

Virtualization Essentials Professional (VEP)

Topics covered

1. Course Introduction
2. Introduction to Virtualization
3. Business Perspective
4. The Virtual Data Center: Server Virtualization
5. The Virtual Data Center: Storage Networks, and Applications
6. Workplace Virtualization Techniques

Course Outline

1. Course Introduction

2. Introduction to Virtualization

Definitions and Concepts
Virtualization in Context
Virtualization in Readiness
Virtualization Landscape

3. Business Perspectives

Business Value
Inhibitors and Challenges

4. Virtual Data Center: Server Virtualization

Server Virtualization
Types of Server Virtualization
Leading Platforms
Unique Features

5. The Virtual Data Center: Storage, Networks, and Applications

Virtualization and Storage
Virtualization and the Network
Systems Management
Opportunities for Application Developers

6. Workplace Virtualization Technologies

- Workplace Virtualization
- Challenges and Solutions

➤ Course Introduction

Course Overview

1. Business Perspective
2. demonstrating an understanding of the key virtualization concepts and terminology.

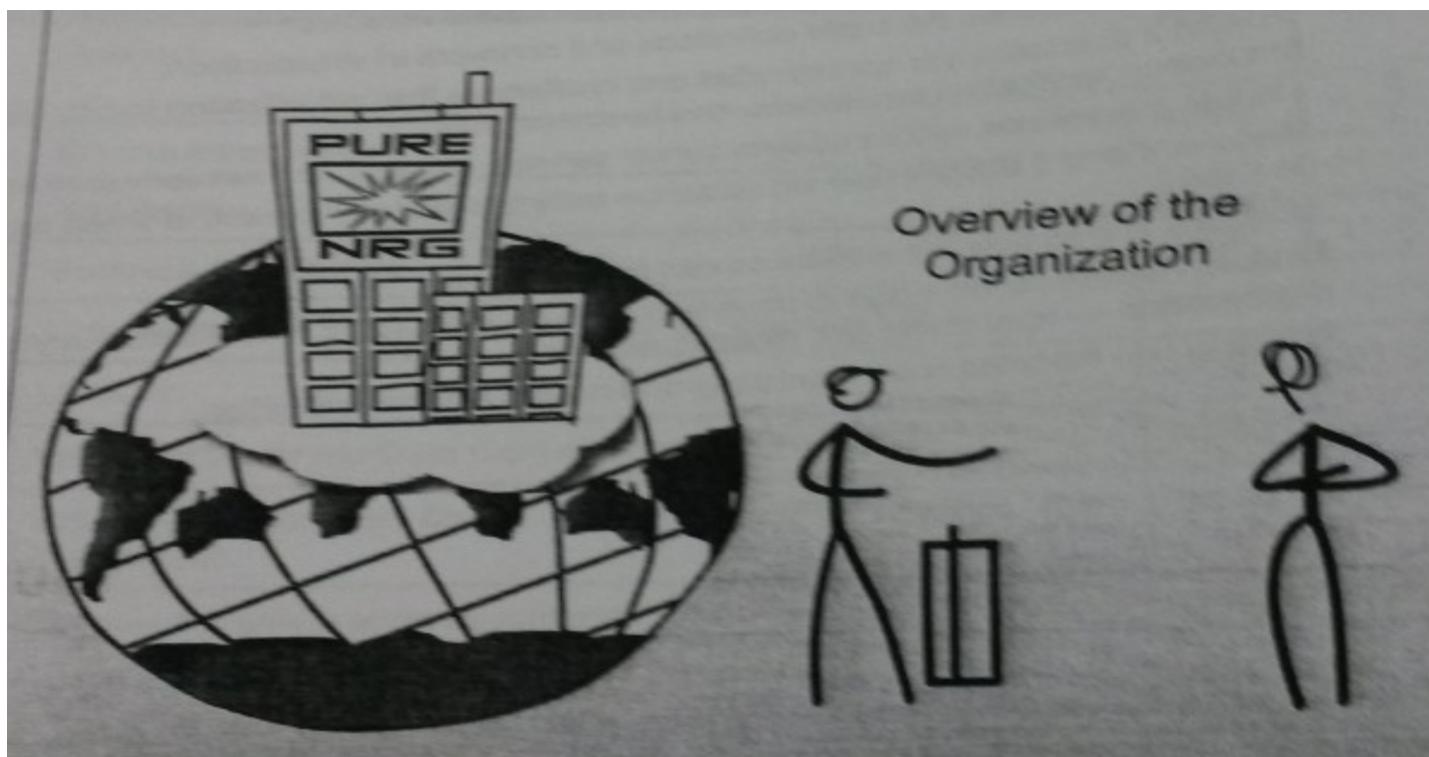
VEP Virtualization Essentials Professional Certification

- 40 multiple-choice questions.
- The pass score is 65% (26 out of 40 questions).
- Exam Length 60 minutes

learning objectives

- Technical capabilities and operating model for virtual infrastructures
- How business benefits can be described and measured
- Implications of direct costs and cost allocations
- Relevant barriers to adoption and success with virtualization and appropriate mitigation strategies
- Technical approaches, components, capabilities, and techniques of virtualization technologies
- Steps that lead to successful adoption of virtualization technologies
- Impact of virtualization on IT service management
- Issues associated with integrating virtualization into an organization's existing compliance risk and regulatory framework

➤ Organization Overview



➤ introduction of PureNRG

PureNRG is a energy company . core business focus on the energy production and distribution its controls

- Generation Facilities
- Transmission Facilities
- Distribution Line
- Customer Access Equipment
- Billing And Accounting Services

PureNRG has a strong brand name and the company to be dependable energy supplier

PureNRG organization

1. headquarter UK
2. Established 1988
3. Has Research and development in the US and Japan
4. mergers and acquisitions since year 2000
5. Focuses on green energy
6. wants to be #1 energy provider in the Industry

The IT Organization

- Employs close to 800 IT staff.
- Focuses on providing more functionality.
- Develops many in-house applications. - (work from Home)
- Possesses a low level of standardization. (process of developing and implementing technical standards. Standardization can help to maximize **compatibility, safety, quality.**)
- Places priority on IT security. (focus on security)
- Must conform to increasing compliance requirements. (Achieve required tasks)

The Plant (Manufactory , Factory)

- The objective of this business unit is to produce electricity and, while doing so, maximize profit and reduce cost. (**produce electricity increase profit and reduce cost.**)

Trading (Commerce , Business)

- The trading unit buys and sells energy. It buys when PureNRG is short on electricity for Its customers or when prices are low. It sells when it has excess electricity or when prices are high. (**Buys and sells energy.**)

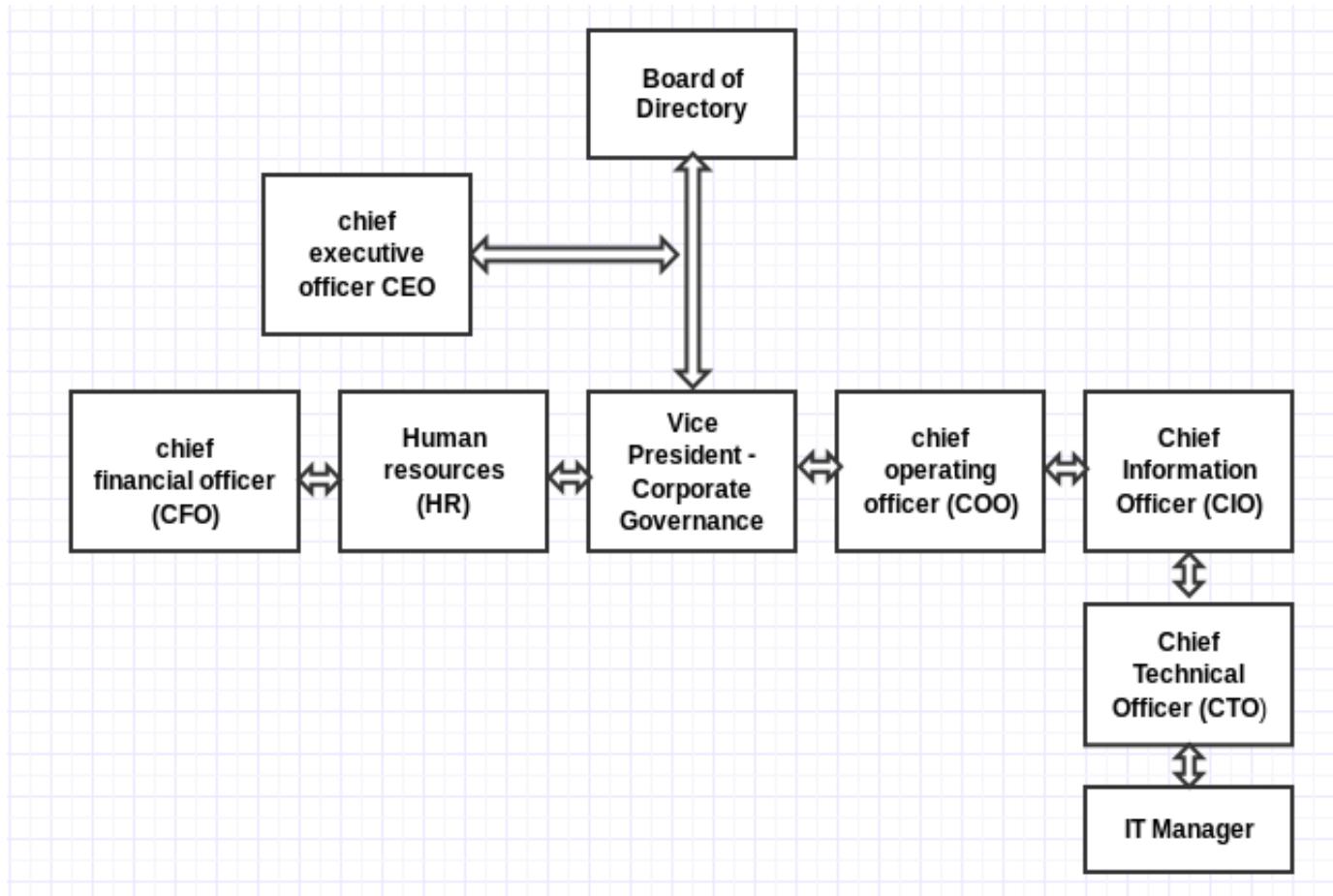
Sales & Distribution

- This business unit manages the sale of electricity, Just as any other organization manages . Its sales.

