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Review Paper on Resource Utilization and Performance Optimization of CPU using Virtualization

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Abstract: System resources utilization is depending on the workload of the application and pattern of some workloads may be suited for hosting on virtual platform. In this study, we are comparing how different workloads perform on CPU and resources utilization using some virtualization application with different operating system. Performance testing plays an important role in CPU resources utilization. These works gives revelation to the users for proper consumption of resources and minimize the power cost using virtualization and help to maintaining the performance of the System by utilizing the maximum resources.

Keywords: Virtual box, PXE, USB, Operating System, Virtualization.

I. INTRODUCTION

Within the past decade, the processing power of microprocessors has increased significantly. Especially processors based on IA-32 architecture have become popular since they are inexpensive and supported by various operating systems and applications. In addition to use in desktop computers, IA-32 architecture has also become widely used as server platform [1] [5].

Whereas desktop computers can contain a large number of applications and configuration can be complex, server systems have been traditionally built by running a single application on one physical server. This approach has several benefits since configurations can be kept simple and in case of a hardware failure, only one application would be affected. The drawback is that certain applications do not require and are unable to benefit from the increased processing power. Typical examples of this phenomenon are applications where processing power needed to complete a request or transaction and the level of resource utilization have been the same for a long time. After a normal warranty period, the3 maintenance costs of hardware typically increase and at certain point, replacing existing hardware with a new one becomes more cost efficient. Transferring applications directly to new and more powerful hardware usually means that the new system becomes underutilized [5].
Within the past decade the number of actively used applications has increased. Entirely new computing areas such as the Internet have been the main reason for this growth. If the new functionality was impossible to achieve by modifying the existing system, a new system was required. Typically, increment in the number of applications also resulted in an increment in physical servers. Additional needs like a separate test environment has made the situation even worse. When the costs of e.g. maintenance and location facilities are taken account, the overall expenses quickly increase to an intolerable level.

In the mainframe environment, a similar phenomenon has not occurred. Main reasons to this have been the price of the main frame system and available partitioning techniques. Due to the high price, mainframes have been used only in situations where performance and availability of the IA-32 architecture has been insufficient [5].

There are several approaches available to use resources more efficiently. If several servers are using the same application to provide different content, content management and distribution can be centralized to a single server or a smaller number of servers. Also several separate and independent applications can be combined into a single server. Each solution has its benefits and drawbacks. Since changes to the existing infrastructure should be minimized, a solution where administrators and users would not even know that environment has changed is preferred. Server virtualization can be seen as one solution to these issues [5].

Virtualization is the process of decoupling the hardware from the operating system on a physical machine. It turns what used to be considered purely hardware into software. Put simply, you can think of virtualization as essentially a computer within a computer, implemented in software. This is true all the way down to the emulation of certain types of devices, such as sound cards, CPUs, memory, and physical storage. An instance of an operating system running in a virtualized environment is known as a virtual machine.

II. LITERATURE SURVEY- A REVIEW

"Resources Utilization via Virtualization in LINUX on Different Workloads using Virtual Box" has defines about virtual box for virtualization. Virtual Box is a cross-platform virtualization application. It installs on your

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existing Intel or AMD-based computers, whether they are running Windows, Mac, Linux or Solaris operating systems. Secondly, it extends the capabilities of your existing computer so that it can run multiple operating systems (inside multiple virtual machines) at the same time. So, for example, you can run Windows and Linux on your Mac, run Windows Server 2008 on your Linux server, run Linux on your Windows PC, and so on, all alongside your existing applications. You can install and run as many virtual machines as you like. Virtual Box is deceptively simple yet also very powerful. It can run everywhere from small embedded systems or desktop class machines all the way up to datacenter deployments and even Cloud environments[1].

"Resources Utilization and Performance Optimization via Virtualization using Different virtualization Applications" In this paper the author has compare how different workloads perform on CPU resources utilization using some virtualization application by giving other operating system loads. Performance testing is very important in the resource utilization of CPU. This work gives very exposure to the users for proper utilization of resources using virtualization and help to maintaining the performance of the System by utilizing the maximum resources [2].

