# Server Virtualization Using VMWare

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***Abstract*—In the traditional IT stack there was a rigid 1-1 mapping between hardware, an instance of an operating system and a single software application. That rigid model leadto tremendous under-utilization of hardware resources. The industry statistic is that in this traditional model, servers are utilized only 5-15%. This is a huge problem for companies – having a very large pool of resources that stays idle most of the time. The server sprawl and the associatedunderutilization of resources have ripple through effects for the entire environment – server sprawl means not only wasted investment in hardware, but also unsustainable power, cooling, and real estate costs. This tremendous complexity means that it is hard to provision new infrastructure and to respond to changing business needs. To Overcome the traditional IT Stack the Virtualization of servers via Vmware has resolved the issues. [1]**

## I. INTRODUCTION

In 1998, VMware was founded by Diane Greene, Mendel Rosenblum, Scott Devine, Edward Wang and Edouard Bugnion. VMware, Inc. is an American cloud computing and virtualization technology company with headquarters in Palo Alto, California. VMware was the first commercially successful company to virtualize the x86 architecture.

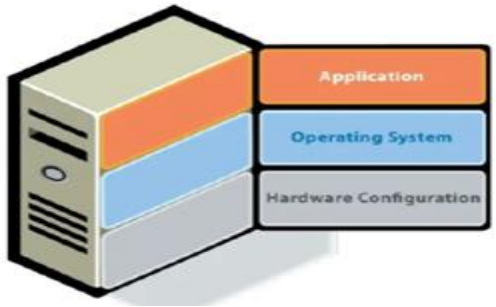
VMware's desktop software runs on Microsoft Windows, Linux, and macOS, while its enterprise software hypervisor for servers, VMware ESXi, is a bare-metal hypervisor that runs directly on server hardware without requiring an additional underlying operating system. More than 20K customers are using the virtual infrastructure suite to transform their IT environment. On the desktop side, VMware's product have more than 4 million users.

VMware Infrastructure is a full infrastructure virtualization suite that providescomprehensive virtualization, management, resource optimization, applicationavailability, and operational automation capabilities in an integrated offering. VMware Infrastructure virtualizes and aggregates the underlying physical hardware resourcesacross multiple systems and provides pools of virtual resources to the datacenter in the virtual environment. In addition, VMware Infrastructure brings about a set of distributed services thatenables fine-grain, policy-driven resource allocation, high availability, and consolidated backup of the entire virtual datacenter. These distributed services enablean IT organization to establish and meet their production Service Level Agreementswith their customers in a cost-effective manner. [2]

## II. PROBLEM STATEMENT

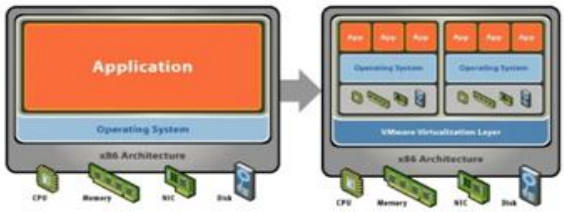
As per abstractmost of the companies – having a very large pool of resources that stays idle most of the time.

The server sprawl and the associated underutilization of resources have ripple through effects for the entire environment – server sprawl means not only wasted investment in hardware, but also unsustainable power, cooling, and real estate costs. This tremendous complexity means that it is hard to provision new infrastructure and to respond to changing business needs. IT departments are stuck wasting cycles on mundane tasks, and don't have time to focus on what really matters. For example, in most companies a single sys admin can support only up to 20 servers, and the time for provisioning a new server is often 6-8 weeks [1]




Old Model Traditional X 86 is challenging is very challenging

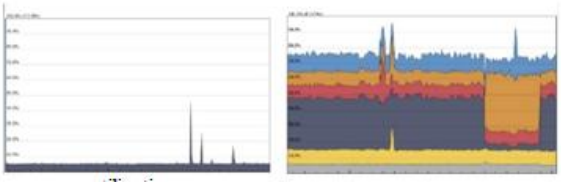
1. Single OS per machine
2. Software and Hardware Tightly Coupled
3. Multiple applications often Conflict
4. Under utilized resources