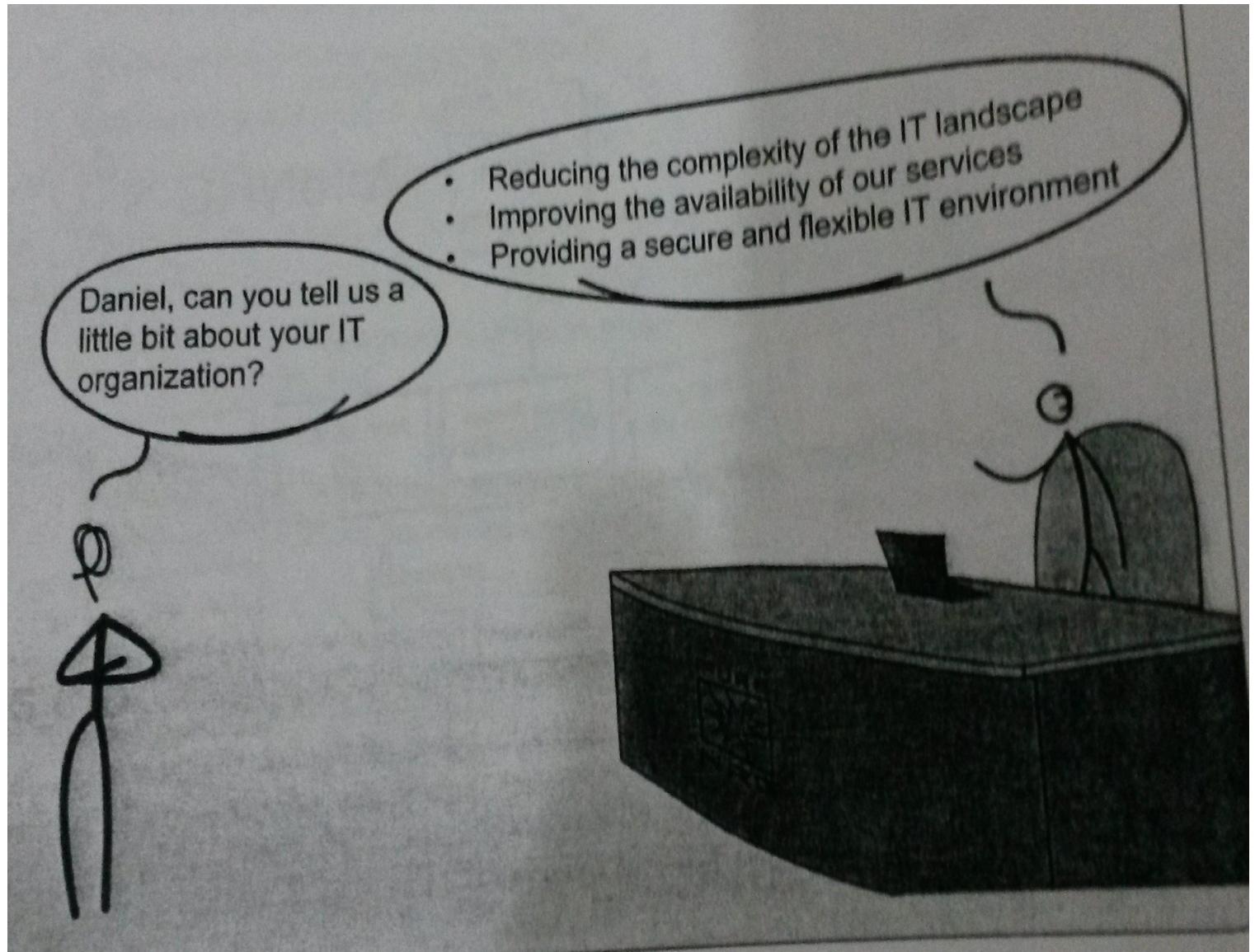
R&D Research and development

- Research and development develops new products and technologies for PureNRG to keep its leading position.

➤ organization chart



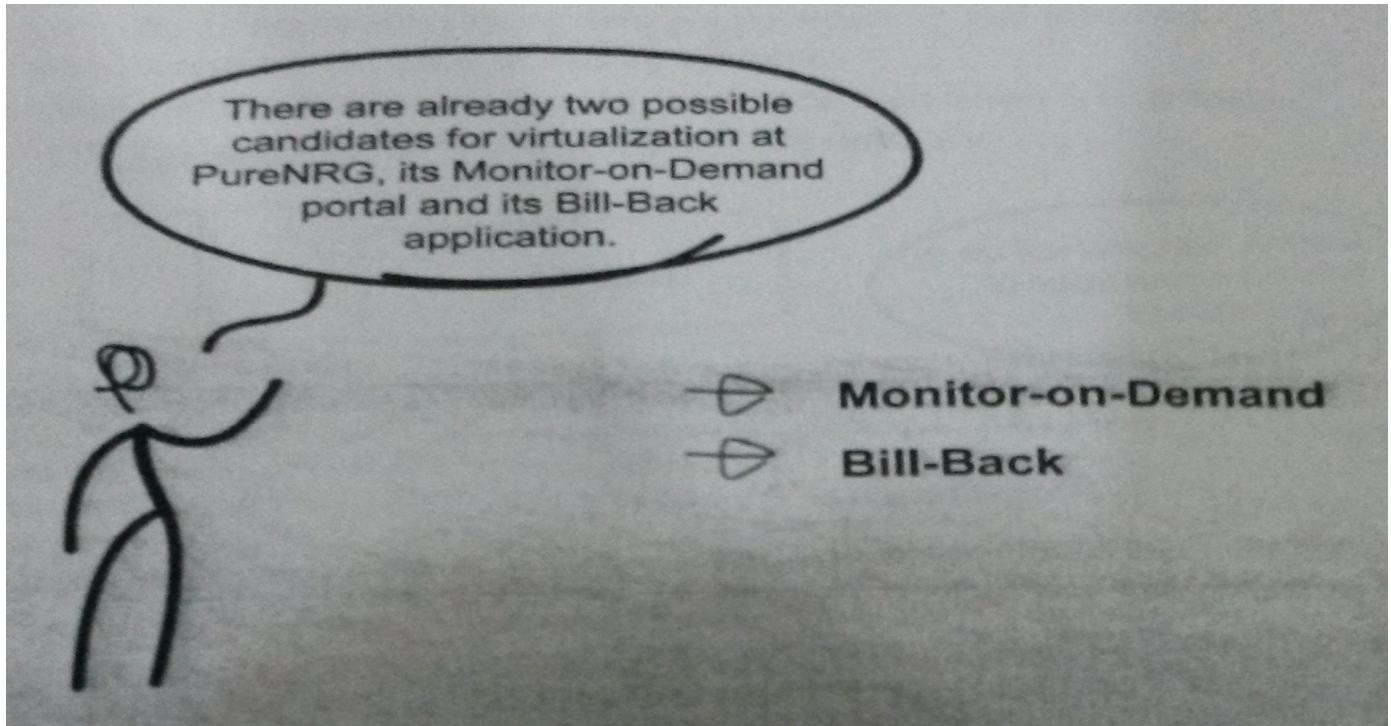
→ **Daniel CIO Chief Information Officer tell us A little about it Organization**



➔ Why PureNrg Need Virtualization

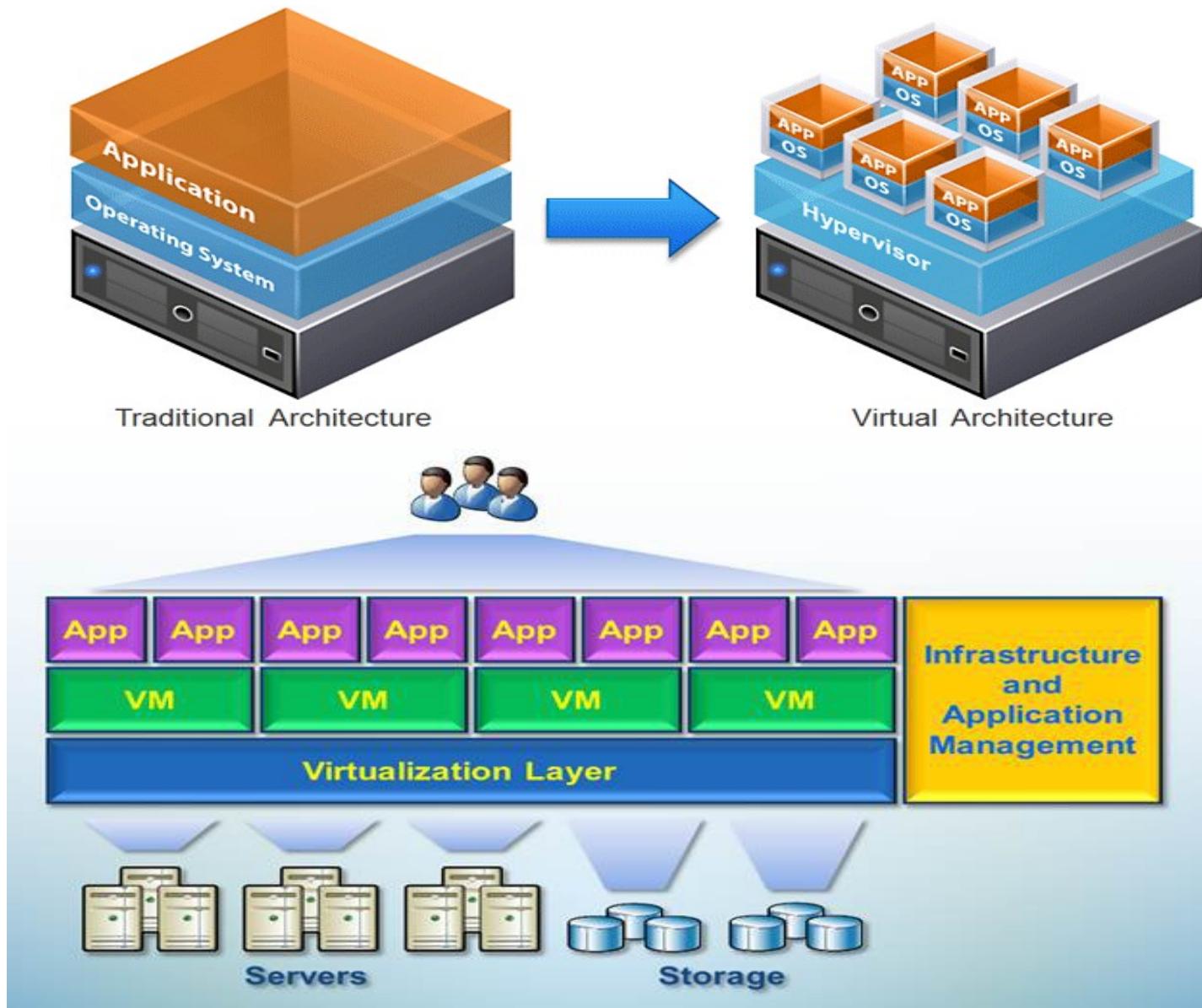
PureNrg is now Looking at creating a virtualized environment and hosting the application in a virtual environment

