

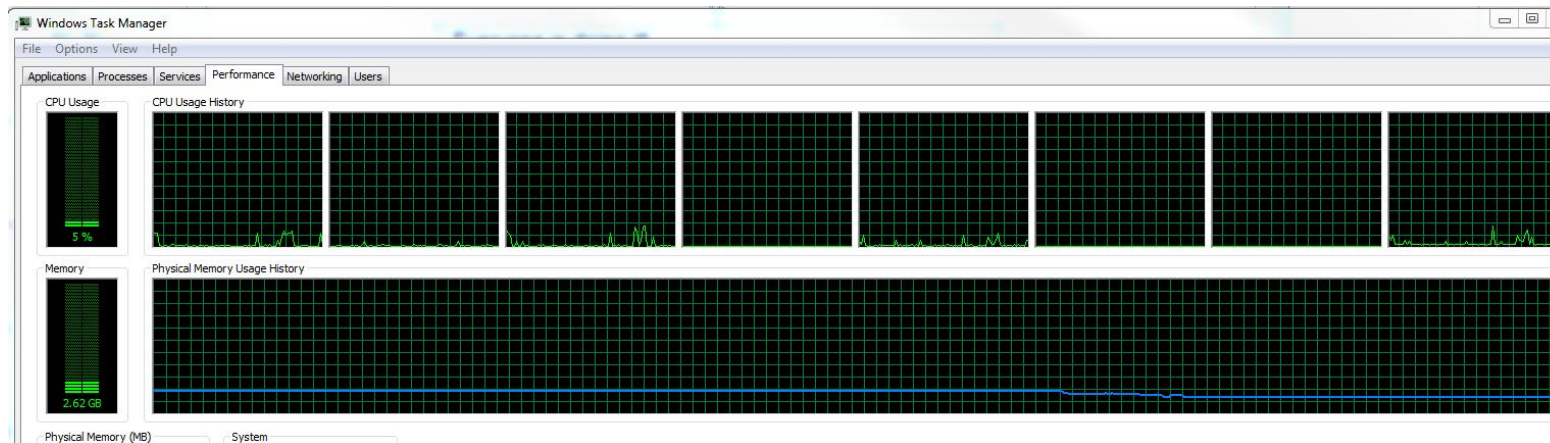
# Virtualization

## Overview

Brett Nelson OCS RTA Manager

# Why Are We Talking Virtualization

- Everyone is doing it! Just Google it 28,000,000 results
- Short Reboots for VM's; 15-30 Seconds
- Removes the Hardware Dependencies; Run old OS's on new hardware
- Smaller Footprint; 2 Servers can run a full 800xA system worth of servers (8-12 servers)
- Take full advantage of the Server Hardware; Most software unable to take advantage of multi-core CPU's



# What is Virtualization

It uses an Operating System (OS) to manage the multiple other Virtual Machines (VM's) running on the computer; this is called a hypervisor

- A hypervisor is responsible for managing/allocating the physical resources of the host hardware to the VM
  - Can be a lightweight OS (VMware ESXi 5.5 ~500MB installed, no local graphical interface)
    - Less overhead, more available resources for the VM's
  - Can be a full OS (Windows 2012 Hyper-V or vmWorkstation, uses a full GUI to manage VM's locally)
    - More overhead, Less resources for the VM's.

