

# OPTIMIZING SERVERS THROUGH VIRTUALIZATION

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## Abstract

This paper represents a comparison of using multiple server services and how virtualization brings down to the utilization of servers. Virtualization of Servers helps in enabling application isolation, mobility, and partitioning of individual servers in the cloud. The physical servers having a virtual server layer above them handles the resource utilization from various clients. This extra layer creates resource utilization considerably.

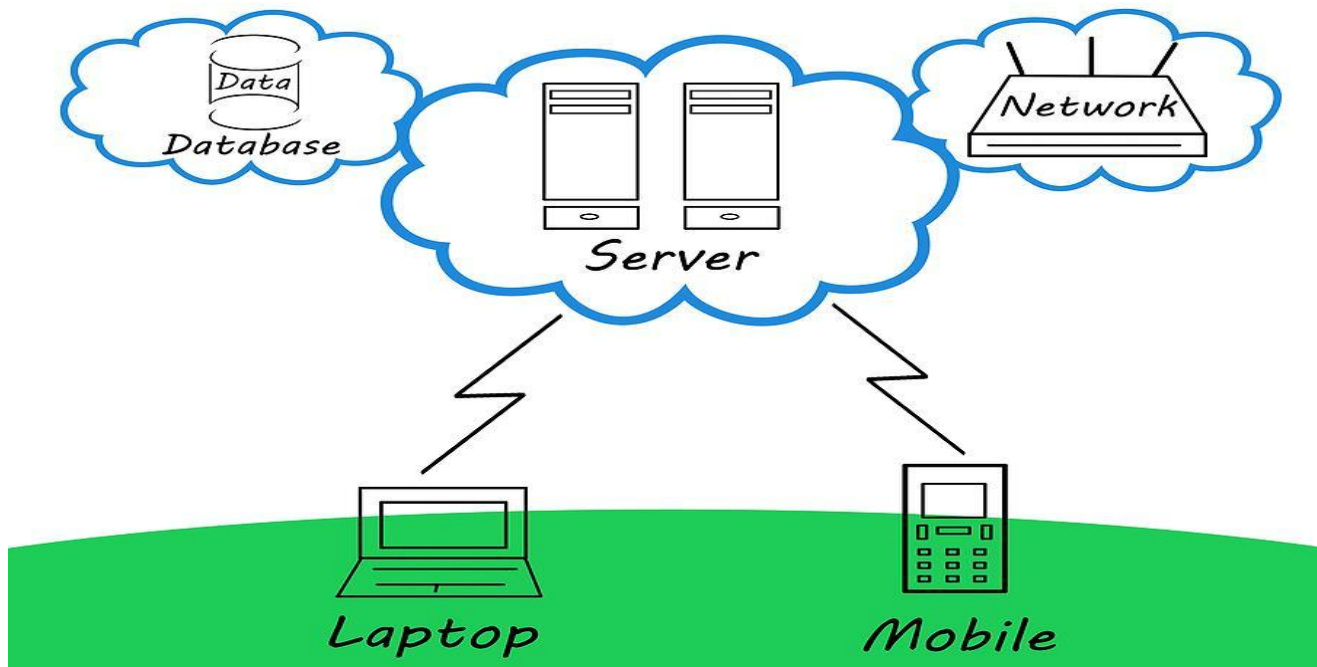
**Keywords**— Virtualization, Servers, Multi Services Servers, etc

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## 1. INTRODUCTION

The process of decoupling the hardware from the operating system on a physical machine is termed as Virtualization. The term has meant hardware into a software implementation. In simple terms Virtualization is a computer within a computer, implemented using software. An operating system running in a virtualized environment is termed as a virtual machine. The main idea of virtualization

is to provide computing resources as pools. Depending on the needs, resources are then assigned to different applications either manually or dynamically from different pools. The scope of virtualization can varies from a single device to a large data centre. Virtualization can be used in different areas such as networks, servers, applications and servers. Data Centre in virtualized environment is presented in Figure below



Virtualization technology helps in making multiple virtual machines, with multiple operating systems to run side by side and with continuity on the same physical machine. From processor to network card, each virtual machine shares a common set of hardware unaware of the fact that this hardware is also being used by another virtual machine at the same time. The virtual machine running several operating systems sees a similar set of hardware regardless of the actual physical hardware components. There are many types of Virtualization technologies available in the market.

