

ABB Technology Days Fall 2013

# System 800xA Server and Client Virtualization

# System 800xA Virtualization

Customers specify it

Customers harmonize with IT

Training environments

Lower cost of ownership

Backup validation

Lower power and cooling costs

Server footprint reduction

## Virtualization and 800xA.

Spare parts reduction

Flexibility

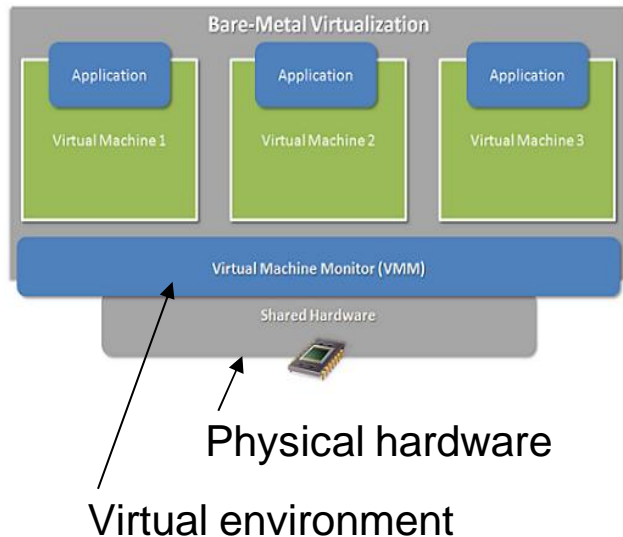
Lifecycle benefits

Performance benefits

Project upgrade benefits

Improved availability

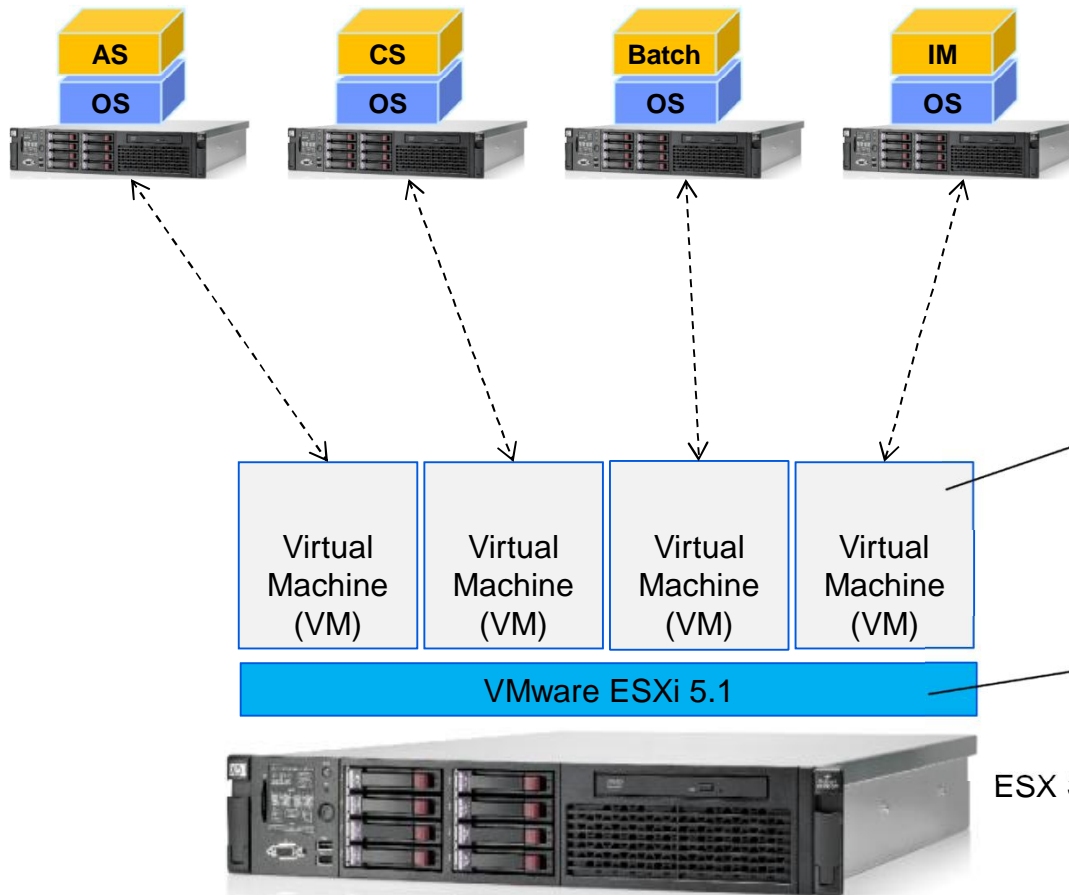
# What is a Virtual Machine?