2.1 Virtualization

Virtualization is the process of decoupling the hardware from the operating system on a physical machine. It turns what used to be considered purely hardware into software. Put simply, you can think of virtualization as essentially a computer within a computer, implemented in software. This is true all the way down to the emulation of certain types of devices, such as sound cards, CPUs, memory, and physical storage. An instance of an operating system running in a virtualized environment is known 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 vary from a single device to a large data centre and virtualization can be applied to different areas such as servers, networks, storage systems and applications. Data Centre in virtualized environment is presented in Figure 2.1.

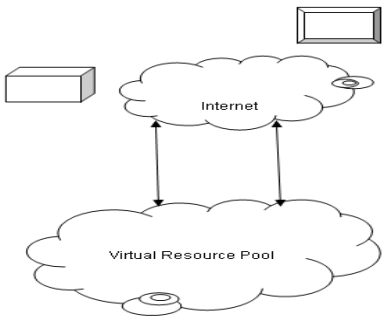

Figure No. 2.1 Data Centre in Virtualized Environment

Virtualization technology allows multiple virtual machines, with heterogeneous operating systems to run side by side and in isolation on the same physical machine. By emulating a complete hardware system, from processor to network card, each virtual machine can share a common set of hardware unaware that this hardware may also be being used by another virtual machine at the same time. The operating system running in the virtual machine sees a consistent, normalized set of hardware regardless of the actual physical hardware components. There are some other types of Virtualization technology available. For example, computer memory Virtualization is software that allows a program to address a much larger amount of memory than is actually available. To accomplish this, we would generally swap units of address space back and forth as needed between a storage device and virtual memory. In computer storage management, Virtualization is the pooling of physical storage from multiple network storage devices into what appears to be a single storage device that is managed from a central console. In an environment using network Virtualization, the virtual machine implements virtual network adapters on a system with a host network adapter.

The focus of server virtualization is to create virtual machines or virtual environments by using normal server hardware and a virtual machine software. Virtual machine software enables sharing physical hardware among several instances called virtual machines. Sharing is done by creating a special virtualization layer, which transforms physical hardware into virtual devices seen by virtual machines. The most visible change is the possibility to run different operating systems (OS) within the same hardware concurrently [3][6] Figures 2.2 and Figure 2.3 illustrate the difference between physical servers and virtual machines.

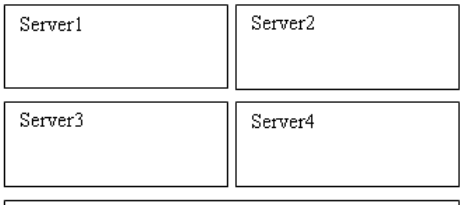

Figure No. 2.2 Physical Servers

Figure 2.2 presents four servers where each server has its own processor, memory, local disk and network connection. Figure 2.3 presents for Virtual Machines (VMs) and a Virtualization Layer [3].

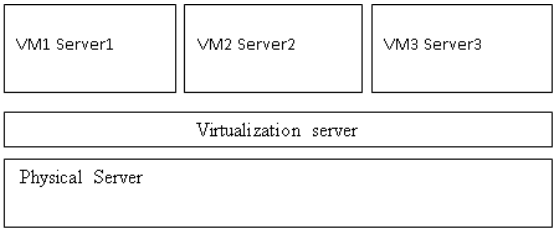

Figure No. 2.3 Virtual machines (VMs) in a single Physical Server

2.1.1 Virtualization compared to system partitioning

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III. CONCLUSION AND FUTURE WORK

Though virtualization we have improved resources and memory utilization and also optimized the performances of the system with different security level.

It has been proved that, a single physical system cannot utilize their 100% resources and memory, so by using virtualization we have improved the resources and memory utilization but also each virtual operating system can also use as the server.

As the technology increases, the desktop computer which are uses at home or small office purpose are very advance in configuration. So by using virtualization those desktop systems are not only works as server but also working as the High performance gaining system in which the many number of operating systems are working in parallel which required different hardware configuration and that different hardware configuration can we provided virtually.

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