

AN OVERVIEW OF VIRTUALIZATION & CLOUD COMPUTING

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ABSTRACT - Virtualization is a technique that merge or split computing resources to gives one or more than execution environments using techniques that is hardware and software division or, partial or overall machine simulation, mirroring and others. Cloud computing comes to light as a unique and latest subject in information technology. Cloud computing relies on other research fields of computing like HPC, service computing, virtualization and grid computing. This paper is about the introduction, features, restrictions, advantages and disadvantages of Virtualization and Cloud Computing. The major purpose of writing this paper is to compare virtualization, cloud computing and to visualize signification of both.

KEY WORDS: Virtualization; cloud computing; introduction; comparison; types; advantage; disadvantage

INTRODUCTION

Virtualization is a developing technology in the information technology world. A number of organizations are using virtualization to solidify their workloads. Virtualization renders prominent accessibility for vital applications and streamlines application preparation & movements .In the world of IT, cloud computing [20, 21] gets a most familiar word in late year. CLOUD stands for Computing Location independent Online Utility which is useable on-Demand that permit users to approach that are occupy on internet devices connected to local, remote and other connection. Cloud computing defined as “Internet based computing,,” where different other utilities just like storage, servers and applications are handed over to an institute’s computers and devices through Internet [19].

VIRTUALIZATION

Virtualization, in computer system, relates to create a virtual edition of anything, which includes nevertheless not restricted to a hardware program of virtual computer, computer network, operating system or storage devices. Virtualization started mainframe computers as a method about logical division of the resources of system which mainframe computer supplies within a variety of application software in 1960s. At that time, the term virtualization has extended meanings [1].

virtualization the data is moved to a server, mapped to its actual location, and allow the user to access it. This makes possible to scroll by the data as if reading a webpage, without bringing it directly on user’s computer or another server.

Application Virtualization

Basically, virtualizing is a technique that differentiate the operating system and the application. The server executes the application on or any other system instead on the system which using it. The main benefit of application virtualization is a user in enabled to run unsuited application in parallel form. Those applications can also be run which are not made for the operating system of the computer from which these are accessed.

Network Virtualization

The way to combine useable resources in the network by dividing availed channel’s bandwidth, each channel does not depends on others, plus it is possible to redistribute each of them to a particular device or server in actual time is known as network virtualization. The hint is virtualization masking actual complexity of the system by splitting the complex system into accomplishable parts, just like hard drive partitioning which make easy to store files.

Server Virtualization

The hiding of server resources from server users is known as server virtualization. We use server virtualization to free the client to understand and accomplish difficult details about resources of server when sharing and usage of resource increased and keeping the capacity to further increase.

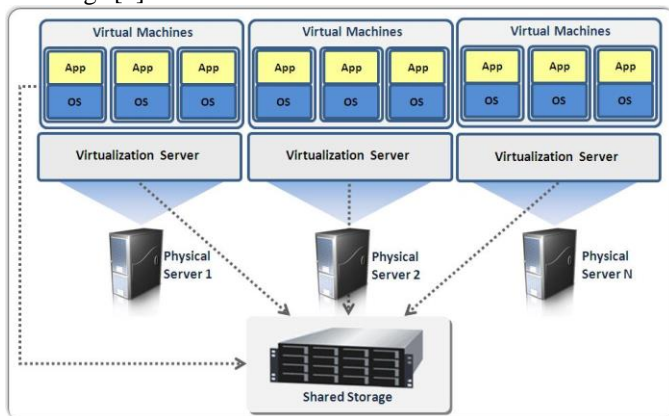


Fig. 01. Virtualization in Computer Systems

TYPES OF VIRTUALIZATION

There are various types of virtualization which are used are given below [2].