- A virtual machine (VM) emulates a physical computer
- One or several VMs run on a regular computer
- Virtual hardware of each VM can differ, e.g. 2 NICs, amount of RAM, etc.
- Run different operating systems on the same physical computer - old as well as newer ones
- Reduced server footprint
- Simplified system maintenance
- Energy saving

# System 800xA Virtualization

## Virtualization – What is this???



**Application:** AS, CS, Batch, IM.....

**OS:** Windows 7 / Windows Server 2008

**HW:** Workstation / Server

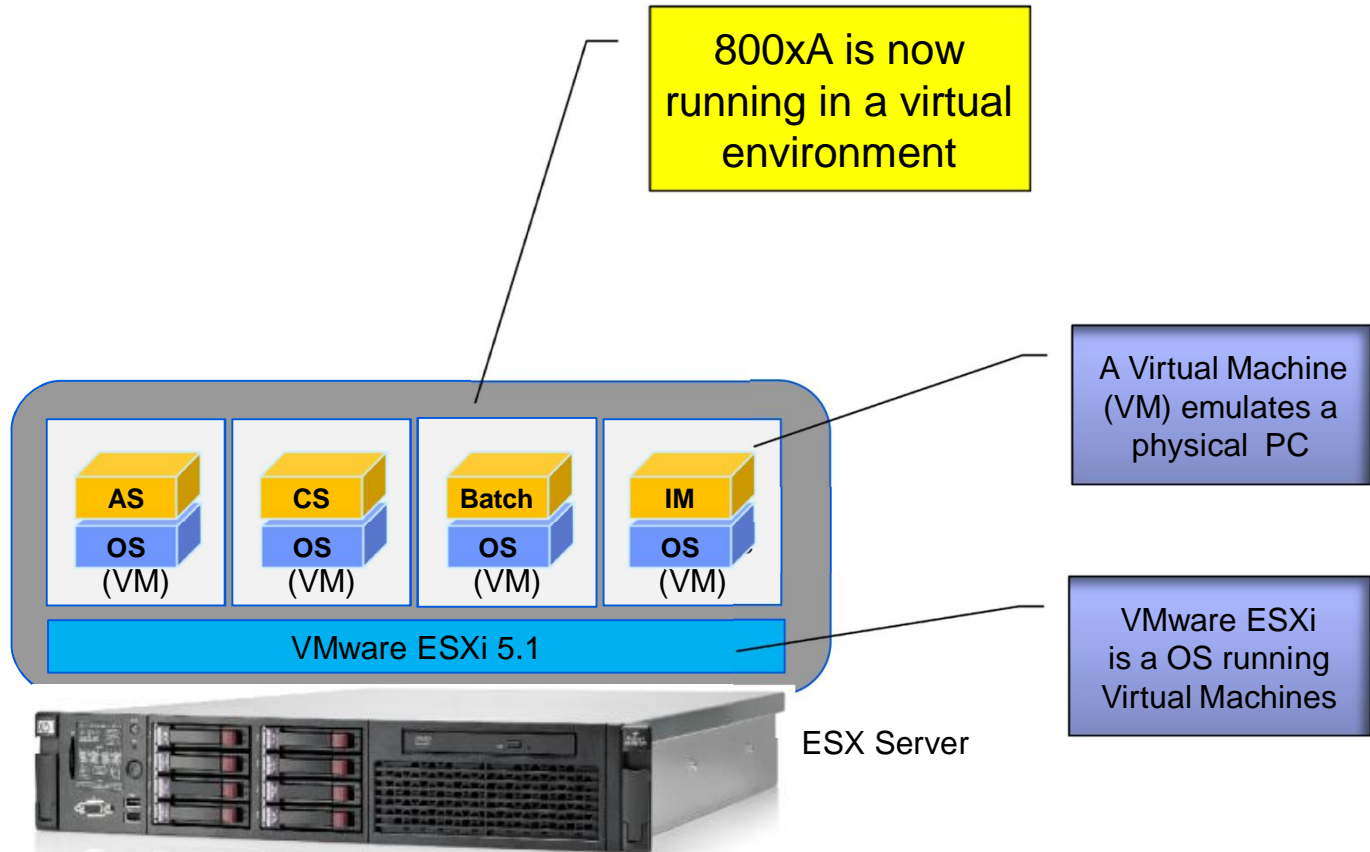
A Virtual Machine (VM) emulates a physical PC

VMware ESXi is a OS running Virtual Machines

ESX Server

# System 800xA Virtualization

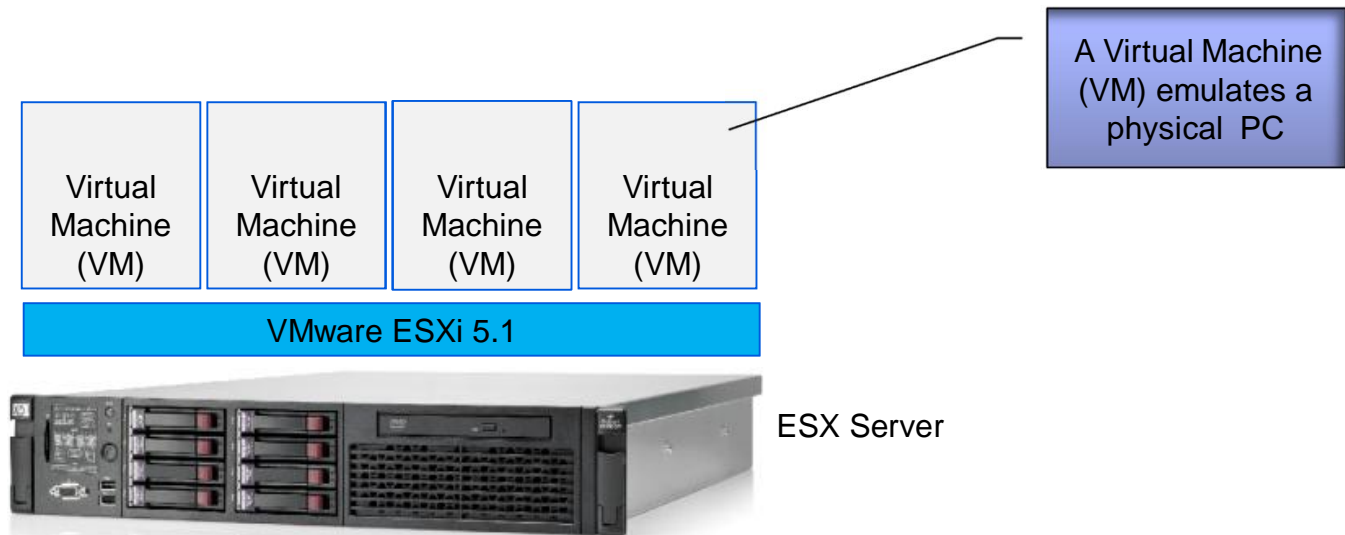
## Virtualization – What is this???



