

# Virtualization

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## What is it?

A way to run multiple systems on a single computer

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## Current Challenges

- Application per server ratio
  - Too high?
  - Too low?
- Time spent on basic tasks
- Difficulty in migration to new hardware
- Cost of maintaining infrastructure

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## Vocabulary

- Virtual Machine - A single virtual system
- Host - The physical system
- Guest - The virtual machine

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Before Virtualization

After Virtualization



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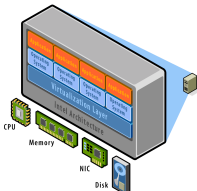
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## After Virtualization



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## Characteristics

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## Partitioning

- Virtual machines run simultaneously on a single piece of physical hardware
- Allows resources to be pooled
- Virtual Machines can be given slices of pooled resources

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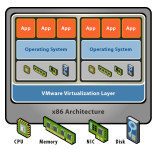
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## Partitioning



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## Isolation

- Each virtual machine is unaware of others
- Virtual machine instability cannot affect other virtual machines
- Guest OS has no idea it is running inside a virtual machine

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## Isolation



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## Encapsulation

Each virtual machine is a set of files



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## Migration

- Migrate live workloads
- Migrate workloads to larger resource pools
- Allows business hour maintenance

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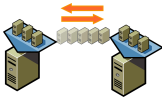
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## Migration



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## Virtualization Timeline

- 1960: IBM S/360 Model 67 mainframe
- 1999: VMware Virtual Platform
- 2005: Mainstream Virtualization

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## Virtualization for Workstations

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## Software Packaging

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## Software & OS Testing

- Test & demo multiple OSs
- Patches before rollout
- Group policies
- Test software on different patch levels

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## Teams

Groups of virtual machines

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## VMware Workstation

Demo

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## Virtualization for Servers

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## Why?

- In a perfect world...
- Unreliable operating systems
- Incompatible software combinations
- Utilization of resources
- Virtualization is a necessary tool in reality

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## Benefits

Consolidation

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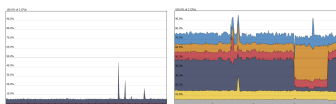
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Before Virtualization      After Virtualization



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## Consolidation: Problem

- Too many servers
- One server running too many applications

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## Consolidation: Solution

- Physical to virtual migrations
- Migrating applications to separate virtual machines if possible

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## Consolidation: Benefits

- Improves server utilization
- Balances load across multiple servers
- Reducing total number of servers
  - Lower power usage
  - Lower cooling costs

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## Benefits

Provisioning

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## Provisioning: Problem

- New software = new server
- New servers take time to provision

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## Provisioning: Solution

- Deploy new servers as virtual machine
- Use virtual machine templates

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## Provisioning: Benefits

- No added power or cooling requirements
- No hardware to rack and install
- Provision new servers previously cost prohibitive
- Virtual machines can be migrated to new servers easily and with little downtime

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## Provisioning: Virtual Appliances

- Preconfigured application environments
- Includes OS and application
- Vendor tweaked installations
- VMware appliance catalog

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## Benefits

High Availability

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## High Availability

Problem: Downtime = Unhappy Users

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## High Availability

Solutions

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## VMware Vmotion

Allows migration of running virtual machine

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## VMware HA

In case of failure, VMs are automatically restarted

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## VMware DRS

Automatic load balancing of VMs

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## Backups

VMware VCB & Vizioncore ESXRanger

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## Virtualization for Desktops

VDI

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## Virtualization Pitfalls

- Too many virtual machines
- Dependence on fewer servers
- Training and qualified help
- Software vendor support
- Trying to virtualize everything
- Server OS licensing

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## Virtualization Software

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## Microsoft

- Virtual PC
- Virtual Server

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## VMware

- Player
- Workstation
- ACE
- Server
- Infrastructure

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## XenSource

Paravirtualization

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## Comparisons

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## Workstation

VMware Workstation & Microsoft Virtual PC

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## Lightweight Server

VMware Server & Microsoft Virtual Server

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# Enterprise Server

VMware Infrastructure

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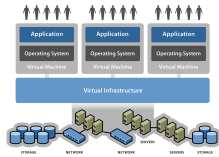
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# Xen vs. VMware

Paravirtualization vs. Native Virtualization

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# Virtualization Types

- Emulation
- Native Virtualization
- Paravirtualization
- OS Virtualization

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# The Future

- Paravirtualization & Native Virtualization
- Software virtualization
- Microsoft!

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# Our Project

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## Goal

- Higher availability for servers
- More storage & expandability
- Decommission troublesome file server
- Be ready for new web servers
- Disaster recovery readiness

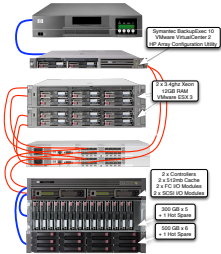
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## Hardware

- Upgraded CPUs in DL380 to match
- Upgraded RAM to 12GB each server
- All other hardware new

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## Software

- VMware Infrastructure 3
- VMware VirtualCenter 2
- Microsoft Windows Server 2003 R2 Enterprise
- Vizioncore ESXRanger
- Symantec BackupExec 10

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## How did it go?

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## Next steps?

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Questions?

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