Data Virtualization

Virtualizing data stands for that a user can have the access to the same data from different physical positions. In data

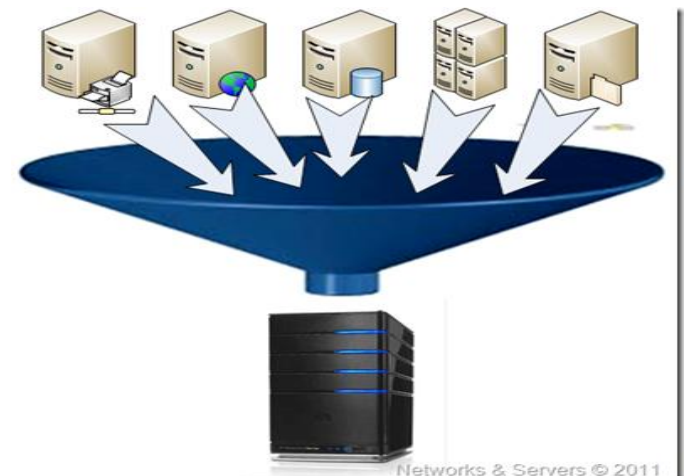


Fig. 2. Server Virtualization Storage Virtualization

The sharing of storage from multiple network storage devices into a single storage device, a central console handle it, is called storage virtualization. Generally storage area networks use storage virtualization.

Operating System Virtualization

The other name of operating system virtualization is container-based virtualization, in which same operating system is used on a server but hacks it up into components. Each virtual environment has its special set of rules and access with the one exception that it all must have compatibility with the same operating system. A simple example of OS virtualization is Open VPN.

Para-virtualization

In para-virtualization operating system virtualization and hardware virtualization are combined. An operating system running on the server either access the virtualization software to execute or directly access the hardware. This double access offers a para-virtualization model better variety to use available resources and maximize the operability of device. Xen platform is an example of open source para-virtualization.

PROS AND CONS OF VIRTUALIZATION

Virtualization is a wonderful invention in technology, at the end of 2012, application workloads were used as virtual cases in near about 70% companies. A VM Manager monitors access to the virtual resource. Virtualization has following advantages:[3][4]

Pros

- Testing and learning
- Virtual Machines are portable
- Less hardware investment
- Have required less maintenance
- Performance is Improved
- Less power usage, safe for environment
- Easier movement into the cloud
- Easy to host a guest virtual machine
- Generates a large of webservers

Cons

- High chances in physical defects
- Powerful machines
- Single point of failure
- Weak in performance
- Particular applications that can't be virtualized.[3][4]

CLOUD COMPUTING

Cloud computing is normally explained that it is a sort of computing that depend on allocation of resources of computing instead of containing the local servers or personal devices to control applications. In cloud computing, the word cloud represents the internet, it means phrase" cloud computing" is "internet centered way of computing" which include different service area such as servers, storage of application and is in the computers and devices of an organization through interne. It is Transmission control protocol/ internet protocol dependent highly developed that adds fast microprocessor, large memory, fast network speed and effective system architecture of technologies of computer. In the absence of standard inter-connect protocols

and development of collecting data center technologies, cloud computing is not reliable.

Cloud Computing Working

The aim of cloud computing is to put on outdated supercomputing, or great computing power performance, which armed and researchers can use for working at a speed of tens of trillions of computations per second, in customer side applications such as business collections, to allocate the personal information , achieve storage of data or to power heavy games of computer.

To achieve this cloud computing may use networks of many servers normally running consumer PC technology at low cost with particular links to spread the sequences of data processing. This mutual Information Technology structure covers many groups of systems which links with each other. Almost virtualization techniques are applied to boost the cloud computing working power. [5]

Cloud computing is an enhancement of the concept of object-oriented programming abstraction. Abstraction, eliminates the informations of complex working from prominence. Interface is noticeable that is receiving inputs and gives outputs. Computations of outputs are not clear mean unknown.