# System 800xA Virtualization

## What is a Virtual Machine?

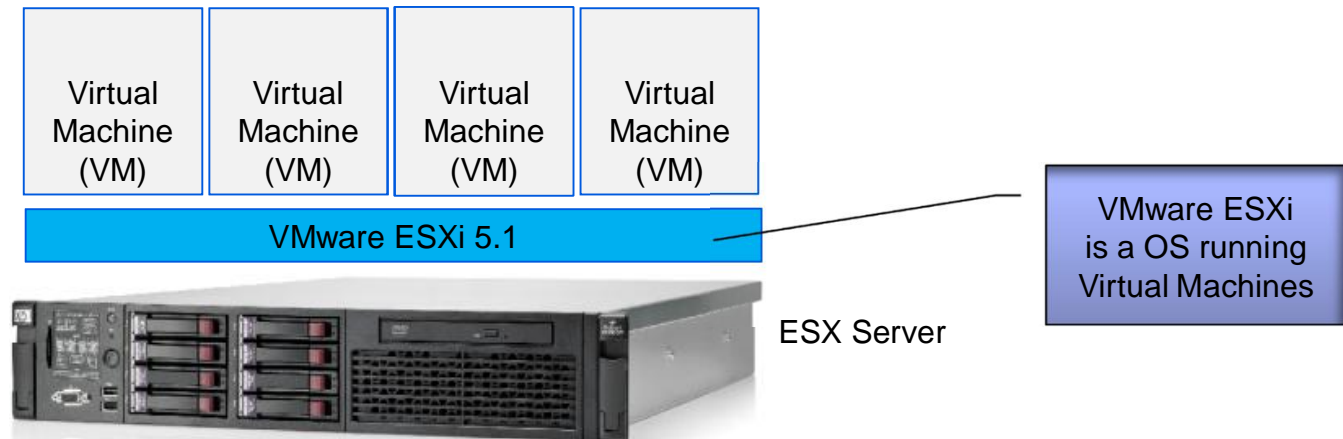
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# System 800xA Virtualization

## What is VMware vSphere ?

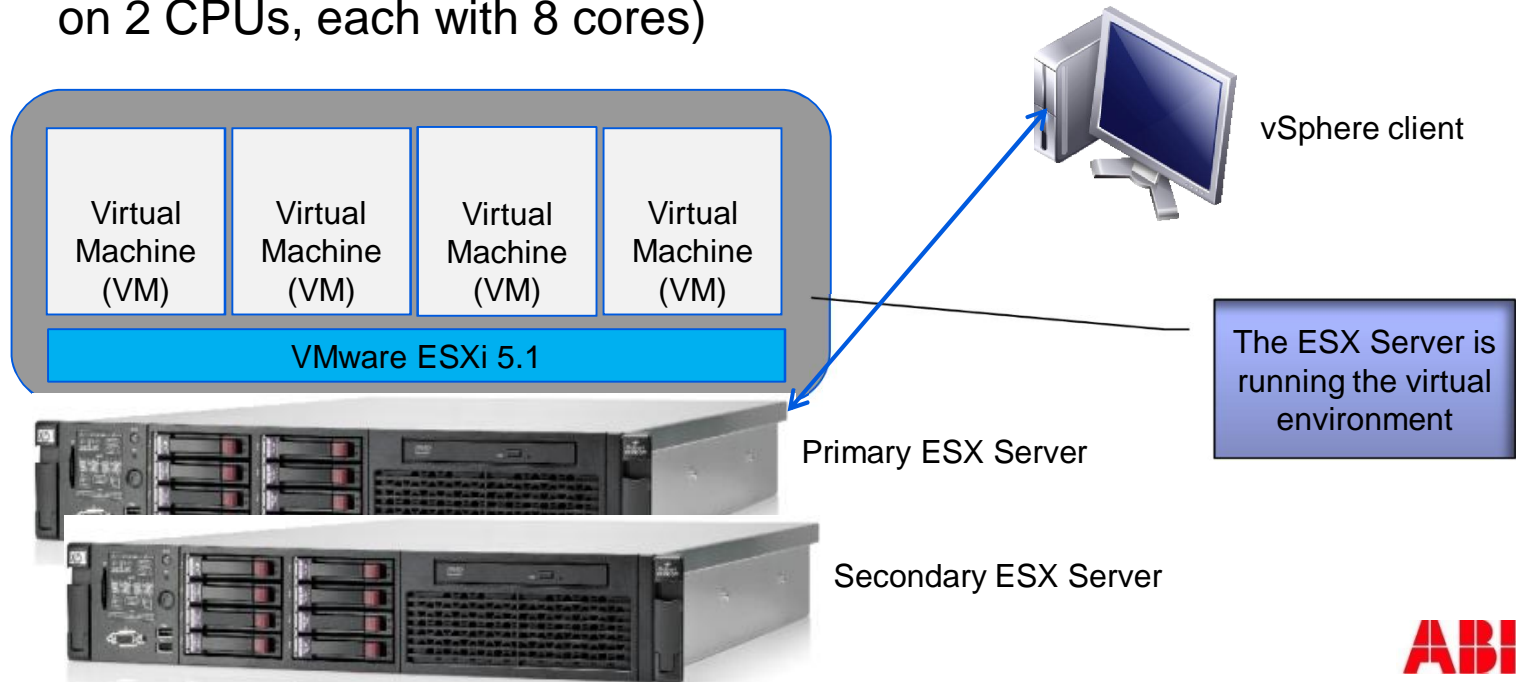
- VMware vSphere is a virtualization technology and market leader in virtualization
- VMware vSphere is used in 70%-90% of the worlds virtualized computer systems
- VMware vSphere has a proprietary VMware kernel for running Virtual Machines
- vConverter converts physical computers to virtual machines