1. online portal Allows our customers to control their appliances through an online portal
2. **Billback or bill back** is an accounting service and suite of software that is used for cost_recovery.



Module 2 Introduction to Virtualization

1. virtualization enabled hardware to be shared among users
2. virtualization is software that separates physical hardware to create various dedicated resources(Cpu - Ram -Disk ..etc)
3. Virtualization software makes it possible to run multiple operating systems and multiple applications on the same server at the same time



A hypervisor, also called a virtual machine manager, is a program that allows multiple operating systems to share a single hardware host. Each operating system appears to have the host's processor, memory, another resources all to itself. However, the hypervisor is actually controlling the host processor and resources, allocating what is needed to each operating system in turn and making sure that the guest operating systems (called virtual machines) cannot disrupt each other.

→ Virtualization-Benefits

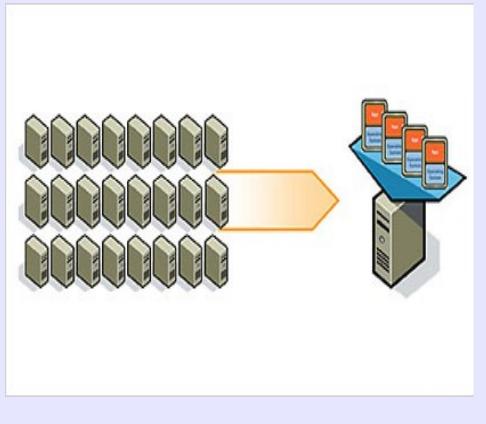
- Isolate applications
- Reduced cost
- Easier backups
- Faster redeploy
- Faster server provisioning
- Reduce hardware vendor
- Increase uptime
- Improve disaster recovery
- Easier migration to cloud

→ virtualization definition

There is No single definition of Virtualization Users,Vendors,Technology provider all have their Own Specific View

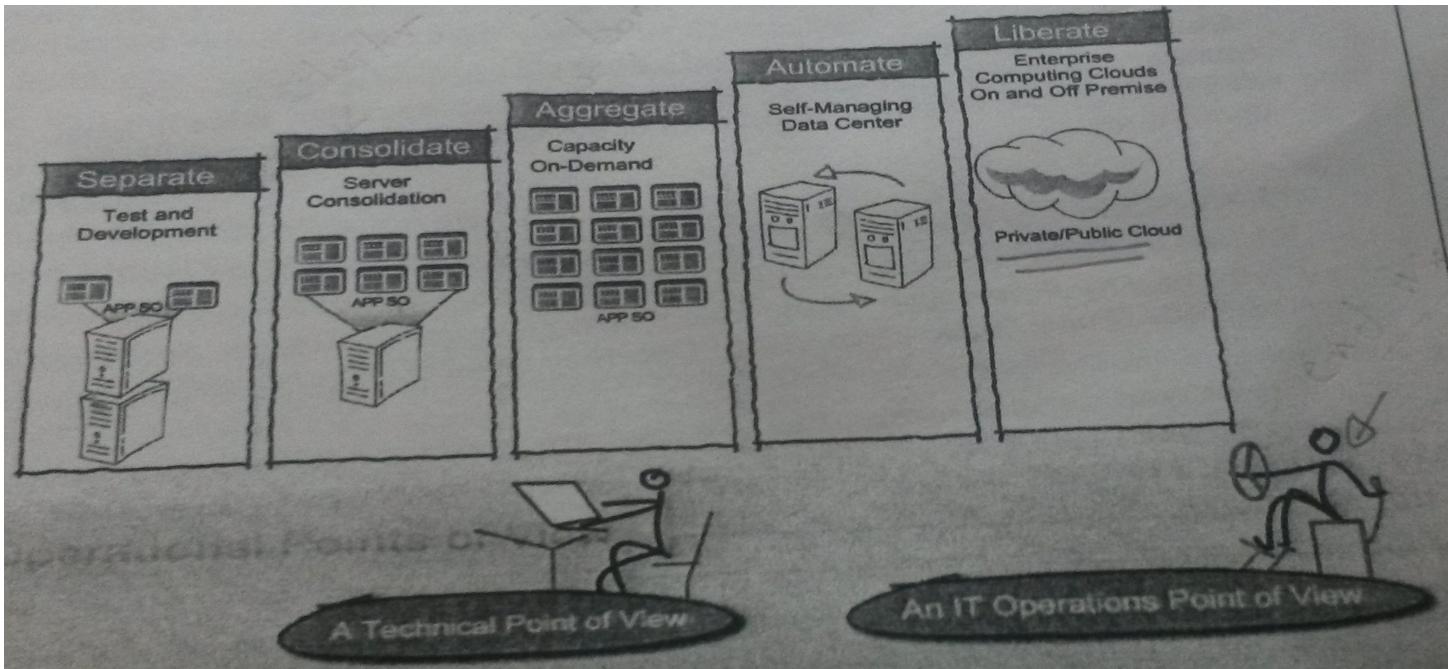
Users	Vendors (Vmware - Redhat)	Technology provider
<ol style="list-style-type: none">1. reduce expenditure , Low Cost2. Server consolidation , Reduce number of Server3. support x86 hardware architecture4. Faster provisioning For OS and Storage5. Enable more-mobile workforce user's desktop, applications and data can be available to them anywhere because it is no longer dependent upon a single workstation or operating system	<ol style="list-style-type: none">1. Virtualization is a framework or methodology of dividing the resources of a computer into multiple execution environments2.	<ol style="list-style-type: none">1. Network virtualization enables IT groups to deploy and manage IT resources as logical services instead of physical resources Using network virtualization

Server consolidation



→ Modern infrastructure

- virtualization is a best seen as a step on the way to modern infrastructure



→ Brief History of Virtualization

- 1964: IBM begins development of CP-40.
 - IBM designed the CP-40 main frame.
 - The CP-40 was never sold to customers, and was only used in labs.
 - it is still important since the CP-40 later evolved into the CP-67 system;
 - CP-67 system is the first commercial Main Frame to support Virtualization
 - [CP-40](#), the first version of [CP/CMS](#) (*Control Program/Cambridge Monitor System*)
 - [CP-40](#) was the *first operating system that implemented complete virtualization*
- 1966: IBM ships the S/360-67 computer in June 1966
 - IBM System/360 Model 67 (S/360-67)**
 - 1968 [CP/CMS](#) installed at eight initial customer sites.
 - CP/CMS. CP Stands for Control Program, CMS stands for Console Monitor System.
 - CMS was a small [single-user operating system designed to be interactive](#).
 - CP was the program which created Virtual Machines. The idea was the CP ran on the Mainframe, and created Virtual Machines which ran the CMS; which the user would then interact with.



- 1972: VM/370 is announced and running on announcement date
- 1. VM/370 was a reimplementation of CP/CMS, and was made available in 1972 as part of IBM's "System/370 Advanced Function" announcement (which added virtual memory hardware and operating systems to the System/370 series).
- 2. **IBM System/370 (S/370)** was a model range of IBM mainframes announced on June 30, 1970 as the successors to the System/360 family.



