Picking a Virtual Environment

Rockwell Automation

Agenda

1 What is Virtualization?

2 Factors in Choosing an environment

3 How to size a Virtual Environment

4 Rockwell Automation Options

5 Guidance for customers

What is Virtualization?

Customers see a 74% decrease in total cost of server ownership with virtualization*

*https://www.vmware.com/pdf/TCO.pdf

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Definitions

Virtual Machine

A file that acts like a physical computer within virtual system (runs the operating system). Also called an image.

Hypervisor

A piece of software that manages the allocation of the physical resources (hosts) to the virtual machines.

vMotion

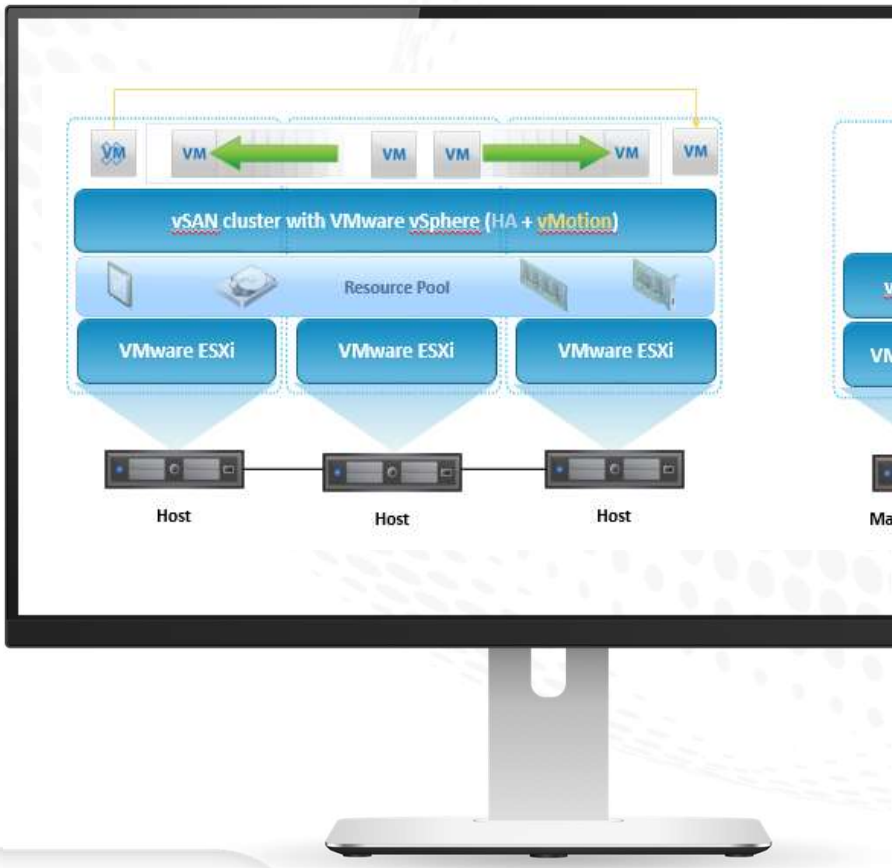
A feature of VMware vSphere that allows for live migration of a virtual machine between the physical servers (or hosts). The applications are continuously available during the migration.

VMWare HA (High Availability)

A feature of VMware vSphere that in the event of a failure (physical host or virtual machine), allows for the virtual machines to be restarted on another host automatically.