# System 800xA Virtualization

## What is an ESX Server ?

- The ESX Server is running the virtual environment and can be redundant (1oo2)
- ESX Server does not have a graphical interface
- vSphere client software running on Windows is used for interaction with the ESX Server
- The ESX server is based on multi CPUs and multi cores server hardware (e.g. Dell PowerEdge R720, which is based on 2 CPUs, each with 8 cores)

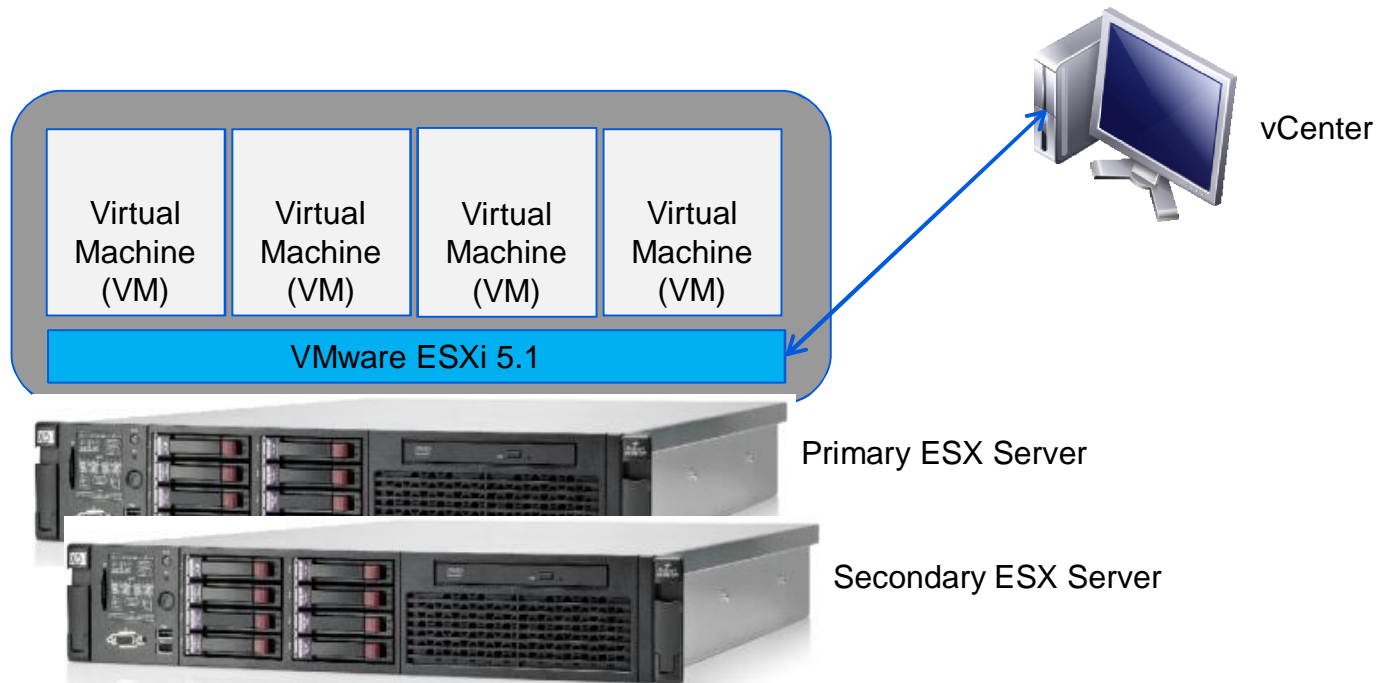




# System 800xA Virtualization

## What is vCenter ?

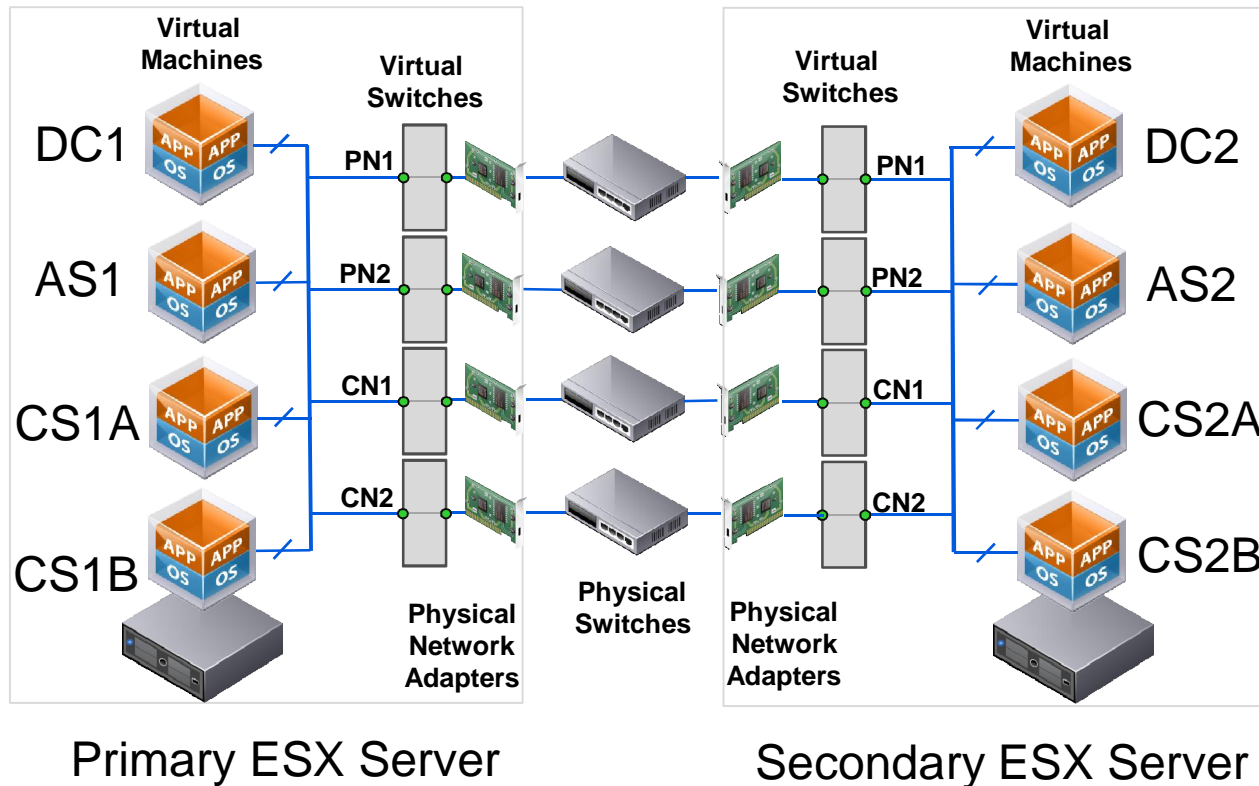
- vCenter is used for the maintenance of the ESXi environment and runs on a Windows computer:
  - Backup and update
  - Performance diagnostics
  - Moving of virtual machines between servers



# System 800xA Virtualization

## System 800xA services running as virtual machines

- Primary and Secondary 800xA services are running on respective ESX Servers
- Virtual switches connect the 800xA nodes to the physical network via ESX Ethernet adapters



# System 800xA Virtualization

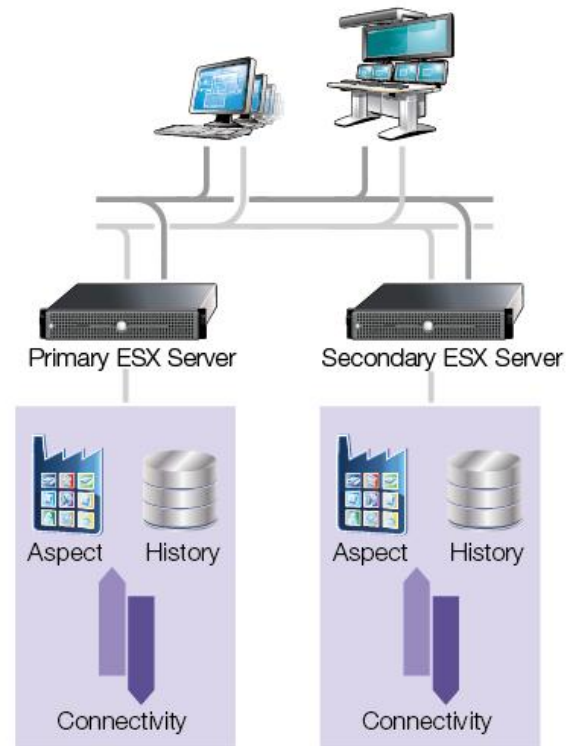
## Virtualized Clients – 5.1 FP 4



- Support for ESXi 5.1
- Virtualized Client capability in addition to 800xA Servers
- No 800xA SW on physical client machines
- Easier to install and maintain