- 1985 October 9, 1985: Announcement of the Intel 80286-based AT&T 6300+ with Simultask
- 1. The Intel **80286** (also marketed as the **iAPX 286** and often called **Intel 286**) is a 16-bit microprocessor
- 2. AT&T 6300 Plus personal computer contained an Intel 80286 processor
- 3. AT&T's Simultask program to run one MS-DOS program under Unix on the 80286-based 6300 Plus



- 1988 SoftPC 1.0 for Sun
 - 1. SoftPC 1.0 for Sun was introduced in 1988 by Insignia Solutions
 - 2. SoftPC appears in its first version for Apple Macintosh. These versions (Sun and Macintosh) have only support for DOS.
- 3. **SoftPC and SoftWindows** were software emulators of x86 hardware. The emulators were developed by Insignia Solutions. Available originally on UNIX workstations to run MS-DOS,
- 1997 First version of Virtual PC
 - 1. First version of Virtual PC for Macintosh platform was released in June 1997 by Connectix
- 2. **Windows Virtual PC** (successor to **Microsoft Virtual PC 2007**, **Microsoft Virtual PC 2004**, and **Connectix Virtual PC**) is a virtualization program for Microsoft Windows.
- 1999 VMware
 - 1. February 8, 1999, VMware introduced VMware Virtual Platform for the Intel IA-32 architecture.
- 2000 IBM announces z/VM
 - 1. IBM announces z/VM, new version of VM for IBM's 64-bit z/Architecture
 - 2. **z/VM** is the current version in IBM's VM family of virtual machine operating systems. z/VM was first It is directly based on technology and concepts dating back to the 1960s, with IBM's CP/CMS on the IBM System/360-67
 - 3. History of IBM mainframes, 1952–present Market name
 - 700/7000 series
 - System/360
 - System/370
 - System/390
 - zSeries 900, 800, 990, and 890
 - System z9
 - System z10
- 2001 Virtual PC -Vmware - AIX5L
 - 1. June, Connectix launches its first version of Virtual PC for Windows
 - 2. VMware created the first x86 server virtualization product
 - 3. IBM Launches Aix5L and powe4 allowing the partitioning of servers
- 2003 XEN-EMC
 - 1. First release of first open-source x86 hypervisor, Xen
 - 2. February 18, 2003, Microsoft acquired virtualization technologies (Virtual PC and unreleased product called "Virtual Server") from Connectix Corporation.
 - 3. Late 2003, EMC acquired VMware for \$635 million.
- 2005 Solaris Zone
 - 1. Sun releases Solaris (operating system) 10, including Solaris Zones, for both x86/x64 and SPARC systems
- 2006 Vmware server
 - 1. VMware releases VMware Server, a free machine-level virtualization product for the server market.
 - 2. Microsoft Virtual PC 2006 is released as a free program, also in July.
 - 3. SUN LDOM is Oracle VM Server for SPARC
 - 4. Microsoft bought Softwricity.

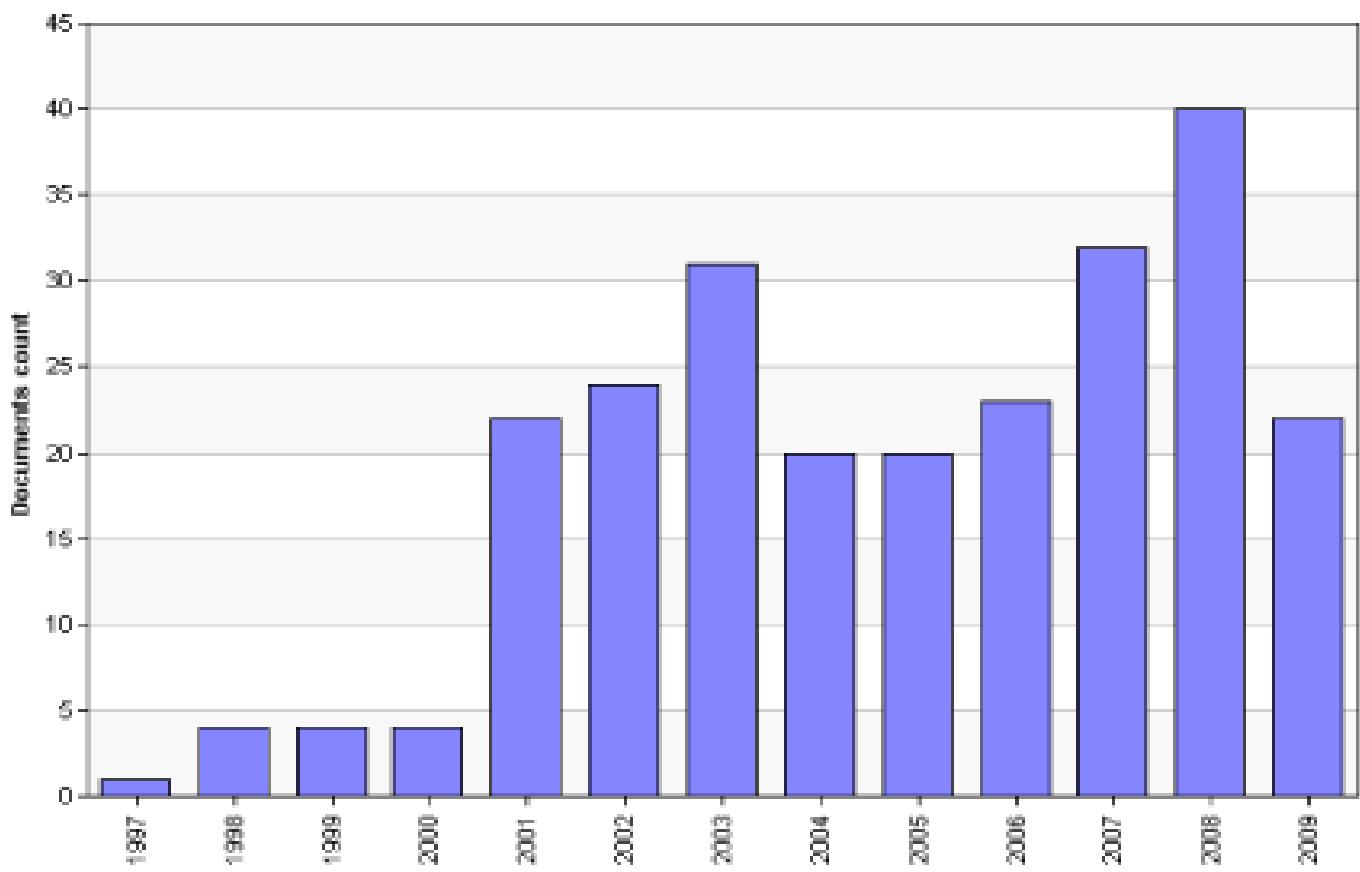
- 2007 xenSource
 1. solaris 8 containers enable migrations to solaris 10 container
 2. citrix buys xenSource

- 2008 citrix xenserver-[VMware](#) Workstation - Hyper-v
 1. citrix release the xenserver xenDesktop xenapp
 2. VMware releases [VMware](#) Workstation 6.5
 3. microsoft introduces windows server 2008 with hyper-v

- 2009 RHEV
 1. redhat announces *Red Hat Enterprise Virtualization*:
 2. Vmware announces Vsphere4

- 2010 Vmware-View VCloud
 1. Vmware announces Vmware-View Vcloud

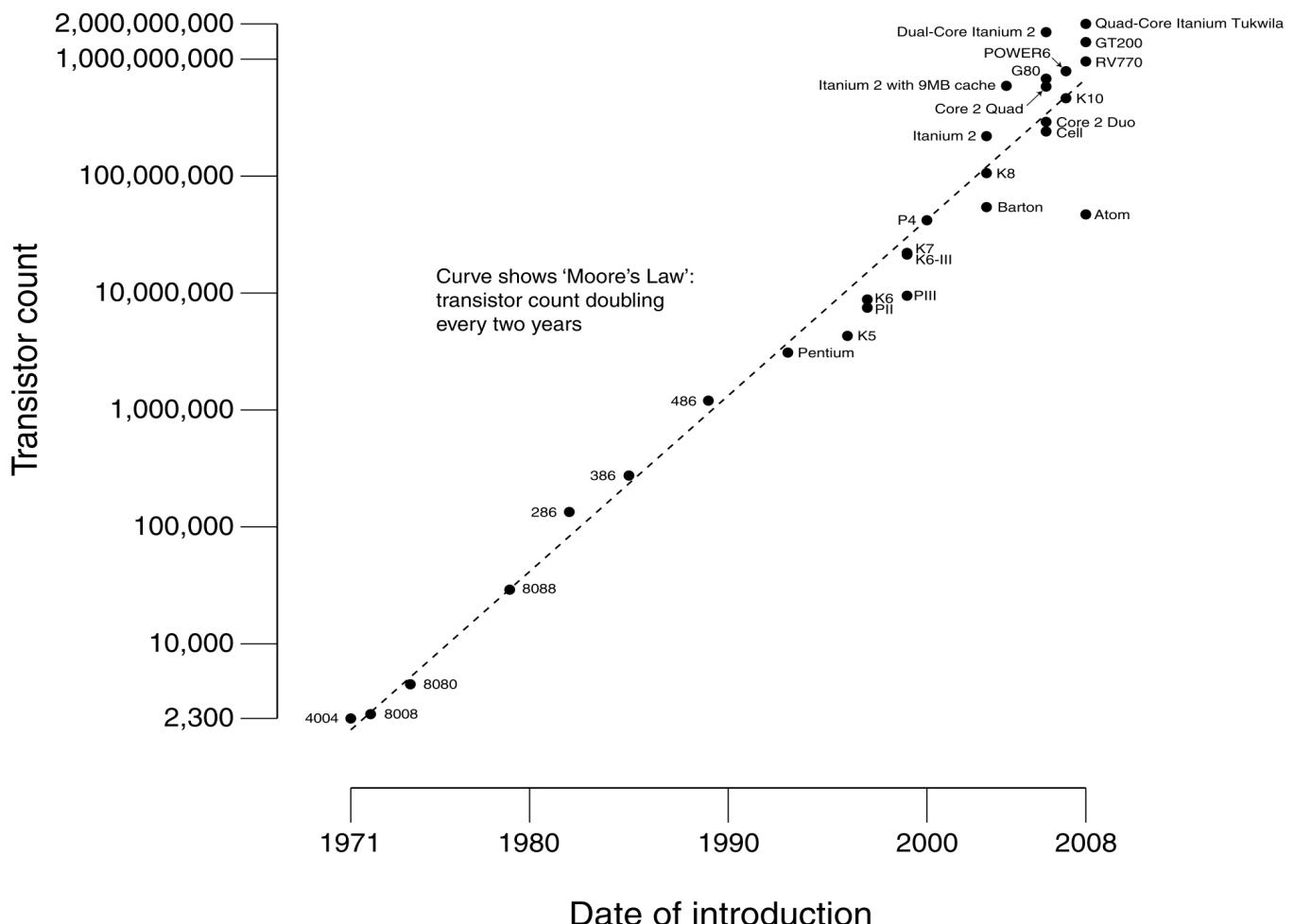
Trend of virtualization patents



➔ transistor count

1. The **transistor count** of a device is the number of transistors in the device. Transistor count is the most common measure of integrated_circuit complexity. According to Moore's Law
2. transistor count of the integrated_circuits doubles approximately every two years. On most modern microprocessors