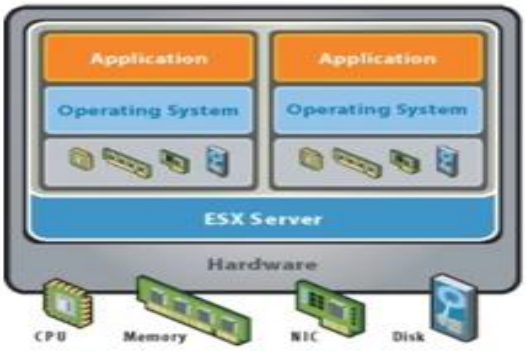

## III. WHAT IS VMWARE VIRTUALIZATION

1. VMWare provides hardware virtualization that presents a complete x86 platform to the virtual machine
2. Allow multiple application to run in isolation within virtual machines on the same physical machine
3. Virtualization provides direct access to the hardware resources to give you much greater performance than software emulation
4. VMwareVirtualization increases the hardware utilization

Above image shows hardware utilization before and after implementation of Virtualization. Virtualization enable consolidation of workloads from underutilized servers onto a single server to safely achieve higher utilization.[2]



## IV. KEY PROPERTIES OF VIRTUALIZATION

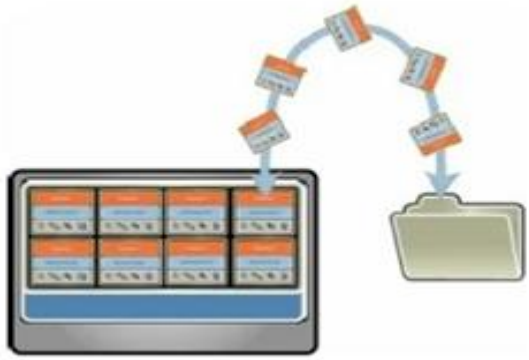



*Partitioning*

- Run Multiple operating systems on one physical machine
- Divide System resources between virtual machines

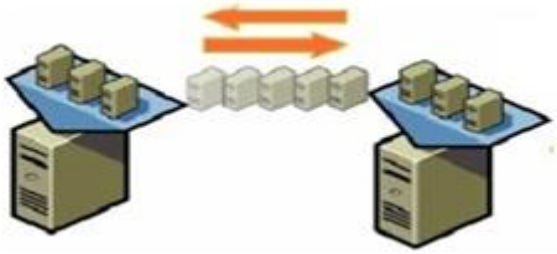
*Isolation*

- Faulty and security isolation at the hardware level
- Advanced resource control over performance



*Encapsulation*

- Entire State of the virtual machine can be saved to file
- Move and copy virtual machines as easily as moving and copying

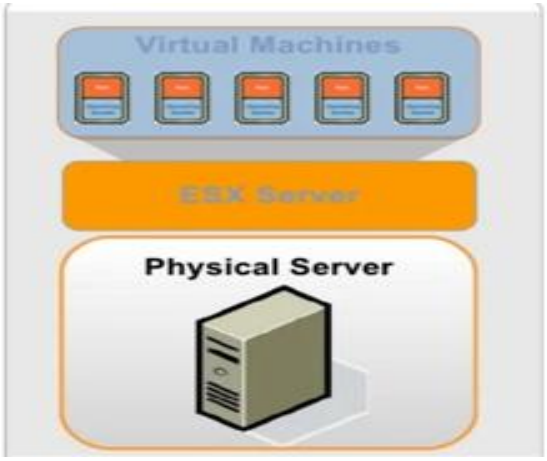


*Hardware Independence*

- Provision or migrate any virtual machine to any similar or different physical server

## V. VMWARE ESX SERVER

*A.* VMware's hypervisor for the data center is called "ESX Server". ESX Server is a baremetal virtualization platform, that is, it sits on top of the server hardware directly and allows partitioning of the underlying CPU, memory, network and storage resources between virtual machines that sit on top of it. This hypervisor layer is an important choice to consolidate several servers onto a single one with many virtual machines, the hypervisor layer needs to be sturdy and reliable.

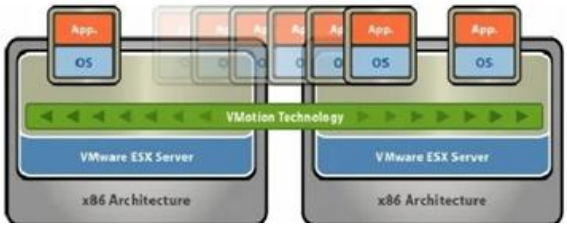



What are some of the key things to look for in a hypervisor?