Many Companies have launched various products such as Vmware, Oracle, Kvm, Zen, etc.

Computer Memory Virtualization is a software that allows a program to make a much larger amount of memory than which is actually available. To accomplish this, we generally create swap units back and forth as needed by a storage device and virtual memory. In computer storage management, Virtualization is the also a collection of physical storage from various multiple network storage

devices into a single storage device that is controlled from a central console. In an environment used by Network Virtualization, the virtual machine implements virtual network adapters with a host network adapter.

The main purpose of server Virtualization is to create virtual environments by joining normal server hardware and a virtual machine software. Virtual machine software creates sharing between physical hardware and Virtual Machines. Sharing is performed by developing a special Virtualization

layer, which changes physical hardware into virtual devices as seen by virtual machines. The possibility to run different operating systems (OS) within the same hardware concurrently is most commonly seen[3] [6] Figures 2 . Figure 2 shows the difference between physical servers and virtual servers. It represents four servers where each server has its own processor memory, local disk and network connection. Figure 3 presents virtual machines and a Virtualization Layer.

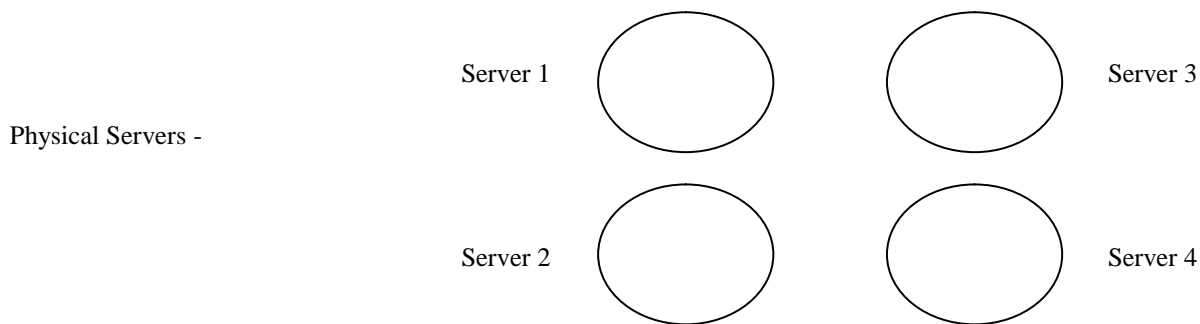


Fig. 2 – Physical Servers

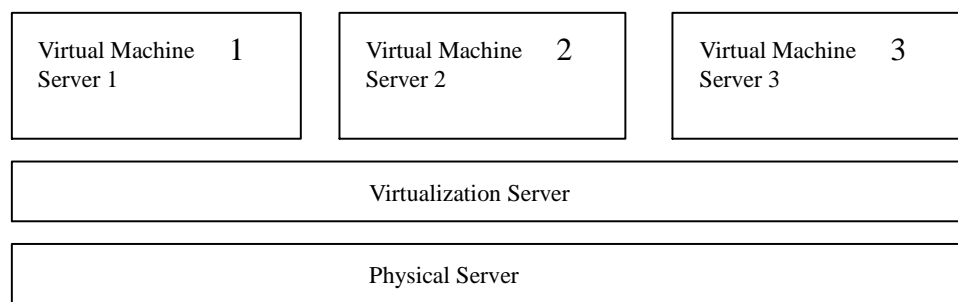


Fig 3 - Presents Virtual Machines (VMs) in a single Physical Server

**Some of the interesting Features of Virtualization are:**

**1) Multiple Operating Systems running simultaneously:**

Vmware and Virtual Box allows users to run more than one operating system at a single time. Using this, we can run software written for one operating system on another without having to reboot to use it.

**2) Software Installations Made Easier:**

Software vendors use several virtual machines to ship entire software configurations. For example, installing and running a mail server becomes easy to import into Virtual Box or Vmware .