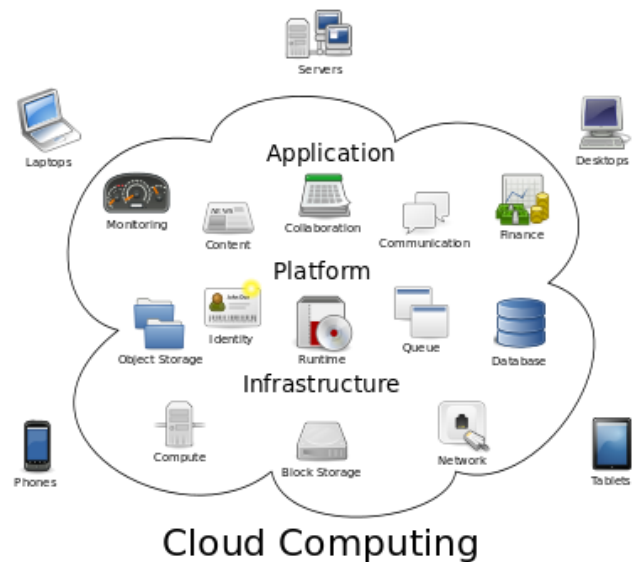


Fig. 03. Cloud Computing

Consider a example, driver of car has clear information that a steering wheel will drive the car in that direction where he wish to go or persistent the accelerator will increase the speed of the car. The driver does not know about how the steering wheel direction and the accelerator pedal are improved into the real speed of the car. In short driver does not know about all these details.

Similar a cloud calls the idea of abstraction in such a way that it does not clear the actual process of user in the environment of a physical computing. In cloud computing environment, data exists in many servers and user does not know about the explanation of connections of network as it is hidden to user. In reality, cloud computing is called so because it does not show any accurate information about inner working.

CATEGORIES

The main categories of cloud computing are of 3 types:

- Infrastructure-as-a-Service (IaaS)
- Platform as- a-Service (PaaS)
- Software-as-a-Service (SaaS) [5, 6].

Infrastructure-as-a-Service

It deals with the sending of the huge resources of computing which includes the ability of processing, storage and network. Considering example of storage, if any one use cloud computing storage service, he should pay only intense part and free of purchasing any disks. Moreover, he does not know about the location of data with which he is dealing. On occasion the IaaS is also known as Hardware-as-a-Service (HaaS) [7].

Platform-as-a-Service

It is usually summaries the application program interface maintenances and infrastructures to cloud applications. PaaS is the connection between application and hardware. Platform as a Service is most important because many companies want it and prefers to have the platform of cloud computing as Microsoft does in personal computer time. Very famous examples are Google App Engine [3] and Microsoft's Azure Services Platform [8].

Software-as-a-Service

It focuses on alternating the application that can run on Personal Computer. If anyone is using SaaS there is no need to install and run the different software on computer. As a substitute of purchasing the software comparative expensive, pay-per-use pattern should be followed that less the total cost. The idea of SaaS is outstanding and some software works efficiently as a cloud computing, but the interruption to network is mortal to online 3D games which are real time applications.

to 3 categories [8]. Mixed machine heterogeneous computing (HC) environments apply a scattered set of various machines that are connected to each other and also with network of computers, to provide performance for applications that are computationally complex that have different requests [9]. Various means are composed to achieve a number of tasks parallels or to resolve complex tasks due to large number of independent subtasks [10].

Advantages of Cloud Computing

Sharing of Resources: For delivery to many user at a time it shares to all the users. Due to this reason it provides the facility of increasing and decreasing of resources according to user.

Pay-As-You-Go: It provides the facility of paying only those resources that are used by any user. User may request for additional resource and also may declare about the resources that he contains after the use.

Superior Hardware Management: For cloud service provider it is possible for it to manage hardware very efficiently and easily because all the same hardware is used by all the computers that are using cloud services. [7]

Reduce Capital and Operating expenditure for Users: Today latest technology is growing day by day. It is necessary for any organization the use of latest technologies in order to accomplish the necessities of clients. But changing the technologies is cost consuming. By using services of cloud computing it is not necessary for users to obtain the physical infrastructure and permanent it. They can save the money by using technology according to need.

Disadvantages of Cloud Computing

Less Reliability: As Cloud Computing shares the resources to many user it may be less reliable. Due to this reason it may be possible that data of one user or organization may mix with other user or organization [11]. An unhappy worker of any organization can change or terminate the data by using ID. If system of cloud storage is not reliable, nobody desires to protect the data on it [12].

Internet: For using the cloud computing services core necessity for users is an internet. Users enforced internet connection with greater speed [13].If internet is not available then data cannot be accessed.