- Performance
- Stability
- Scalability
- Cross-platform support: HW agnostic, widest guest OS support including windows (multi-generations), linux, solaris x86, novell

## VI. VMWARE INFRASTRUCTURE DISTRIBUTION SERVICE

### VMWARE VMOTION




VMware VMotion enables the live migration of running virtual machines from one physical server to another with zero down time, continuous service availability, and complete transaction integrity.[3]

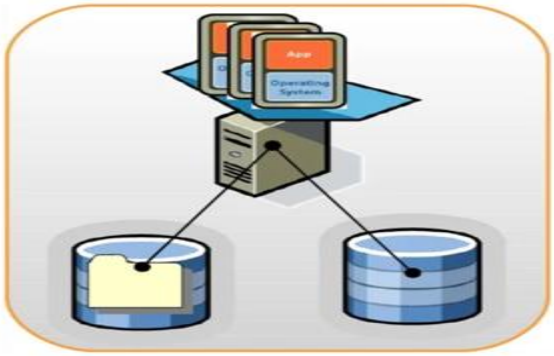
### VMWARE DISTRIBUTION RESOURCE SCHEDULER (DRS)


Feature that allocates and balances computing capacity dynamically across collections of hardware resources for virtual machines. This feature includes distributed power management (DPM) capabilities that enable a datacenter to significantly reduce its power consumption

### VMWARE HIGH AVAILABILITY (HA)


Feature that provides easy-to-use,cost-effective high availability for applications running in virtual machines. In the event of server failure, affected virtual machines are automatically restarted on other production servers that have spare capacity.

### VMWARE STORAGE VMOTION



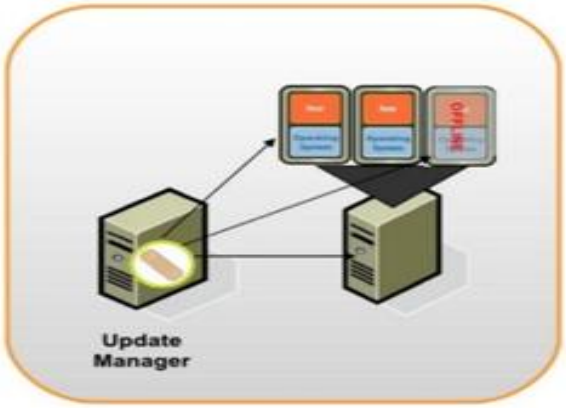
VMware Storage VMotion enables the migration of virtual machine files from one datastore to another without service interruption.

Storage Independent live migration of virtual machine disks

- Zero downtime to virtual machines
- LUN Independent

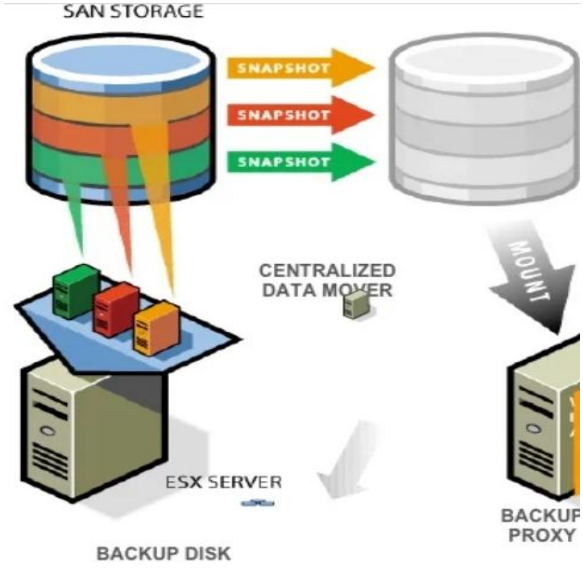
Supported Fibre Channel SANs [4]

VMWARE UPDATE MANAGER




Enables security administrators to enforce security standards across ESX Server hosts and managed virtual machines. This plugin provides the ability to create user-defined security baselines which represent a set of security standards. Security administrators can compare hosts and virtual machines against these baselines to identify and remediate virtual machines that are not in compliance.