**3) Backup and Recovery:**

Having virtual machine installed, its virtual hard disks can be considered as a “storage box” that can be easily rebooted ,started, copied, backed up, and easily transported between the hosts. Moreover with the use of another feature called “snapshots”, we can save a particular state of a virtual machine and later on revert it back to that state.

**4) Infrastructure Consolidation:**

System loads can significantly be reduced. Hardware and electricity costs can be cut by using only a fraction of the potential power by running operating Systems using Virtualization.

**2. PROPOSED WORK**

**2.1 Working of Virtualization as Multiple Server:**

In my case I have three Operating Systems which are considered. All the Virtual OSs which are working as servers by providing different server services. Utilization of resources and memory usages of different Virtual OSs with comparison between graphs is done. When OS working with other OSs the comparison is shown with the help of graphs. Using Virtualization a single physical machine is splitted into following the three operating systems namely:

- Window XP
- Windows Server
- Ubuntu Linux

The above Virtual operating systems provide different virtual services. The resource usage and the memory utilization are different for each of the Operating System.

### 3. IMPLEMENTATION & RESULTS

Following are the three examples which were populated to observe the impact on CPU usage and the memory utilization:

- Windows XP working as the FTP server to provide client system File transfer services.
- Windows Server enabled as HTTP sever providing web based services.
- Ubuntu configured RIS which used for installing the Operating System on any client machines.

Sr. No.	Scenario	CPU Usage (%)	Memory Utilization (%)
1	Windows XP	17.1	52.2
2	Windows Server	34.2	55.2
3	Ubuntu Linux	13.5	56.2
4	Window XP & Window Server	20.5	76.2
5	Window XP & Ubuntu Linux	29.5	77.2
6	Window Server & Ubuntu Linux	18.1	71.2
7	Window XP, Window Server & Ubuntu Linux	72.4	65.6

The above table shows the Resource usage for all the servers separately as well as after implementing one of them as a virtual machine. We find that CPU usage as well Memory Utilization increases as we start increasing the virtualization or adding separate virtual servers. Most important point to be noted here is that Memory Utilization gets decreased when I successfully implemented the Virtualization, and thus optimizing the resource usage. Now suppose we are not using Virtualization, and have the three operating systems running on three different servers.

#### CPU configuration used for the implementation –

- No of Cores – 2
- Processor Speed – 2.8GHz
- RAM – 1GB

#### Using this configuration for

- Windows XP is using 52.2% of 1024 MB i.e. 534 MB.
- Windows Server is using 55.2% of 1024 MB i.e. 565 MB
- Ubuntu is using 56.2% of 1024 MB i.e. 575 MB

Total resource utilization comes out to be **1674 MB**.

After implementing Virtualization using Virtual Box all three systems are using 65.5% of 1024 MB which is 671 MB, which is comparatively less than the total resource utilization consumed by each operating system successfully. Similarly by adding the CPU usage we calculate out that after Virtualization overall CPU usage has been increased by 6%, which can be used for the extra implementation of Virtualization running on Ubuntu Operating System. This image represents the scenario 7 whose values at a particular instance are presented in Table 1.

### 4. FUTUREWORK AND CONCLUSIONS

I was successfully able to optimize the resource utilization as shown in Table 1. Ubuntu as an RIS server has optimized the resource usage as Linux is a very robust system. Virtualization has helped in server hardening and utilization. It also enabled better reliability and security for applications on the same host. Virtualization has helped in disaster recovery and business continuity. The same process can also be used in reducing IT departments' time from day to day administrative tasks. In future, I would like to, continue the experiment with newer versions of Ubuntu. I feel that we can also look forward into changing the roles of different operating systems like using Windows XP as a RIS server, Ubuntu as the FTP server. Using this way we can also compare the results so as to which combination brings down the resource utilization and what is the minimum level that could be achieved. Overall , virtualization has maximized computer utilization and decreased the associated issues of file management, power consumption and physical space. The below given Figure 4 shows the results for Point No 7 presented in Table 1.

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