VMWare vSAN

A feature of VMware vSphere that allows physical servers to share their internal storage as a virtual storage area network

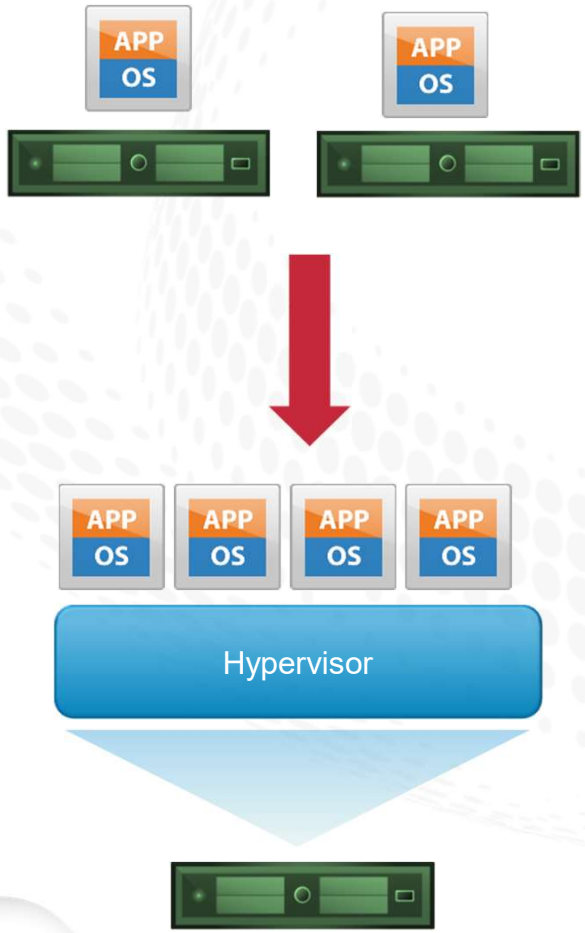


What is Virtualization?

Virtualization breaks the link between operating system and physical hardware

By breaking the dependency of the OS to the physical server, resources in the host can be shared leading to the following benefits:

- Scalability
  - Can easily scale up and out
- Downtime Avoidance
  - Delivers high availability and fault tolerance
  - Delivers quick deployment and replacement
- Lower Total Cost of Ownership
  - Decrease the server footprint in your facility and realize savings over the lifetime of your assets
- Ease of Management
  - One pane of management
  - Visibility into the system state helps reduce cyber security risk



Hyperconverged Infrastructure (HCI)

What is it?

Software defined infrastructure that aggregates compute and storage from multiple servers into a pool of resources for hosting applications.

This is only implemented in the VersaVirtual 2000. the VersaVirtual 1000 is a one host solution

How does it Work?

In the VersaVirtual 2000, the combination of VMware vSphere with VMware vSAN enables the components of the appliance to operate as a hyperconverged solution

Benefits

Reduced complexity

- One place to manage the compute and storage
- No need to provision storage any more

Easy scalability

- shared pool across the cluster allows to easily scale up or down including future expansions

Considerations for Manufacturing

Virtualization is widely adopted by IT and growing in Manufacturing

Considerations:

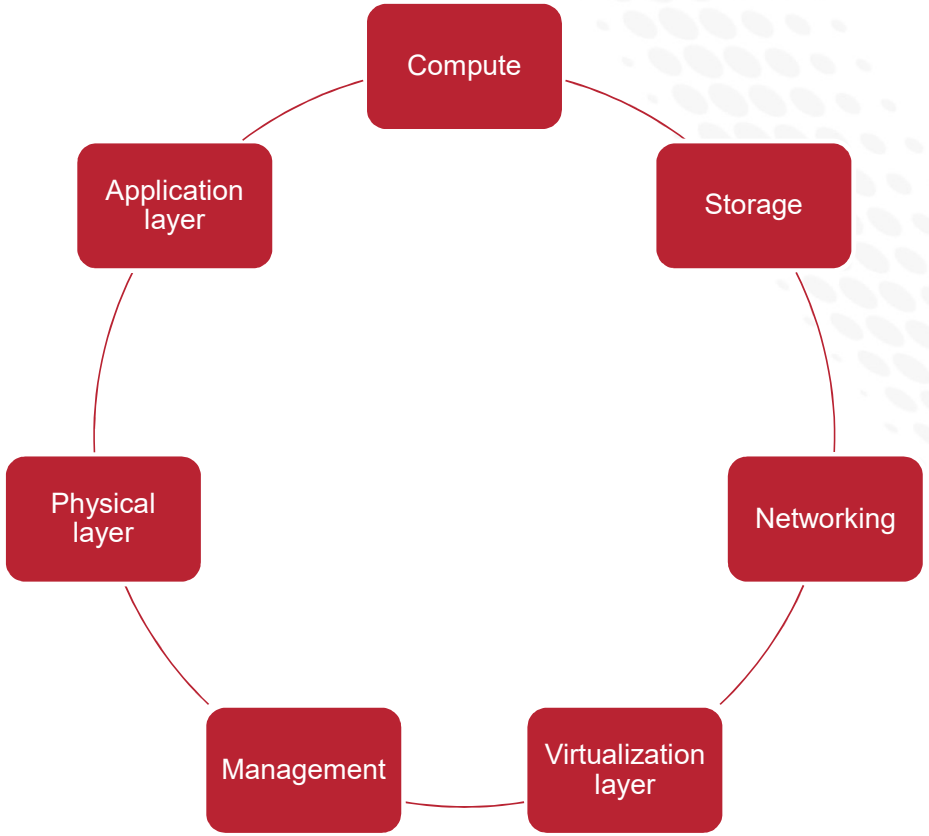
- Cyber security risk from islands of compute on the plant floor
- Long ICS® upgrade cycles vs. short IT upgrade cycles
- Space, power, cooling and management limitations
- Management of operator and engineering workstations
- Management of multiple incompatible software versions
- Higher downtime costs

Opportunities:

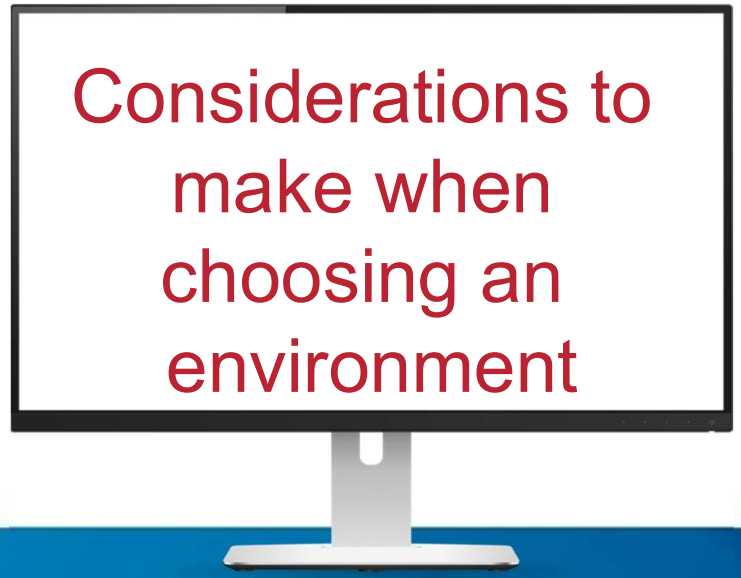
- Access to one pane of management allowing for increased visibility and management
- System longevity with HW/SW abstraction
- Server consolidation
- Centralized server management and deployment
- Independent workstation deployment
- Improve reliability with management and recovery features

Factors in choosing an environment

What you need to run a virtual environment



Considerations to make when choosing an environment



Understanding Technical requirements

- Size: how many applications need to run on this system? What are the resource requirements of those applications
- How will it connect to the network
- Where will it be housed?

Redundancy

- How critical is the system?
- What failure modes does it need to recover from or survive?
- Insert link to redundancy white paper here

Management

- Who will manage the environment?
- Are there IT skills on staff to monitor, maintain, and administer the system

Sizing

How to appropriately size

Let's avoid over-building our infrastructure, eh?