VMWARE CONSOLIDATED BACKUP




VMware Infrastructure′s storage architecture enables a simple virtual machine backup solution: VMware Consolidated Backup. Consolidated Backup provides a centralized facility for LAN-free backup of virtual machines. Consolidated Backup works in conjunction with a third-party backup agent residing on a separate backup proxy server (not on the server running ESX Server) but does not require an agent inside the virtual machines. [5]

VMWARE VIRTUAL CENTRE

VirtualCenter Server provides centralized management for datacenters. It aggregates physical resources from multiple ESX Servers and presents a central collection of simple and flexible resources for the system administrator to provision to virtual machines in the virtual environment.

The VirtualCenter Server components are user access control, core services, distributed services, plug-ins, and various interfaces.

The User Access Control allows the system administrator to create and manage different levels of access to the VirtualCenter for different users.

For example, there might be a user class that manages configuring the physical servers in the datacenter and there might be a different user class that manages only virtual resources within a particular resource pool. Core Services are basic management services for a virtual datacenter.

They include services such as:

VM Provisioning – Guides and automates the provisioning of virtual machines

Host and VM Configuration – Allows the configuration of hosts and virtual machines

Resources and Virtual Machine Inventory Management – Organizes virtual machines and resources in the virtual environment and facilities their management.

Statistics and Logging – Logs and reports on the performance and resource utilization statistics of datacenter elements, such as virtual machines, hosts, and clusters

Alarms and Event Management – Tracks and warns users on potential resource over-utilization or event conditions.

Task Scheduler – Schedules actions such as VMotion to happen at a given time.

Consolidation – Analyzes the capacity and utilization of a datacenter's physical resources. Provides recommendations for improving utilization by discovering physical systems that can be converted to virtual machines and consolidated onto

ESX Servers. Automates the consolidation process, but also provides the user flexibility in adjusting consolidation parameter

VirtualCenter Server has four key interfaces:

ESX Server management – Interfaces with the VirtualCenter agent to manage each physical server in the datacenter.

VMware Infrastructure API – Interfaces with VMware management clients and third-party solutions.

Database interface – Connects to Oracle or Microsoft SQL Server to store information, such as virtual machine configurations, host configurations, resources and virtual machine inventory, performance statistics, events, alarms, user permissions, and roles.

Active Directory interface – Connects to Active Directory to obtain user access control information


Web Access Users can also access VirtualCenter Server through the Web browser by first pointing the browser to an Apache Tomcat Server set up by VirtualCenter Server. The Apache Tomcat Server mediates the communication between the browser and VirtualCenter through the VMware API.[5]

## VIII. ADVANTAGES

*Speedy Recovery Time*

The benefits of virtualization in disaster recovery are to consider quicker recuperation of IT resources that accommodate improved business revenue and continuity. The more seasoned frameworks are unequipped for recuperating inside a couple of hours, and by and large, organizations experience any longer downtime, which brings about income misfortune.

*Easier IT Management*

The benefits of virtualization technology are that the IT representatives saved a large part of the provisioning work and gruelling maintenance that actual servers require.

*Better Scalability*

The other benefits of virtualization are that the virtualized conditions are intended to be versatile, which considers greater adaptability regarding organization development. Rather than buying extra infrastructure components, new upgrades and applications can be executed with virtualization without much of a stretch.

*Move to be more green friendly*

At the point when you can eliminate the number of actual servers you're utilizing, it'll lead to a decrease in the measure of power being devoured. This two green benefits of virtualization are that it diminishes the data centre's carbon impression and lessens costs for the business. That money can be reinvested somewhere else.

*Quick and Easiest way to expand Business Processes*

Another benefit of virtualization is that the business world changes quickly, and organizations should have the option to react in like manner. Rather than customary organization plans, which required making arrangements for hardware installation and purchases, virtual foundation permits organizations to scale quickly, including new virtual servers request. Moreover, it's simpler to change how virtual resources are allotted, enabling organizations to move methodologies in a hurry

## IX. CONCLUSION

The benefits of virtualization are recorded as Desktop Visualization, Storage Virtualization, Administrative Virtualization, Application Virtualization, and OS Virtualization.

Benefits of server virtualization are that it improves business continuity and disaster recovery, easier IT management, and more agile business processes.

Virtualization is an incredible asset that eases managerial overhead while expanding efficiency, scalability, and cost optimization. [7]

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