CPU Transistor Counts 1971-2008 & Moore's Law

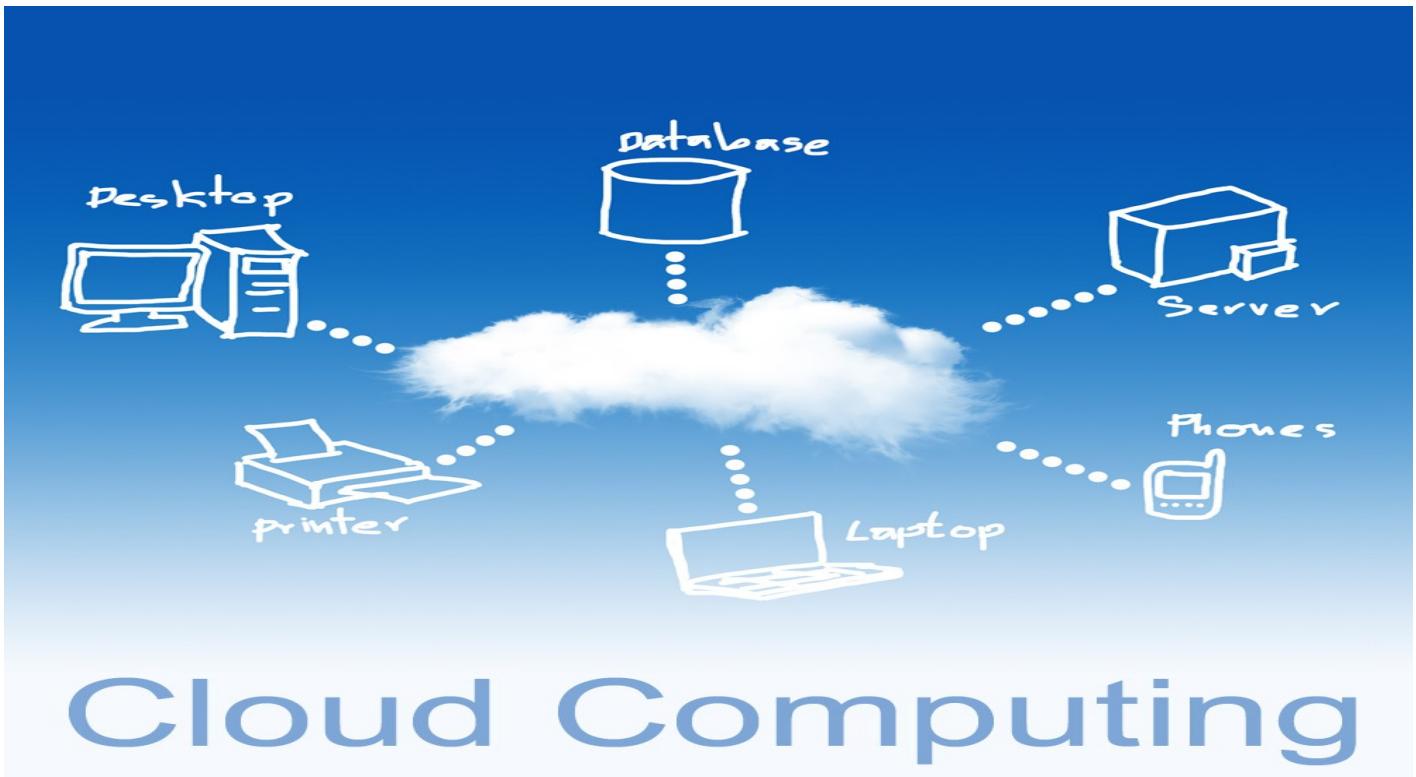


➔ virtualization weak process and control

1. capacity management (storage)
2. service -level management - Ensure their expectations are met
3. incident and problem management (Troubleshooting)

→ Cloud Computing

1. Cloud services provider access to the software and can help developers rapidly create applications
2. Virtualization is a part of cloud
3. it necessary to separate resource from their physical location without virtualization the cloud becomes very difficult to manage
4. Virtualization can exist without the cloud, but cloud computing cannot exist without virtualization
5. Virtualization and Cloud Computing more flexible and cost efficient way to delivering it



→ virtualization requirements

when company move from physical space to virtual space change in people and technology are required

1. virtualization specialist
2. shared hardware ,means that a hardware is connected with network and all the users of that network can use that hardware such that a in library we have only one printer but all can use that
3. hypervisor

Cloud requirements

when company move from **virtualization to Cloud** change in people and technology are required

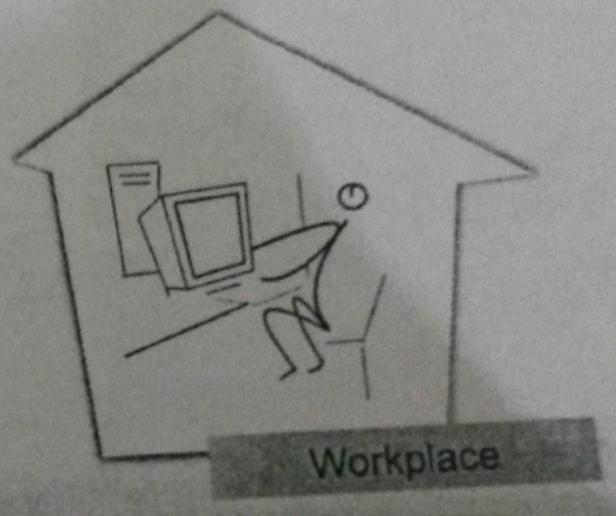
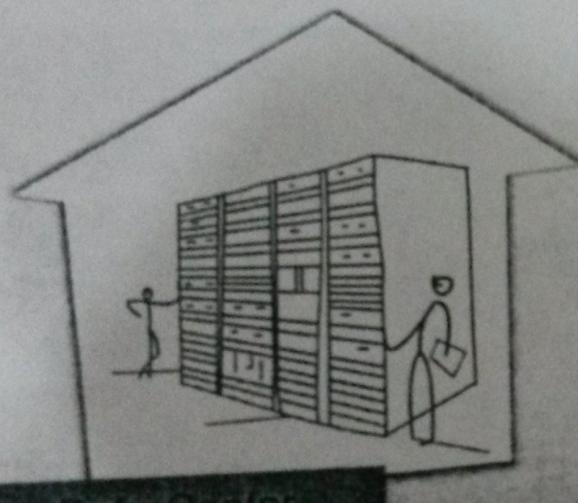
1-source expertise – consultant - organization need staff with vendor management and partner relationships

2-common IT and business strategy – staff to engage in successful strategies they need to understand both the business and it

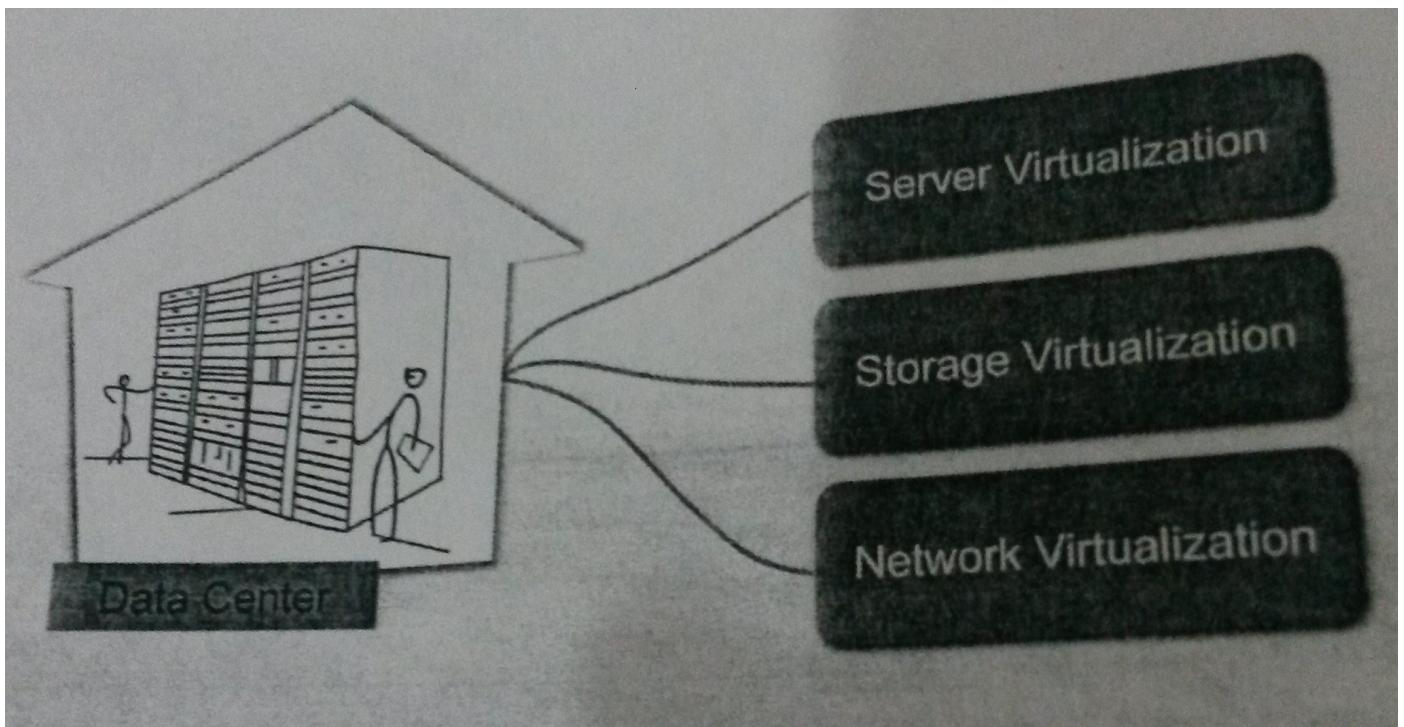
3-federation

→ virtualization landscape (Datacenter virtualization - workpalce virtualization)