Sizing virtual infrastructure can be a challenging balance between not enough and too much. To size your hardware right you need to understand:

Considerations

- CPU requirements for your workloads
- RAM requirements for your workloads
- Disk I/O requirements (IOPS)
- Disk capacity requirements
- Failures to expect and automatically mitigate (hardware vs. Software redundancy)
- Potential for future expansion

Best Practices

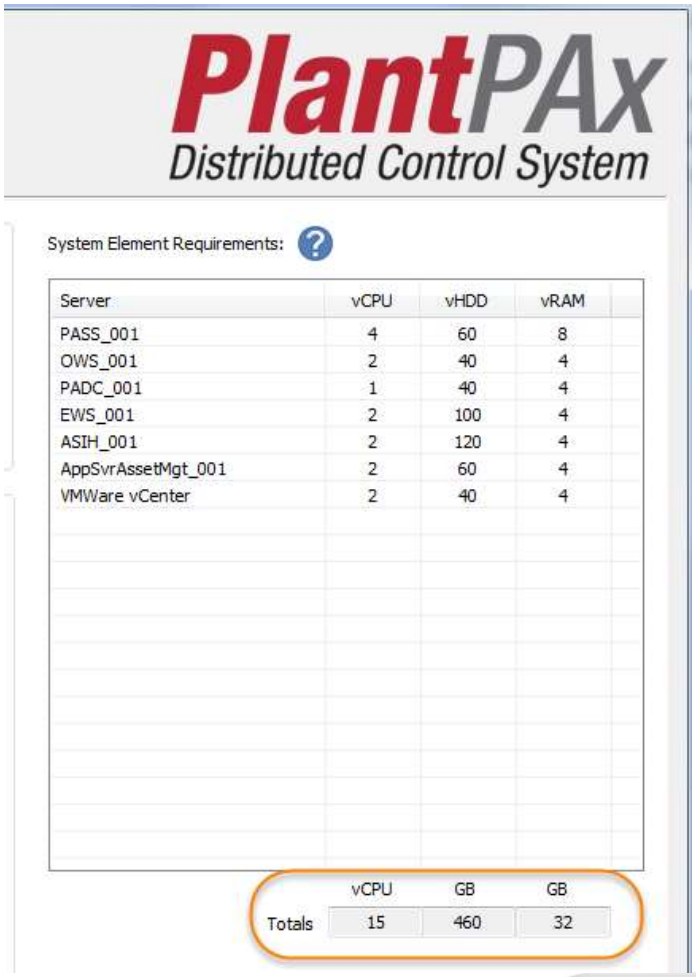
- Maintain a consolidation ratio of 3 vCPU per 1 physical core
- Do not overcommit RAM
- Size I/O for peak load (boot storm)
- Evaluate data growth rate for Historian / DB applications
- If the application can tolerate a reboot on failure, use HA. If not combine HA with software redundancy. Use FT if software redundancy is not available
- Leave at least 20% CPU/RAM capacity for growth. Systems always grow whether planned or not.

Example - Finding the size in a manual

When looking to understand the size needed for an application, look for information related to RAM/CPU in the virtual infrastructure requirements fields

Category	Description[1]
Virtual Infrastructure	Required: 4 vCPU 8 GB vRAM min

Example - Finding the size in PlantPAx Estimator



Server	vCPU	vHDD	vRAM
PASS_001	4	60	8
OWS_001	2	40	4
PADC_001	1	40	4
EWS_001	2	100	4
ASIH_001	2	120	4
AppSvrAssetMgt_001	2	60	4
VMWare vCenter	2	40	4

	vCPU	GB	GB
Totals	15	460	32

When building your PlantPAx system, you can find the needed requirements in the estimator totals

Rockwell Automation Options

VersaView Industrial Computers

Capability

- Display or non-Display ruggedized industrial computer
- The line is completely fanless and maintenance free
- Multiple mounting options, including DIN Rail.

Available Support Services

TechConnect support

Use Case

complete line of open architecture industrial PCs, thin clients, and monitors. The open architecture supports modern operating systems and various software applications, but the ideal deployment is to use FactoryTalk® View SE software for distributed applications.