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# Intro to Virtualization

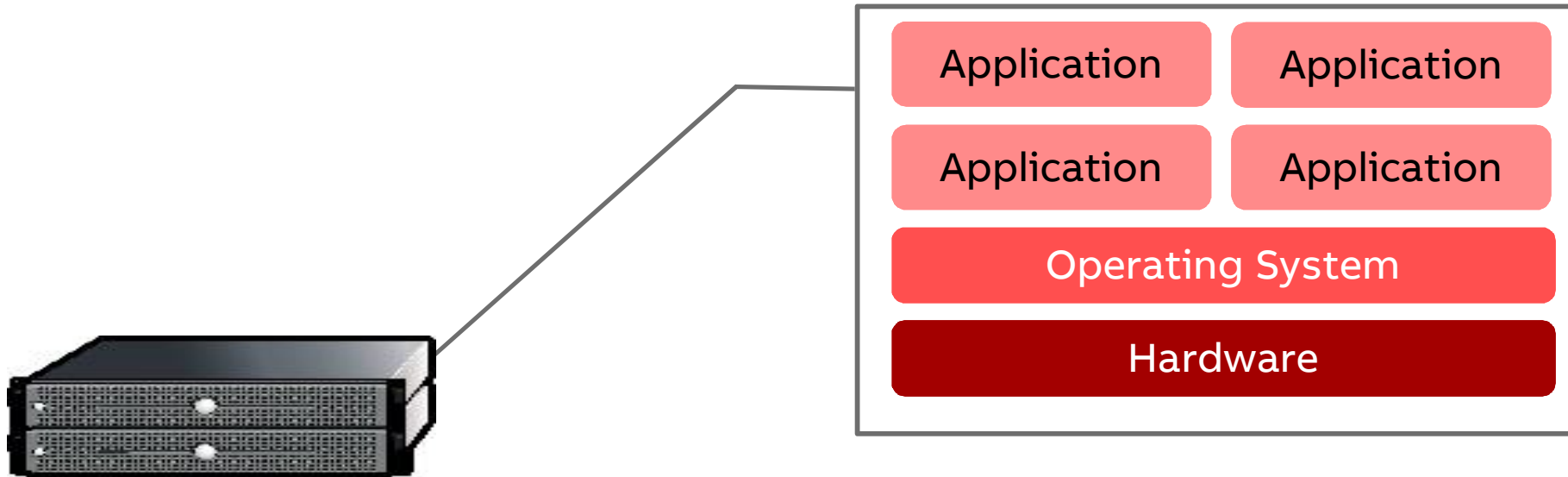
## What is Virtualization

In simple terms:

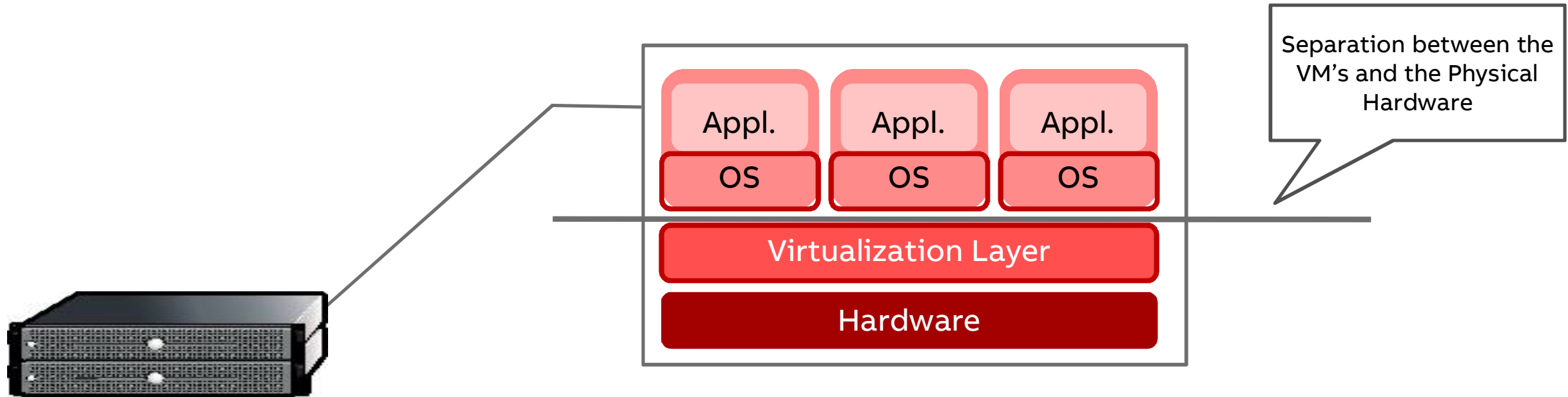
- Running multiple operating system in one computer
- Adds a layer between the hardware and the Multiple OS's
- The VM is made up of files that represent:
  - The Hard drive (.vmdk)
  - The BIOS (.nvram)
  - The hardware Structure (.vmx)