**The entire 800xA system can literally be virtualized!**

Virtualization with 2 servers



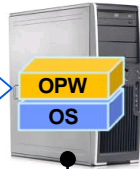
# System 800xA Virtualization

## Client Virtualization based on Remote Desktop

### Physical Client System



**800xA OPW**  
3rd Party SW  
Drivers  
Windows 7



Rich Clients (1- 4 screens)



800xA Servers

### Virtual

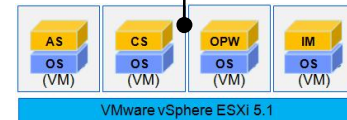
### HP t610 Flexible Thin Client



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ESX Servers

# System 800xA Virtualization

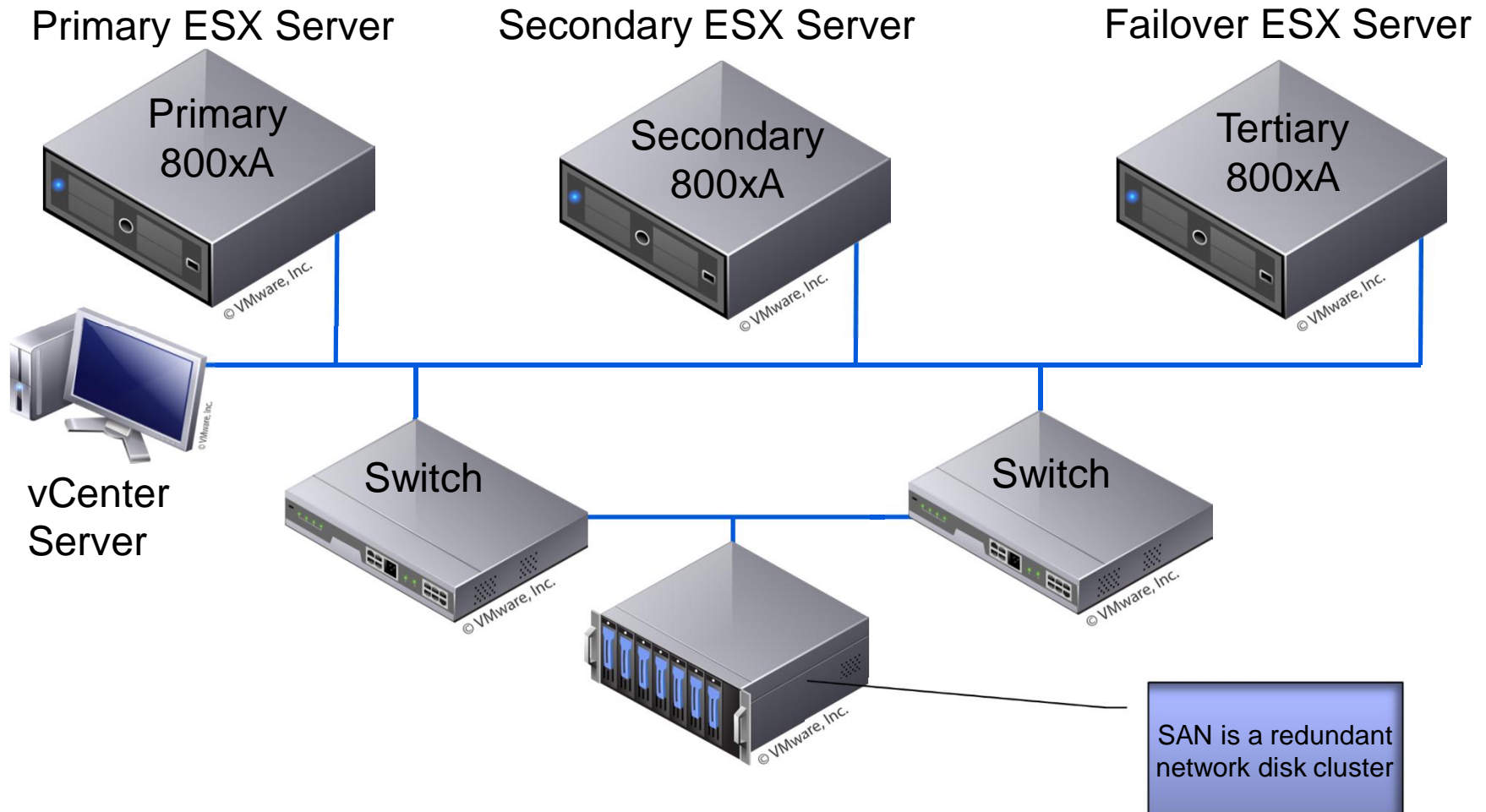
## Virtual Client Benefits

- + Reduced operator room space requirements
  - + Reduced operator room power and heating requirements
    - + Reduced operator room cooling requirements
    - + Reduced operator room noise
  - + Fast replacement of thin client
  - + Ability to move virtual client to new hardware without reinstall
  - + Standard installation. No messing with drivers.
  - + Added security by setting up virtual client with no USB ability
  - + Clients now in server room without costly remote solutions
- ...but...don't install all client in the same server!