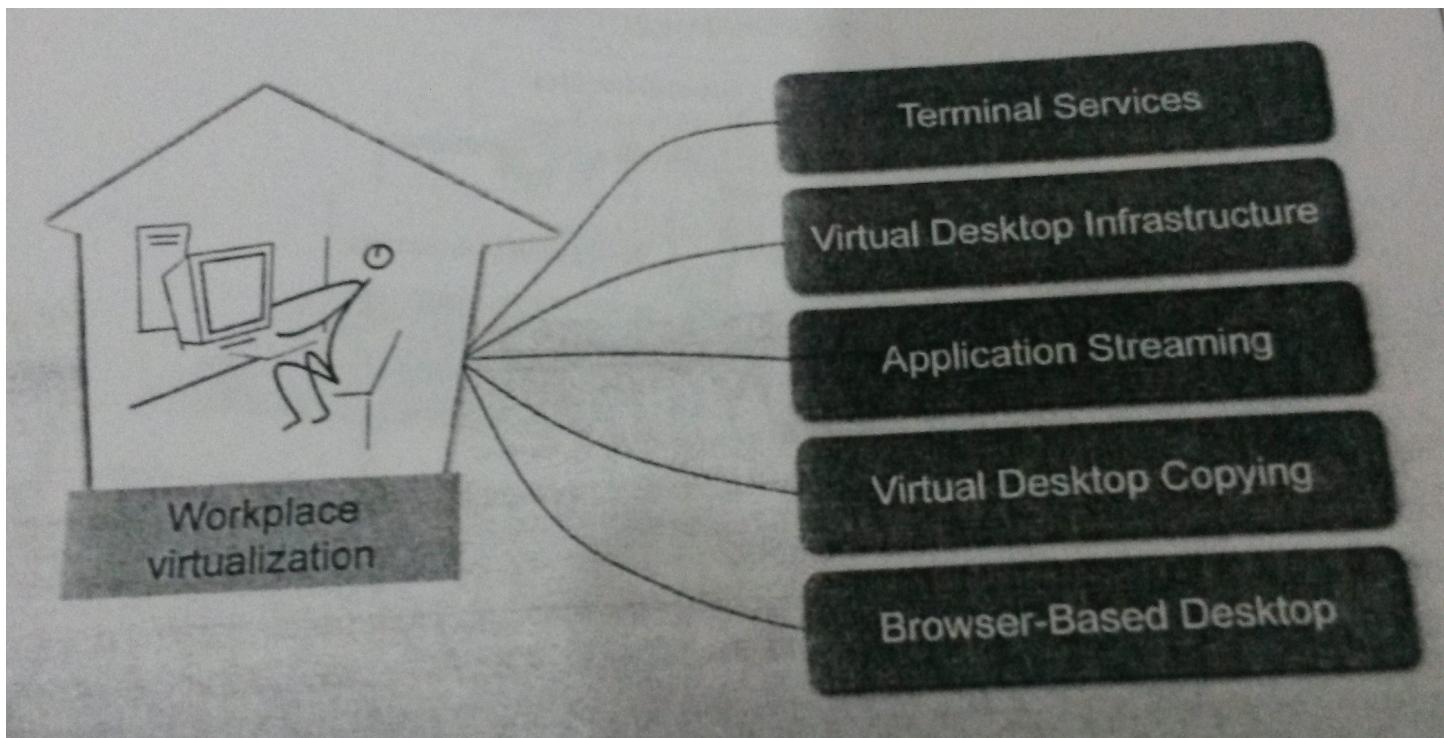
We distinguish two locations for virtualization:



→ Data center virtualization



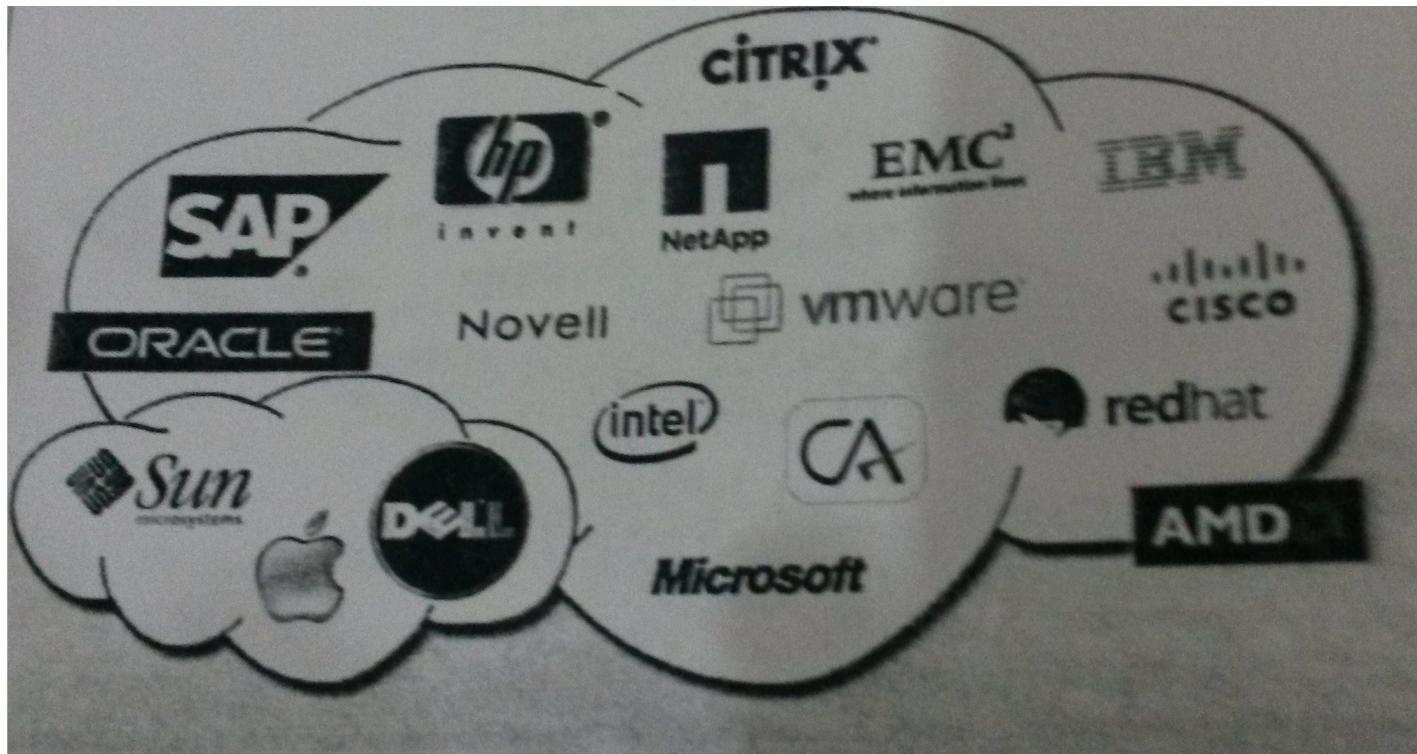
→ workplace virtualization



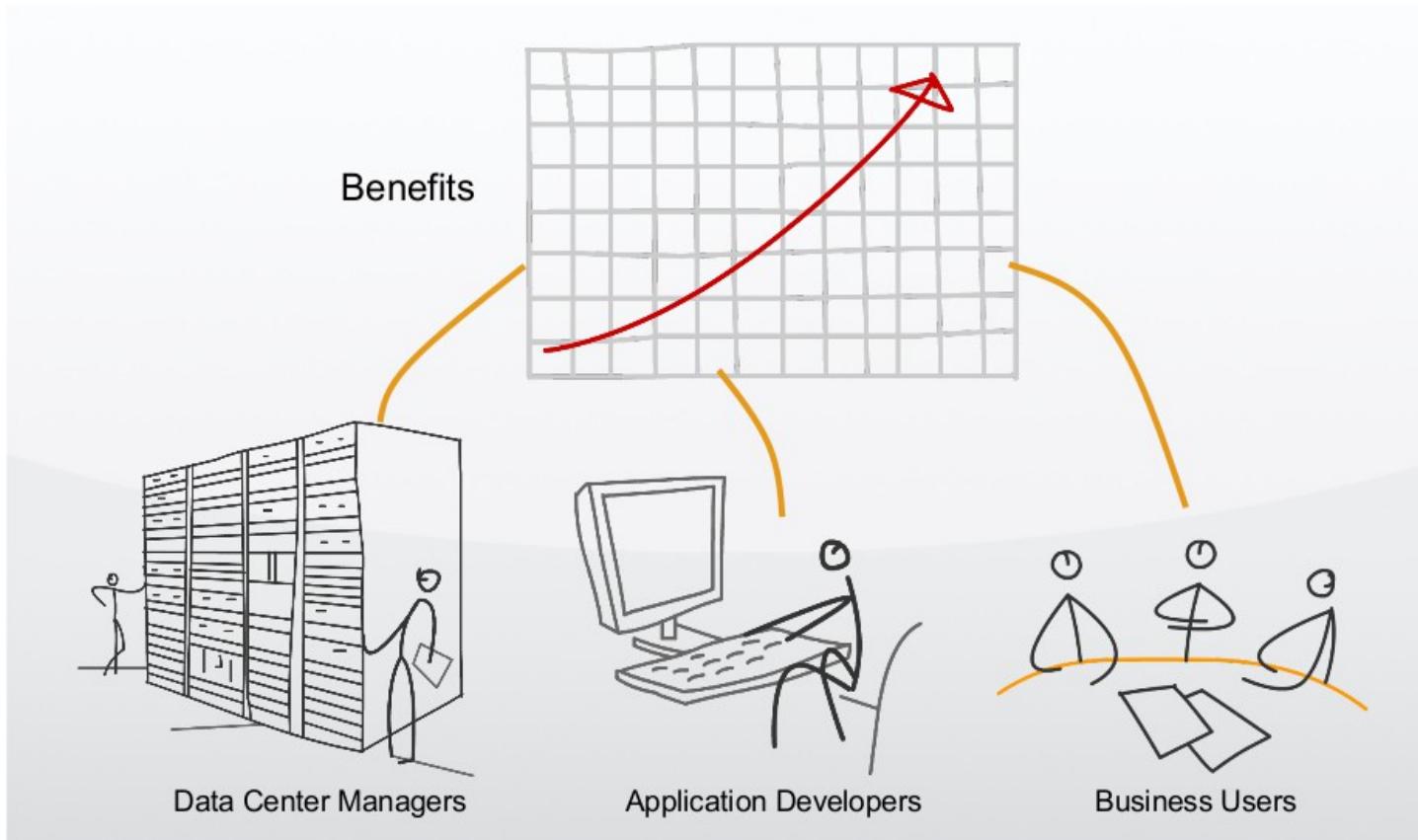
→ vendors



➔ virtualization leading vendors



Business Value



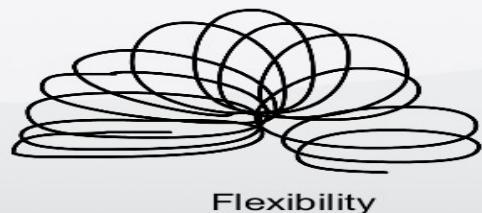
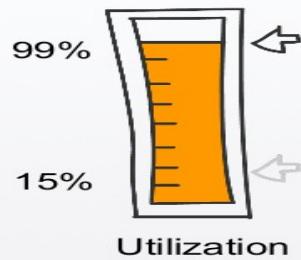
1. Virtualization is an exciting and innovative technology that is transforming the way IT is delivered
2. it is an essential feature of all modern IT operating environments and will be a fact of life at companies large and small in the coming years

Business Value

1. Reduced Capital Expenses
2. Reduced Operating Costs
3. Greater IT Flexibility
4. Quicker Time to Market

- **virtualization makes it possible to reconfigure and reassign hardware**
- **this facilitates new ways of working can improve hardware utilization and business flexibility**

Benefits for the Data Center



Flexibility

My Fedora server Resize Machine

close

CPUs (27 left)

Choose number of CPU cores

Memory size (103.00 GB left)

Choose memory size

resize machine

SERVER2012 - Virtual Machine Properties

Hardware | Options | Resources | Profiles | vServices |

Virtual Machine Version: 8

Show All Devices

Add...

Remove

Hardware	Summary
Memory	4096 MB
CPUs	1
Video card	Video card
VMCI device	Restricted
SCSI controller 0	LSI Logic SAS
Hard disk 1	Virtual Disk
CD/DVD drive 1	Client Device
Network adapter 1	VM Network
Floppy drive 1	Client Device

Disk File

[secondary] SERVER2012/SERVER2012.vmdk

Disk Provisioning

Type: Thick Provision Lazy Zeroed

Provisioned Size:

40 GB

Maximum Size (GB):

330.08

Virtual Device Node

SCSI (0:0) Hard disk 1

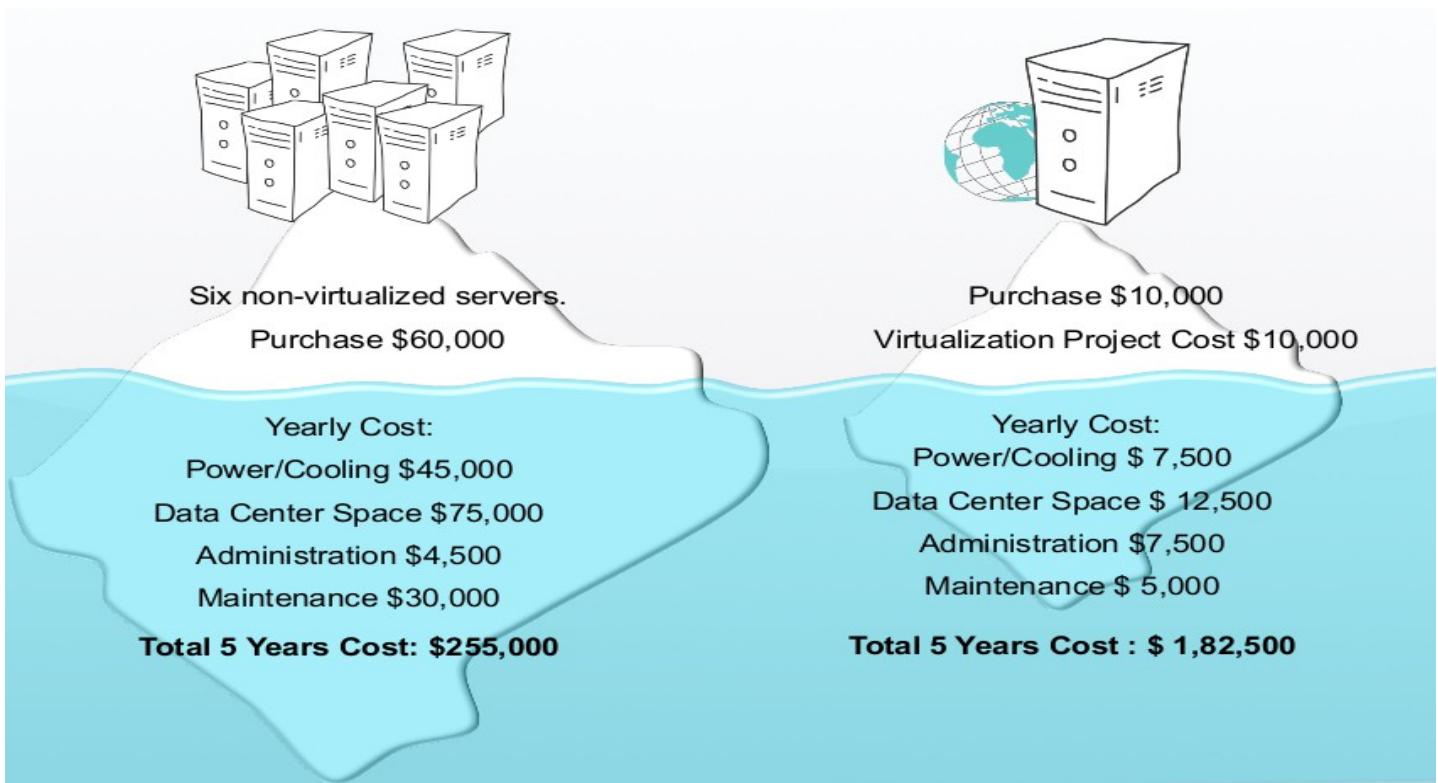
→ Server Costs



Aggregating all server costs, we can see that the purchase of a \$10,000 server commits the organization to a further \$32,500 in costs over a 5-years period.

1. Purchase -buy new server -Number of Datacenter server increasing
2. power/cooling power and cooling Cost
3. data center space data center space is not cheap
4. administration cost must also be include
5. maintenance

■ Cost Comparison



■ benefit of virtualization consolidation

Consolidation

Consolidation

Improved Availability

Downtime Avoidance

Disaster Recovery

Dual Use



1. improve availability if hardware fail application can be migrated to standby server
2. downtime avoidance Application can be switched to alternative hardware
3. disaster recovery in the event of a disaster application can be switched quickly to standby location
4. Dual use