 HarmConnect6.0.vmdk	2/22/2017 4:44 PM	VMware virtual disk file	27,787,008 KB
 HarmConnect6.0.nvram	2/22/2017 4:44 PM	VMware virtual machine BIOS	9 KB
 HarmConnect6.0.vmx	2/22/2017 4:46 PM	VMware virtual machine configuration	4 KB

# Traditional Systems

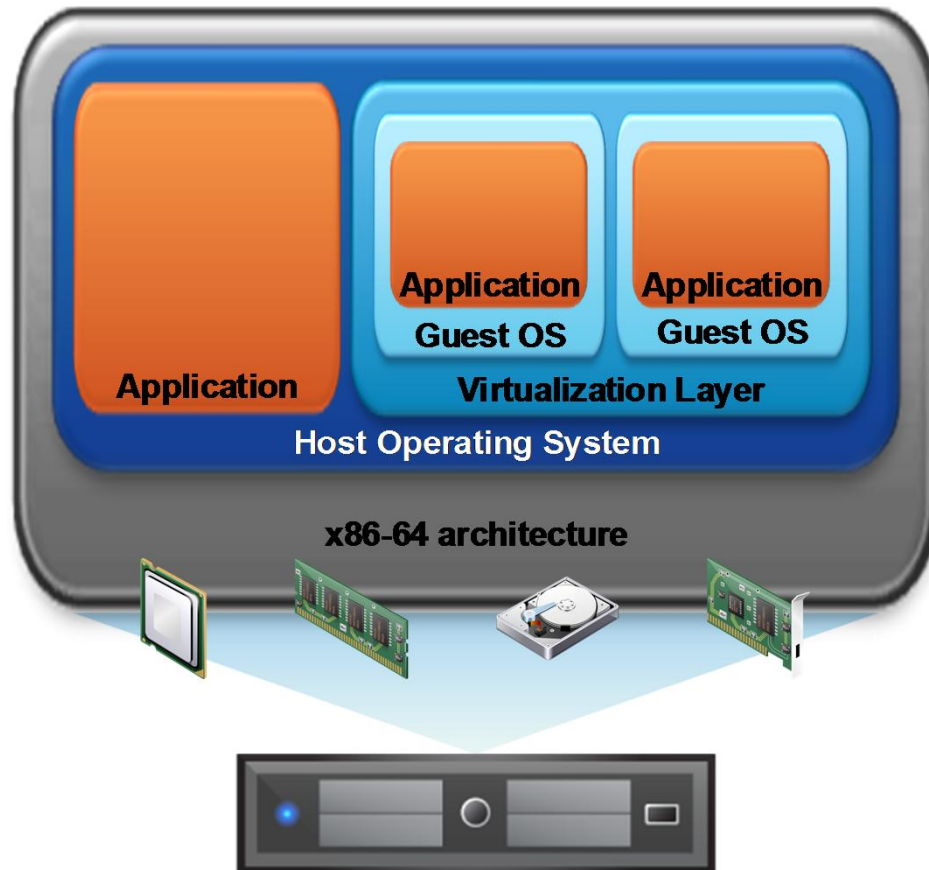


# Virtualized System

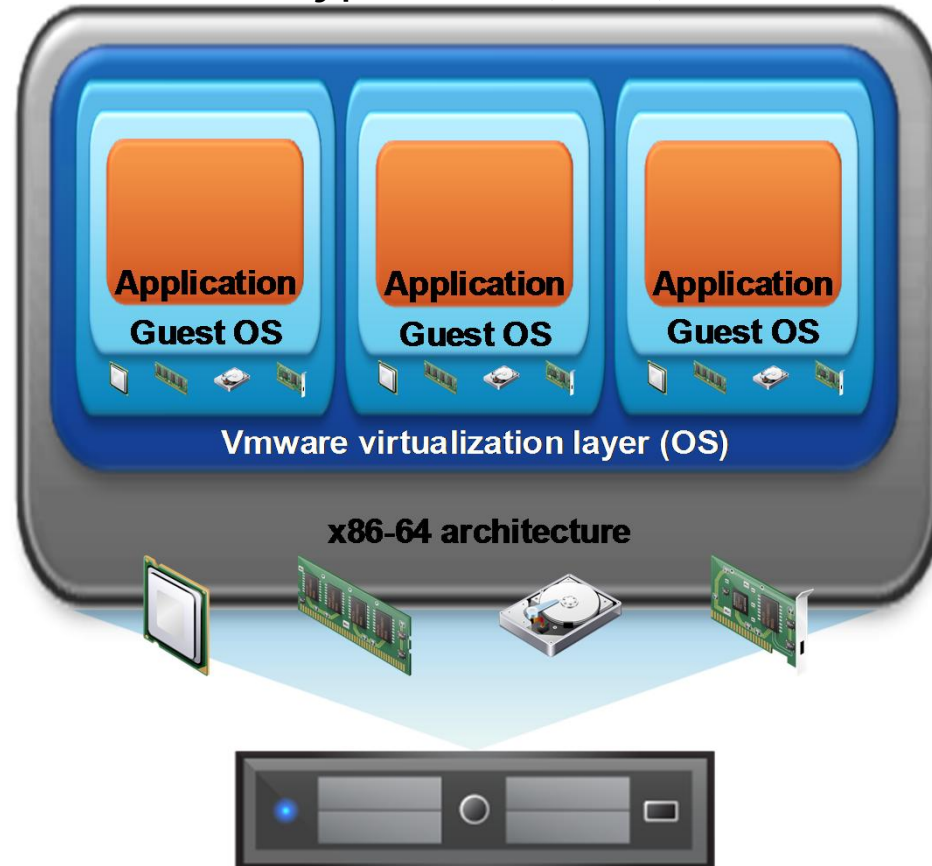


# Intro to Virtualization

Full OS Running vmWorkstation



Hypervisor (ESXi)



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## Reasons Customers are Virtualizing

- Integration of the IT Department in to the process control arena
- Tested and proven technology (no longer cutting edge)
- Allows for less risk during windows patching
- Ease of remote management (Can Press a power button from my desk)
- Can leverage already existing IT support in disaster recovery plans
- Ability to have some self recover on hardware failure (High Availability)



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## Reasons Customers are Virtualizing

- Methods to improve hardware redundancy (High Availability)
- Reduce IT overhead
- Use of ThinClient in production environment
- Reduce time for disaster recovery
- Take full advantage of the Server Hardware; Most software unable to take advantage of multi-core CPU's
- Availability to add VM's in already existing hardware.
- Allows for Hardware refreshing without reinstalling (V2V conversion)

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## Concerns and Pitfalls

- Lack of experience managing a virtual environment
- Not maintaining hardware
- Overextending resources
- Misconfiguration, time sync
- Personnel can have difficulty understanding VM architecture
- Taking advantage of VM technologies that are not supported by ABB (vMotion on a running VM)

# ABB and Virtualization

## Support by both System 800xA and Symphony Plus Operations

- Virtualization supported by System 800xA support started in version 5.0SP2 and back dated for 4.1
- Virtualization supported by Symphony Plus Operations support started in version 2.0.4

## Support for VMware ESXi

- Currently support for version ESXi5.5, with previous support back to ESX 3.1

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# System 800xA Architecture in 6.0

Methods to reduce foot print

## Virtualization

- Reduces the amount of server hardware
- Continue with same amount of OS's to manage/update
- Not bound to hardware

## Node/Function Based

- Reduces the amount of server hardware
- Reduces the amount of OS's to manage
- Allows for 8 functions per node

## Virtualization with Node/Function Based

- Reduces the amount of server hardware
- Reduces the amount of OS's to manage
- Not bound to hardware
- Limit to 4 functions per VM