# Client Virtualization Considerations

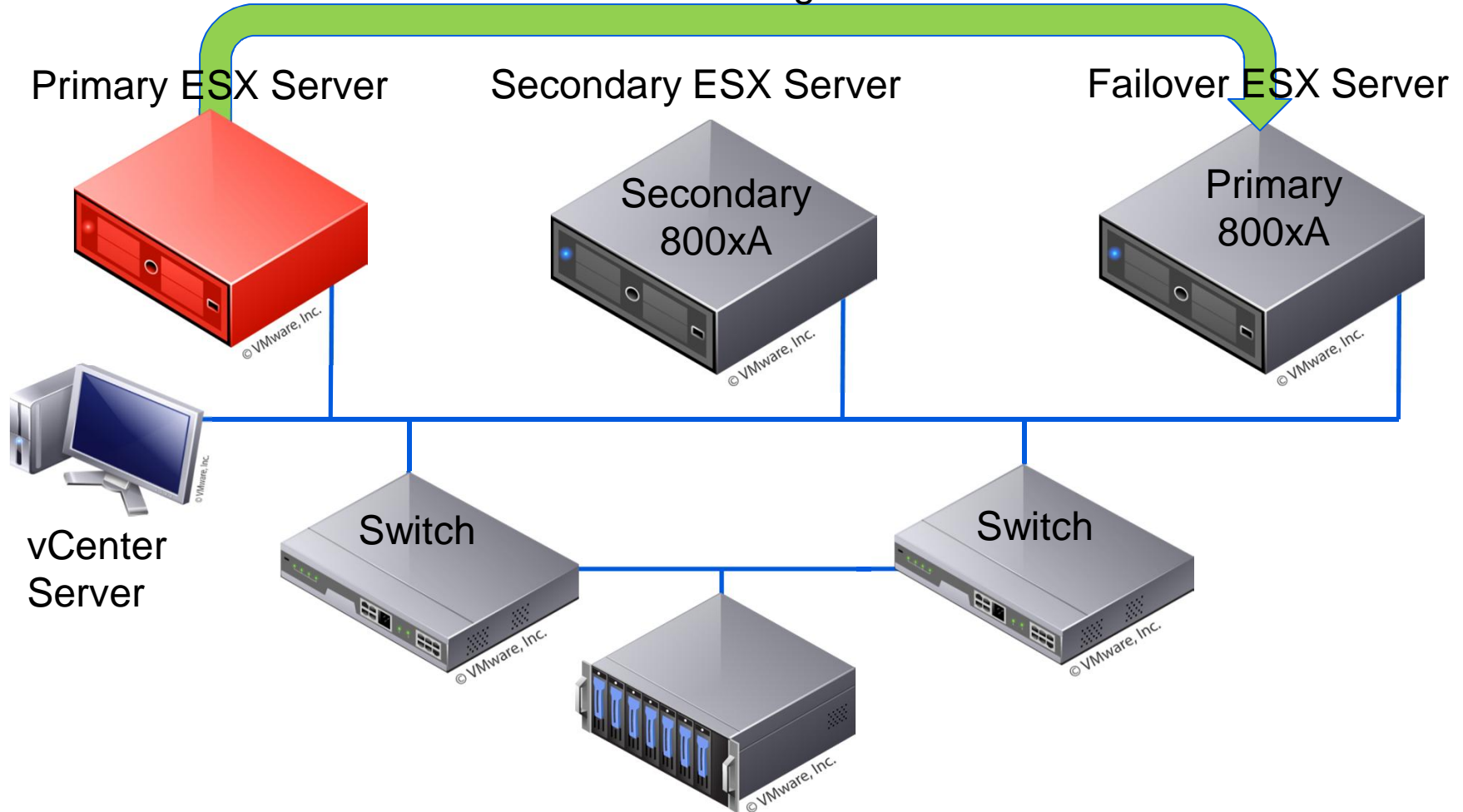
- Thin clients handle 1 to 4 screens
- Remote Desktop performance is impressive
- Graphics acceleration is not used, hence engineer and validate system graphical performance
- Avoid animated PG2 elements such as rolling drum
- Thin client with embedded Windows software, make sure the hardware supports 4 screens (graphic card performance) if that's requested.
- Recommended Hardware for thin client as of March 2013, [HP T610](#)
- Currently working on a Dell solution, but not yet certified.

# System 800xA Virtualization SAN Cluster



# System 800xA Virtualization SAN Cluster

Automatic Restarting Of Nodes





# System 800xA Virtualization

## Improved MTTR (Mean Time To Recovery)

- At server failure the Virtual Machines are restarted on another server automatically
- Single mode operation only for a few minutes – MTTR improved
- Makes use of the VMware High Availability feature
  - Restarting virtual machines on another ESX server in case of hardware failure
  - Will not replace 800xA redundancy schemes – not real time from a DCS perspective

# System 800xA Virtualization

## Virtualization benefits

### 1. **Increased performance**

- Utilize latest processor technology
- Faster network through virtual machines on virtual switches

### 2. **Increased Availability**

- Well proven installation and configuration of all software

### 3. **Reduced Maintenance Cost**

- Less variants of software, hardware and related configurations
- Migration to new hardware without reinstallation
- More possibilities to add additional servers

# System 800xA Virtualization

## Virtualization benefits

### 4. **Reduced Upgrade Costs and risks**

- The complete upgraded system can be set-up, tested, and started in parallel with the previous version

### 5. **Reduced physical equipment**

- Reduced server count
- Reduced installation and wiring

### 6. **Second order effects in**

- Power saving, less cooling
- Saving cabinets and space
- Reduced spare parts requirements
- etc.

