services session hosts.
- It reduces packaging complexity.
- It stabilizes (Windows) user profiles.
- Application virtualization is an essential part in 'layering' of OS | Applications | user configuration.
- It's an important component in the complete application and desktop delivery stack.
- Application virtualization creates dynamic user environments in a static pooled server hosted VDI and SBC environments.
- Improves end-user mobility – access personalized applications from any machine and a per-user application entitlement model.

VIII. APPLICATION VIRTUALIZATION STRATEGY IN SAAS

The transition to a dynamic and optimized desktop is causing many IT organizations to reevaluate traditional IT operations, deployment, delivery, packaging, support, and management methods. "Static desktops becoming a thing of the past."

Application virtualization is a key component in the optimized desktop. It's important to have a vision and strategy around application and desktop delivery. Designing, building, managing and maintaining the application virtualization infrastructure using the right Technologies, corresponding vendors and products is an important step.

Agent-less

Client-less, or agent-less, application virtualization involves the use of an embedded virtual OS that is deployed as part of the virtualized application. While creating the virtual application package, the application and client

components are compiled and stored in one single container, mostly a single executable. These virtualized applications are fully encapsulated and able to run as a standalone executable from multiple locations such as a network drive, local drive, or USB removable storage device. Every virtualized application contains a 'built-in' agent. So no agent, or client-component, is installed in the Operating System but every application has an agent which is used at runtime. VMware ThinApp and Turbo are examples of agent-less application virtualization solutions.

Agent-based

Client-based, or agent-based, application virtualization involves the use of a locally installed agent or client on the endpoint. This agent or virtualization engine, contains functionality to setup and maintain the Virtual Environment for each application. The agent takes care of management tasks such as Shortcut creation, File Type Association (FTA) registration and is a key component in the streaming behavior. This behavior is a key functionality for agent-based application virtualization solutions such as Microsoft App-V.

Kernel and user mode

Windows runs all code, application and services, in one of two modes, user-mode and kernel-mode. The two modes reflect two different security models. Code running in kernel-mode has full Operating System access. Kernel-mode code typically comes from device drivers and the Windows kernel itself. A kernel-mode driver or service is part of a locally installed agent on the endpoint.. Problems when executing code in kernel mode can quickly lead to complete system halts (Blue Screen Of Death). Kernel mode drivers require admin privileges to be initially installed. User-mode agents don't. Code running in user-mode does not have full Operating System access and there is no direct interaction with the kernel of the endpoint's Operating System.

Portable apps

Portable applications are software programs that are able to run independently without the need to install files to the system they are run upon and irrespective of the version of Windows installed on the system. They are commonly used on a removable storage device such as a DVD, USB flash drive, or flash card. Agent-less application virtualization may convert even complex application into portable apps.

U3

U3 is a proprietary method of launching windows applications from U3 compatible USB drives. Applications that comply with U3 specifications are allowed to write files or registry information to the host computer, but they must remove this information when the USB flash drive is ejected. Customizations and settings are redirected and stored with the application on the flash drive. This isn't a virtualization technology, but has its use-cases though.

Characteristics of SaaS

i. **Self Reviving** Multiple backup/restore copies of the application are present on the cloud so as to tackle the accidences of copy getting corrupted.
ii. **Multi-user** Multiple subscribers of the application can use the application at the same time notwithstanding the fact that the same application is being shared by them.
iii. **Software Level Agreement (SLA) Driven** Scalability and availability issues are catered to by using SaaS as the system adjust itself in accordance to the peak demand & thus all SLA with the clients are fulfilled.
iv. **Virtualized** The services provided by the SaaS are independent of the hardware and OS, thus the services can cater to abide client base.
v. **Flexible** The SaaS services can be used to serve a large variety of workload types - varying from small loads of a small consumer application to very heavy loads of a commercial application.

IX. CONCLUSION

This survey give the brief idea about cloud computing and concepts related to cloud computing like virtualization and application virtualization strategies. This paper focuses on SaaS which uses the technique of Application Virtualization which is not without its pitfalls, the facility to deliver the tools users need quickly and reliably is core

to the concept of delivering a flexible, cost-effective and robust workspace. Application virtualization gives facility to deliver applications to devices which do not support those applications.

REFERENCES

1. http://www.explainthatstuff.com/cloud-computing-introduction.html
2. *Yogesh Bhardwaj, Dr. Manju Kaushik "A Review Paper on Virtualization and Security in Cloud Computing"*
3. *Kirandeep Kaur α & Dr. Gurjit Singh Bhathal σ" Trend and Need of Application Virtualization in Cloud Computing."*
4. *Abhirup Ghosh "Cloud Computing".*
5. *Gurjit Singh Bhathal and Dr. G. N. Singh "Application Virtualization: a new way of application delivery as service to end application deployment"*
6. *T.Swathi, K.Srikanth, S. Raghunath Reddy "virtualization in cloud computing"*
7. *Rakesh Kumar, Shilpi Charu"(February, 2015) An Importance of Using Virtualization Technology in Cloud Computing" Global Journal of Computers & Technology*
8. *Ruben Spruijt, Jurjen van Leeuwen, Rory Monaghan (November 2016)" Application Virtualization Smackdown″*