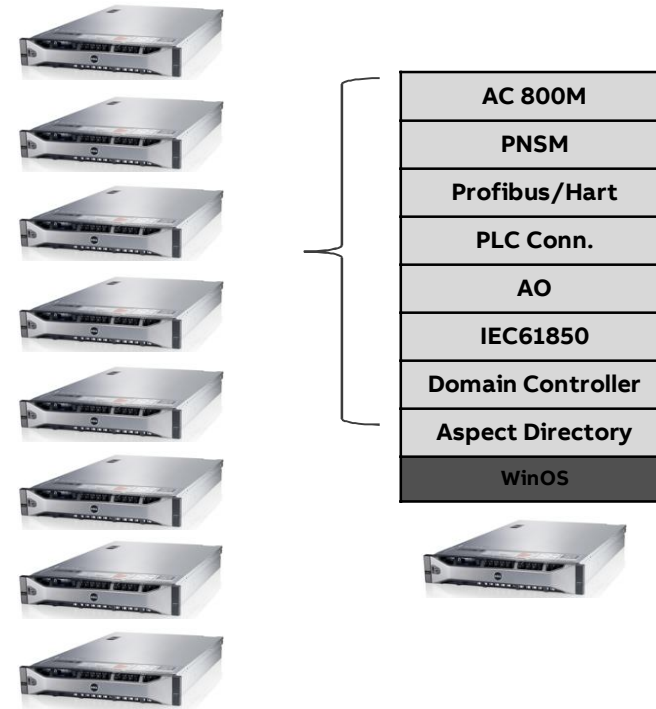


# System 800xA Architecture

## 6.0 – Node/Function Based

- Reduces the amount of server hardware
- Combine up to 8 functions into one server when it is a physical node
- Combine up to 4 functions into a VM node

Same Functionality In A Smaller Footprint



Version 5.1

Version 6.0

# System 800xA Architecture

## Typical System in 5.0

### System Dimensions

- 10,000 tag system
- AC800M Connectivity
- Batch w/History
- Asset Optimization
- 8 operator clients /
- 2 engineering clients

18 Physical Nodes and 18 OS's to manage



# System 800xA Architecture

## Typical Virtual System in 5.1

### System Dimensions

- 10,000 tag system
- AC800M Connectivity
- Batch w/History
- Asset Optimization
- 8 operator clients /
- 2 engineering clients

4 Physical Nodes and 18 OS's to manage



Primary and  
Redundant  
Services

Desktops VM's

# System 800xA Architecture

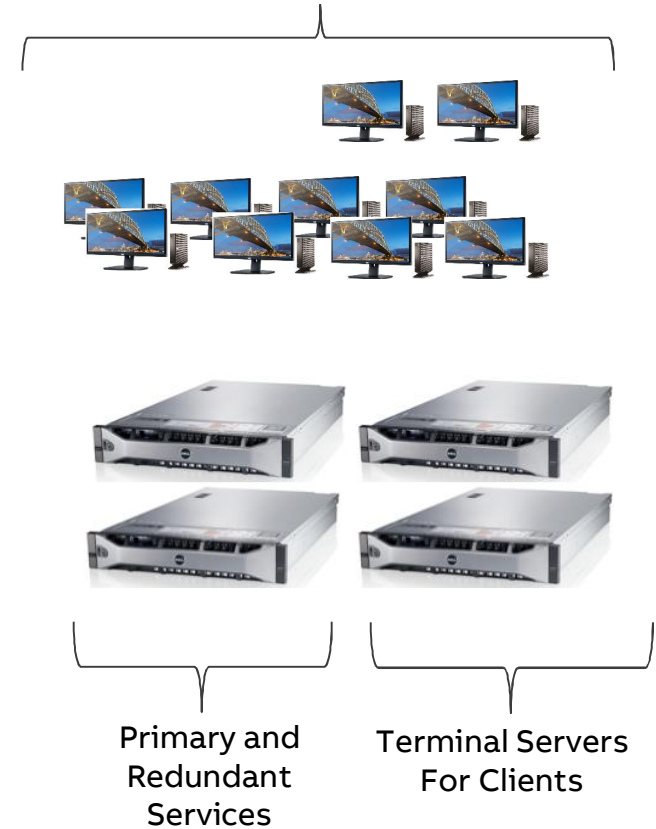
Function based approach with version 6

## System Dimensions

- 10,000 tag system
- AC800M Connectivity
- Batch w/History
- Asset Optimization
- 8 operator clients /
- 2 engineering clients

4 Physical Nodes and 4 OS's to manage

RDP via ThinClients.