# System 800xA Virtualization

## Energy saving potential

▪ Before



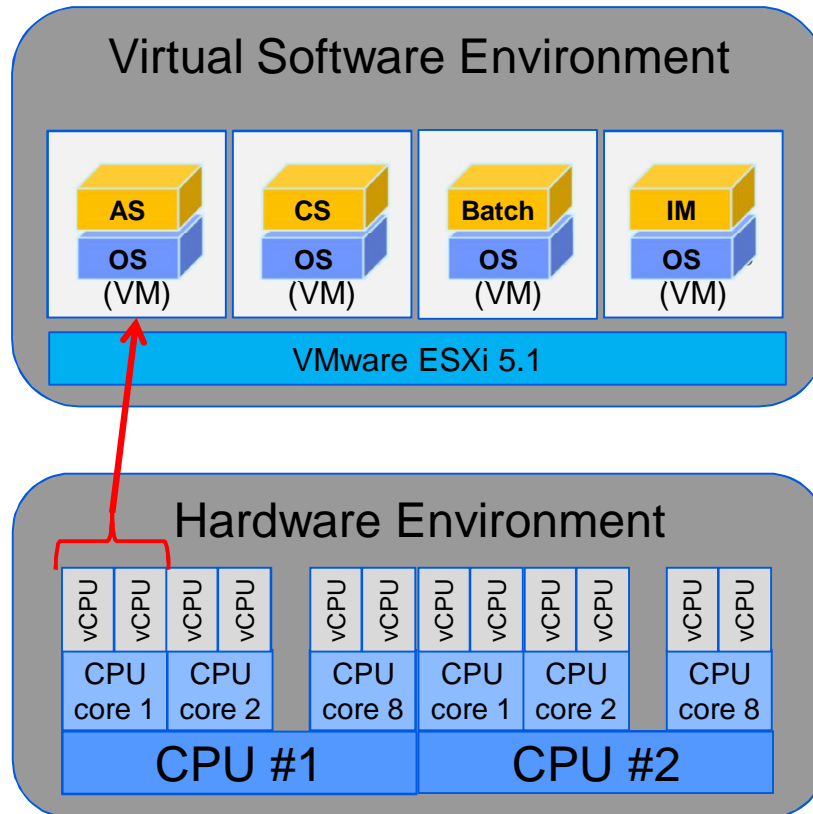
▪ After



- 800xA servers used for various product support tasks
- Before virtualization:
  - 9 st Dell PE1850 - 200W  
=> 15.768 kWh/year
- After virtualization:
  - 1 Dell R610 - 200W => 1.765 kWh/year
- Annual saving – 14.000 kWh

# System 800xA Virtualization

## Virtual CPU – What is that???



- E.g. Dell PowerEdge R720, based on 2 CPUs, each with 8 cores  
=> 16 cores
- Each core can handle 2 Virtual CPUs => 32 vCPUs
- One Virtual Machine (VM) requires two vCPUs  
=> Max 16 Virtual Machines



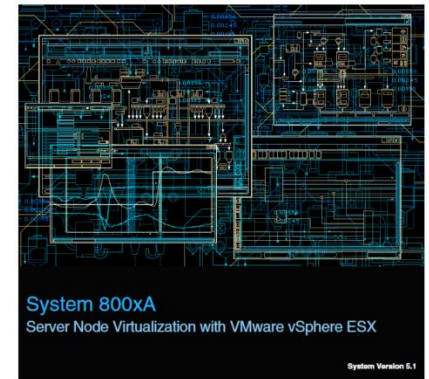
ESX Server

# Best practices for creating robust virtualized solutions

Node	vCPU	RAM GB	Disk GB		Node	vCPU	RAM GB	Disk GB	
DC1	2	2	60		DC2	2	2	60	
AS1	2	4		2 vCPUs per 800xA service nodes are required		2	4	60	
CS1	2	4				2	4	60	
IM	2	4				6	8	60	
BS1	2	4	60		SC	2	4	60	
VCL	2	4	60		VCL	2	4	60	
VCL	2	4	60		VCL	2	4	60	
VCL	2	4	60		VCL	2	4	60	
VCL	2	4	60		VCL	2	4	60	
VCL	2	4		26 vCPUs totally are required	VCL	2	4		
VCL	2	4			VCL	2	4		
VCL	2	4			VCL	2	4		
ECS	2	4	60			2	4	60	
Total	26	50	970	32 vCPUs are available => OK!		30	54	780	30 vCPUs totally are required
Node	Log CPU	RAM GB	Disk GB		Node	Log CPU	RAM GB	Disk GB	
Server	32	64	1500		Server	32	64	1500	32 vCPUs are available => OK!
Note Log CPU = Logical CPU. i.e. Hyperthreaded cores. e.g. 2 x 8 core CPU gives 2 x 8 x 2 Logical Processors									
For each server, the total number of vCPU should be less than the number of Logical Processors									

# Summary

- Virtualization offers excellent cost-of-ownership advantages
- Fully supported for System 800xA
- ESX(i) 4.x and ESXi 5.x supported
- From a security standpoint a system running on virtual machines does not differ from a conventional one
- No performance drawbacks identified
- System 800xA  
Server Node Virtualization User Guide



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