Non-Interoperability: Exchange of data is not possible. Any user that stores data on one cloud cannot transfer data to another cloud [14].

Security Requirement Specific to the user

Level: Virtual, Physical, Application [15]

Service level: Software as a Service, Platform as a Service, Infrastructure as a Service.

Security Requirement:

- Data Protection Coverage
- Software security
- Leak in network
- Records security (the data transit and rest)
- Reliability in hardware
- Defend network resources

Threats:

- Errors in programming
- Software interruption (deletion)
- Spasms on the network
- Exploitation of infrastructure

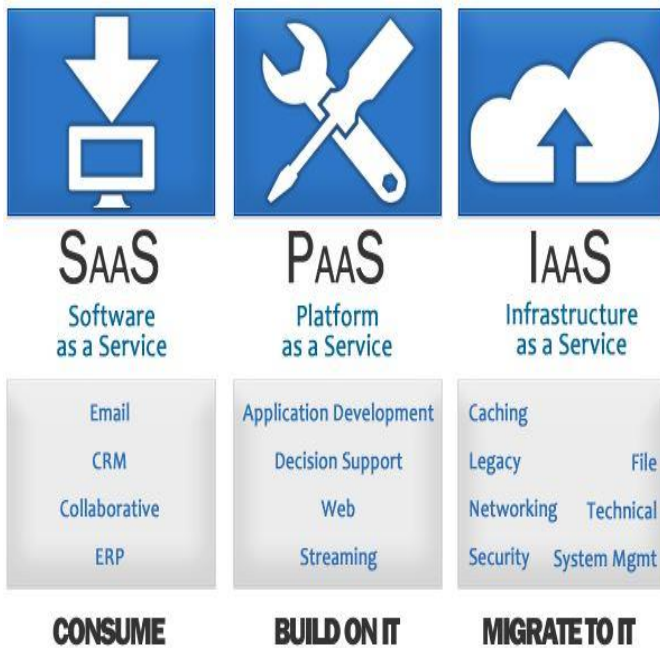


Fig. 04. Services Models

Cloud computing is basically have 5 layers containing Applications, Clients, Platform, Infrastructure and Servers. The 5 layers appears more practical and perfect as compares

Interruption in hardware
Normal ruin

CLOUD COMPUTING VS. VIRTUALIZATION

Virtualization software permits one physical server to run a number of separate computing environments. In practical, it is just like to generate more than one server for each server user buy. This is major technique in cloud computing. Cloud suppliers have huge data hubs which are filled with servers to switch cloud services of the servers, but they are unable to give a distinct server to each user. So, they virtually divides the data on the server, enabling each customer to work with a different “virtual” case of the same software.

Cloud computing, is a defensive term that surrounds virtualization. It offers a company access to complicated applications and heavy computing resources through the Internet. Small businesses are most probably subscribed to a cloud-based service to borrow cloud computing such as Cisco WebEx, than to build their own cloud base on their networks. [16]

Comparison

The comparison between Cloud Computing and virtualization is presented below; [3]

TABLE 01 COMPARISON B/W VIRTUALIZATION AND COMPUTING

Virtualization	Cloud Computing
Part of the ordered substructure	Brings resources of computing as a utility to client across the network
A self-service layer itself is not provided to the client and without that layer user can't hand over compute as utility	Cloud deals computing as a service instead of a particular technology
One probable utility that can be delivered	An access for the bringing of utilities to an clients
Can exist without the cloud	Can exist only with virtualization
Virtualization allows itself an arrangement to serve and efficiently use its IT resources	Using cloud computing it is possible to use those resources on other level by giving access to elements when required

CONCLUSION

This paper compares the cloud computing and virtualization. Virtualization technologies offers a number of important utilities which make it a very strong tool that can be used in a large number of applications. These are not limited to server consolidation, application sandboxing, access to different types of hardware and operating systems, debugging. There are different techniques that Virtual Machine ware is ensuing to make performance of virtualization better over time. The idea of cloud computing is getting more preferred and it is now in the initial level. Famous corporations are serving all forms of cloud computing. So, these areas required a deep research further.

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