# System 800xA Architecture

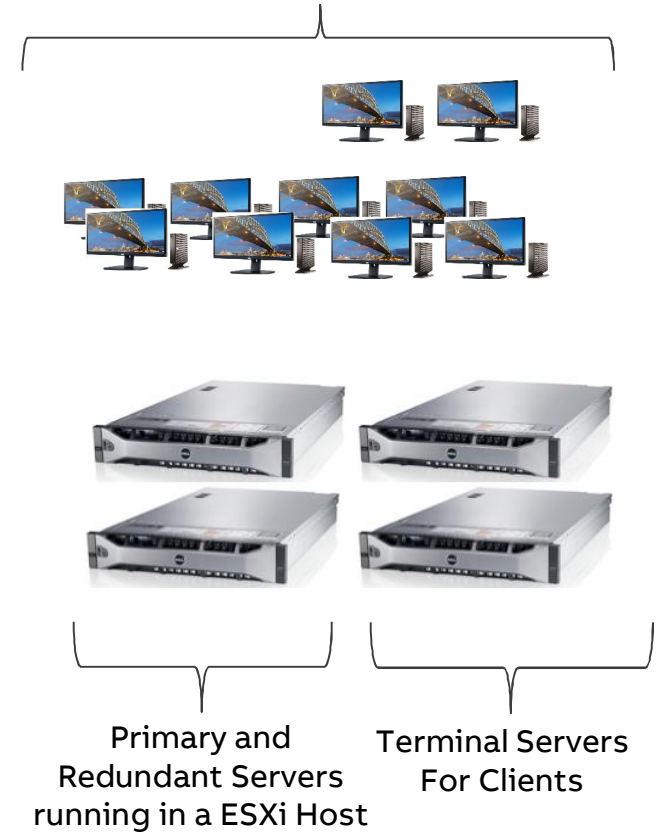
Function/Virtual based approach with version 6

## System Dimensions

- 10,000 tag system
- AC800M Connectivity
- Batch w/History
- Asset Optimization
- 8 operator clients /
- 2 engineering clients

4 Physical Nodes and 6 OS's to manage

RDP via ThinClients.



# Training

## US950

### Topics

- vmWorkstation
- Installation of ESXi
- Deploying OS (Client and Server)
- Configuring SANS storage
- Installation of vCenter
- Backup and Recovery
- Updates to ESXi

#### ABB UNIVERSITY COURSE DESCRIPTION

### US950

## Virtualization for ABB Control Systems Using VMware® ESXi environment



Learn How to use VMware® ESXi environment and how it can be used to virtualize your ABB Control System. Configure a complete virtual system with lectures and hands on exercises.

#### Course type and methods

This is an instructor led workshop with short presentations and demonstrations, extended exercises, hands on sessions and discussion.

#### Student Profile

This ABB University Course is targeted to system engineers, service & support engineers and system administrators.

#### Prerequisites

Students should have attended the Administration and Installation course NA939 and NA940 or have knowledge and experience associated with the content of this course. Knowledge about Virtualization is not required.

#### Course objectives

Upon completion of this course the participants will be able to:

- Describe and explain the purpose, principles and advantages of virtualization

- Setup and configure a VM by using VMware® VMWorkstation
- Plan and design the required hardware for a VMware® ESXi environment
- Set up and configure an ESXi server environment
- Set up virtual Control and Client/Server networks
- Create an virtualized server and client
- Configure networking internal and external to the system
- Make backups of VM by using Acronis® software into a virtual environment.
- Handle licensing, security and data exchange in an ESXi environment
- Learn about proper time sync configurations for the DCS and the ESXi environment
- Advance topics relating to ESXi; SANS, iSCSI, High Availability, vCenter configuration

#### Duration

The duration is 5 days



**ABB**