■ Application Development

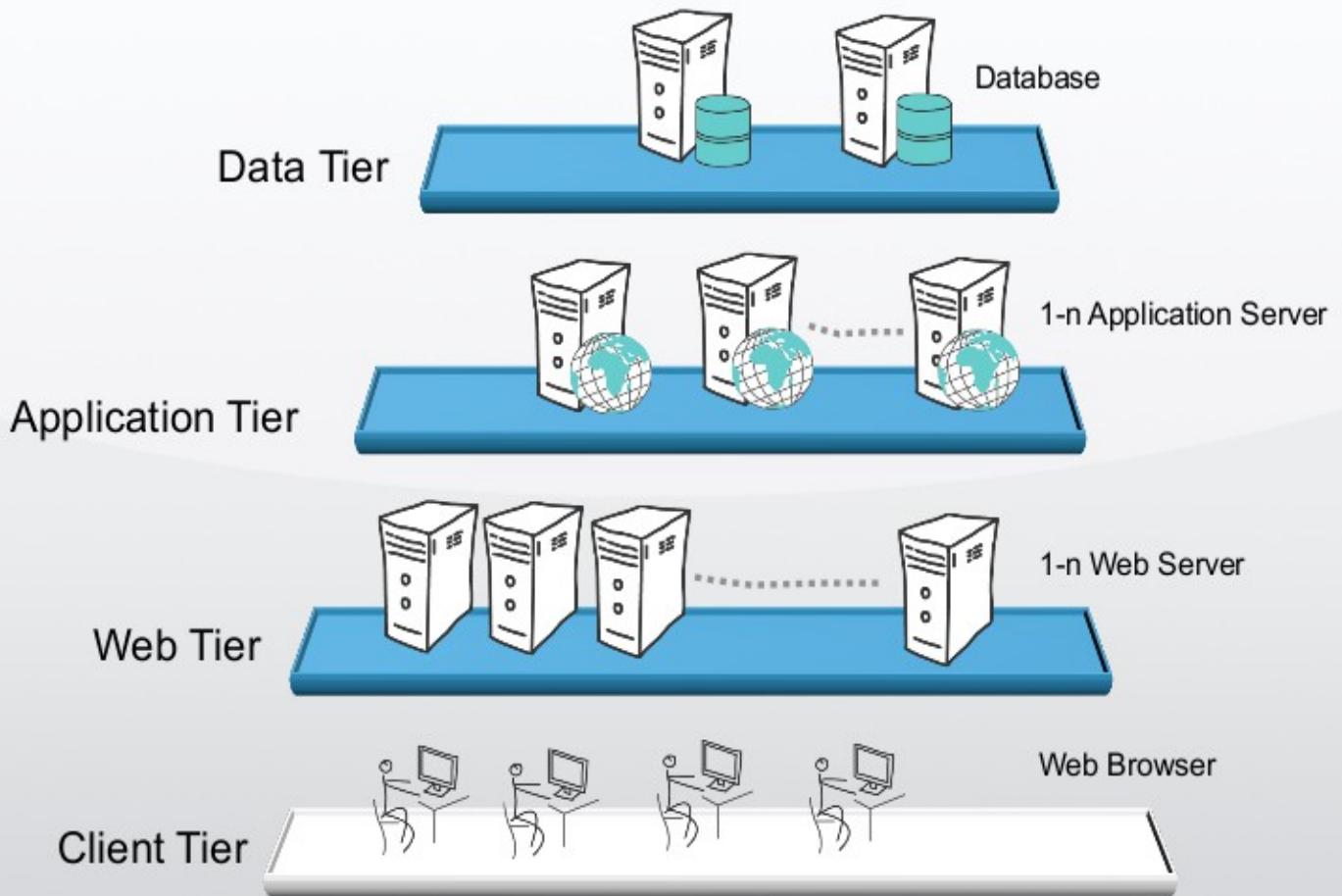
Virtualization for Desktop Development

With desktop virtualization, you can create applications without having to install a development software on the PC. Everything can be contained in virtualized environments that are provided to you. You can learn how the virtual environment supports developers by reading about:

- Multiple Operating Systems on a Single Device (For developers to test code with different OS 32 bit - 64Bit)
- Templated environments
- Snapshots

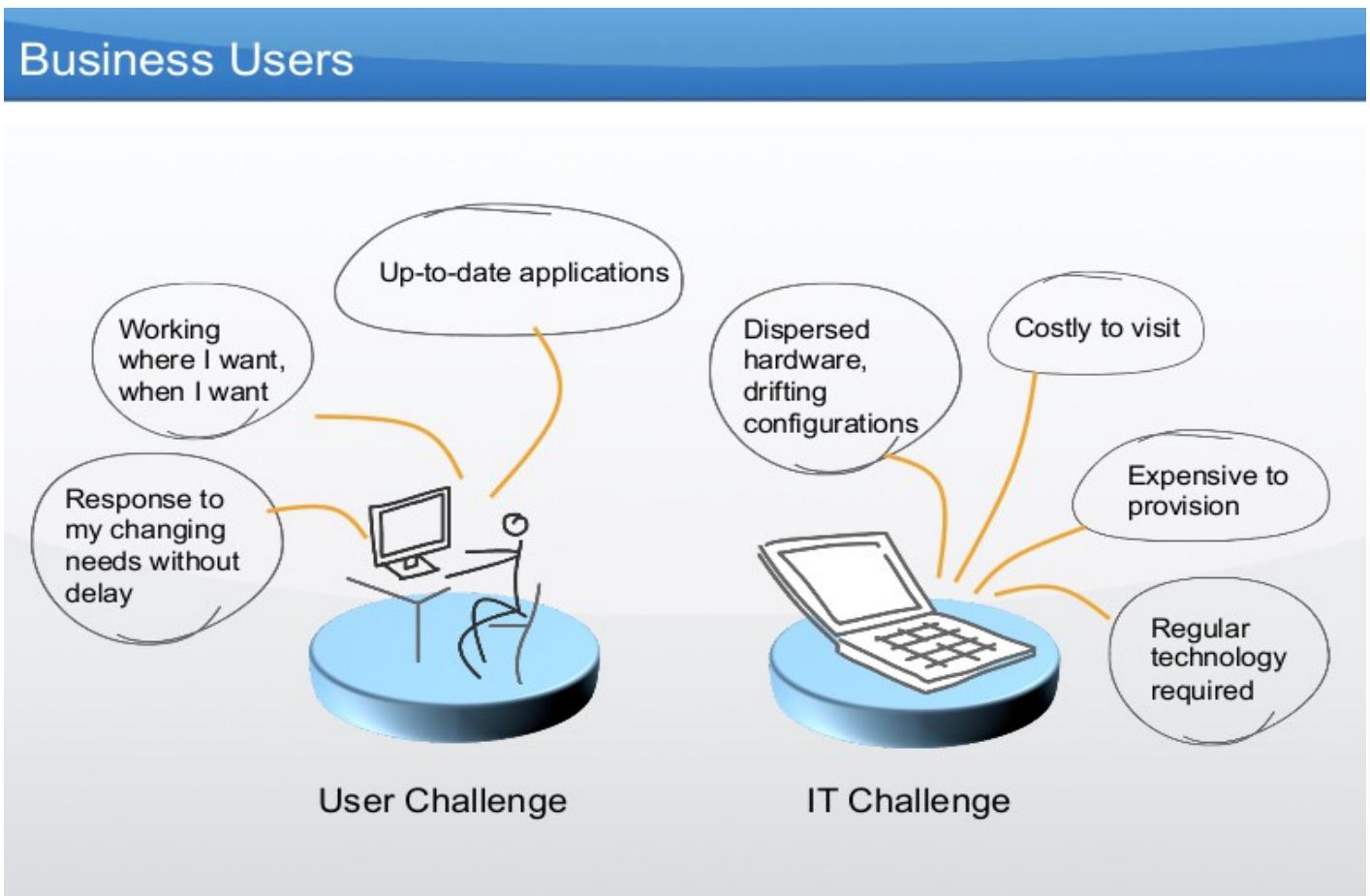
Application Development (Contd.)

Virtualization for Multiserver Developmental Environments



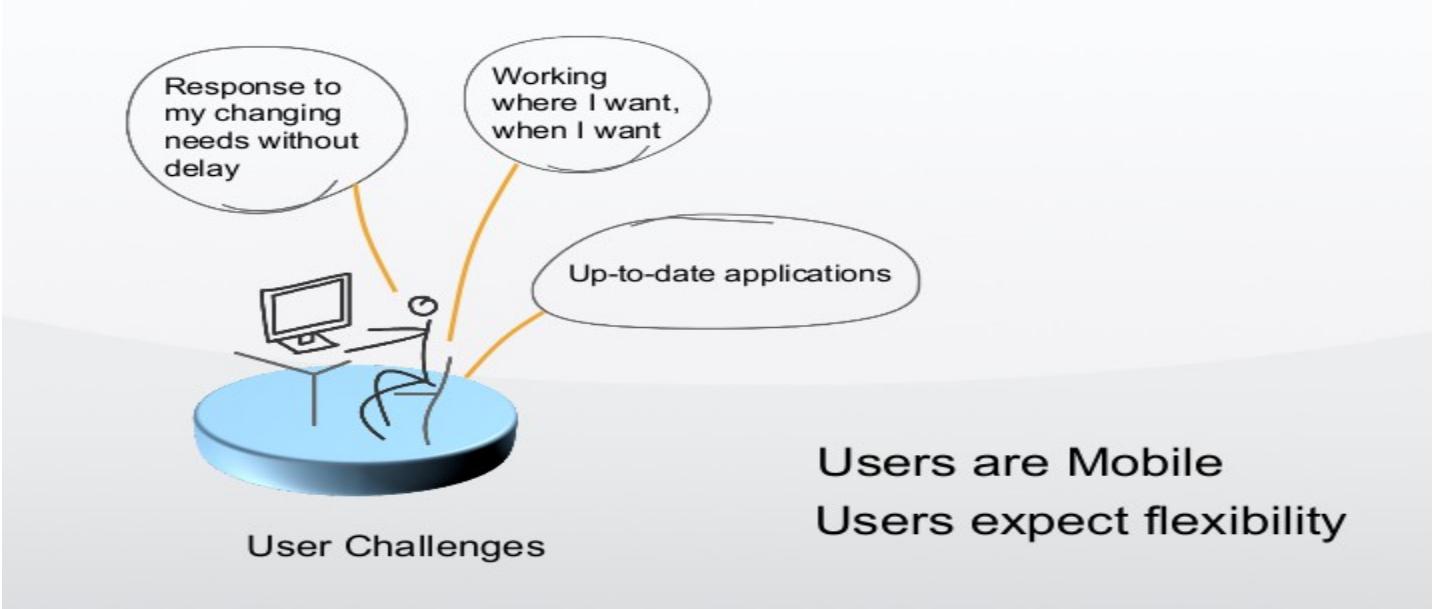
- virtualization benefit for Application Development
 - 1. controlling cost
 - 2. allow applications team to provisioning server themselves
 - 3. providing Identical Topologies in Development and production
 - 4. reproducing legacy environment when need
 - 5. Snapshots
- business users will be benefit from the fast delivery time and lower cost of data center virtulization

Business Users



- *Anywhere access to desktops and applications*

User Challenges for desktops and mobile



- for it Desktop are difficult to control/Manage

IT Challenges for desktops and mobiles



Difficult to Manage
Configuration Diverge
Technology Changes
Regular Refresh

Benefits of Desktop Virtualization

Desktop virtualization embraces a number of technologies with different attributes.

- Thin Terminals
- Provisioning
- Roaming
- Disaster Recovery

- Thin Terminals or Thin client



- provisioning
install bases on Vm template

- Roaming
roaming user who can connect to their Virtual PC from any thin Client

- Server Virtualization for the Data Center