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VersaVirtual™ Appliance 1000

Capability

- 5-15 Virtual Machines (VMs)
- Uplink: 2 ports copper 10GB links
- One-host solution with VMware vSphere and vCenter

Included Support Services

- 8x5 next-business-day hardware replacement
- Monitoring and Administration services, allowing customers to focus on their application data. Includes 24x7 system support

Use Case

A one host solution is ideal for non-critical application use. For situations where a test bed virtual infrastructure is needed, or a non-critical production application

VersaVirtual™ Appliance 2000

Capability

- 5-15 Virtual Machines (VMs)
- Uplink: 2 ports copper 10GB links
- 2 node vSAN cluster with management node
- N+1 failure redundancy

Included Support Services

- 8x5 next-business-day hardware replacement
- Monitoring and Administration services, allowing customers to focus on their application data. Includes 24x7 system support

Use Case

An ideal architecture for running production-critical applications for small- to medium-sized plants or production areas.

Hardware and software redundancy combine to minimize production risk of both failures and regular maintenance activities.

Industrial Data Center (IDC) E2000/E3000

Capability

- 20+ images
- Scalable to customer requirements
- Multi-node vSAN cluster with management node
- Uplink: SFP+ (1Gb/10Gb)

Support Services

24x7 System support

8x5 NBD Hardware replacement*

Monitoring and Administration (Uplift)

Use Case

An ideal architecture for running production critical applications for medium to large sized plants or production areas.

Hardware and software redundancy combine to minimize production risk of both failures and regular maintenance activities

	VersaView 5400 Non-Display Computer	VersaVirtual 1000 Appliance	VersaVirtual 2000 Appliance	IDC E2000	IDC E3000
# Hosts	N/A	1	2	2 (up to 10)	3 (up to 10)
External Display output	Dual	N/A	N/A	N/A	N/A
CPU	Quad Core Intel Atom E3845	Intel Xeon Silver 4110 (8c)	Intel Xeon Silver 4114 (10c)	Intel Xeon Gold 6130 (16c)	Intel Xeon Gold 6130 (16c)
HDD	128GB SSD	2TB usable	2TB usable	4TB usable (expand to 10TB/host)	6TB Usable (expand to 10TB/host)
RAM	4GB	96GB	128GB	128GB/host (expandable to 384)	128GB/host (expandable to 384)
Thermal solution	Fanless	Cooling Fan	Cooling Fan	Cooling Fan	Cooling Fan
OS	Windows 7	VMware vSphere	VMware vSphere	VMware vSphere	VMware vSphere
Power	24V DC	100-240 VAC 50/60Hz, dual	100-240 VAC 50/60Hz, dual	100-240 VAC 50/60Hz, dual	100-240 VAC 50/60Hz, dual
Operating Temp	-20…60C	10…35C	10…35C	10...35C	10...35C
Mounting Options	Wall, VESA Mount, Din Rail, Bookshelf, Machine	19" Rack	19" Rack	Pre-configured in 48U rack	Pre-configured in 48U rack

What is in a VersaVirtual™ Appliance

	1000	2000	Notes
Server	Intel Xeon Silver 4110 8 core - One server sled 96 GB RAM	Intel Xeon Silver 4114 10 core – two server sleds sharing resources as one cluster 128 GB RAM	Both allow customers to run up to approximately 15 images. This is due to the redundancy nature of the 2000
Storage	2 TB usable	2 TB usable	While the 2000 has more server sleds, the redundancy cuts the usable space
Network I/O	10G networking internal to server communication **Uplink:** 2 ports copper 10 GB	10G networking internal to server communication **Uplink:** 2 ports copper 10 GB	
Virtualization	vSphere Standard	vSphere Standard vSAN Standard	vSAN is the software package that allows for the shared storage across the servers

24x7 remote monitoring and administration

1 year hardware / software **warranty**

Guidance for Customers

Steps to decide

Determine Which SKU

- Customer use case
- Sizing
- Redundancy needs

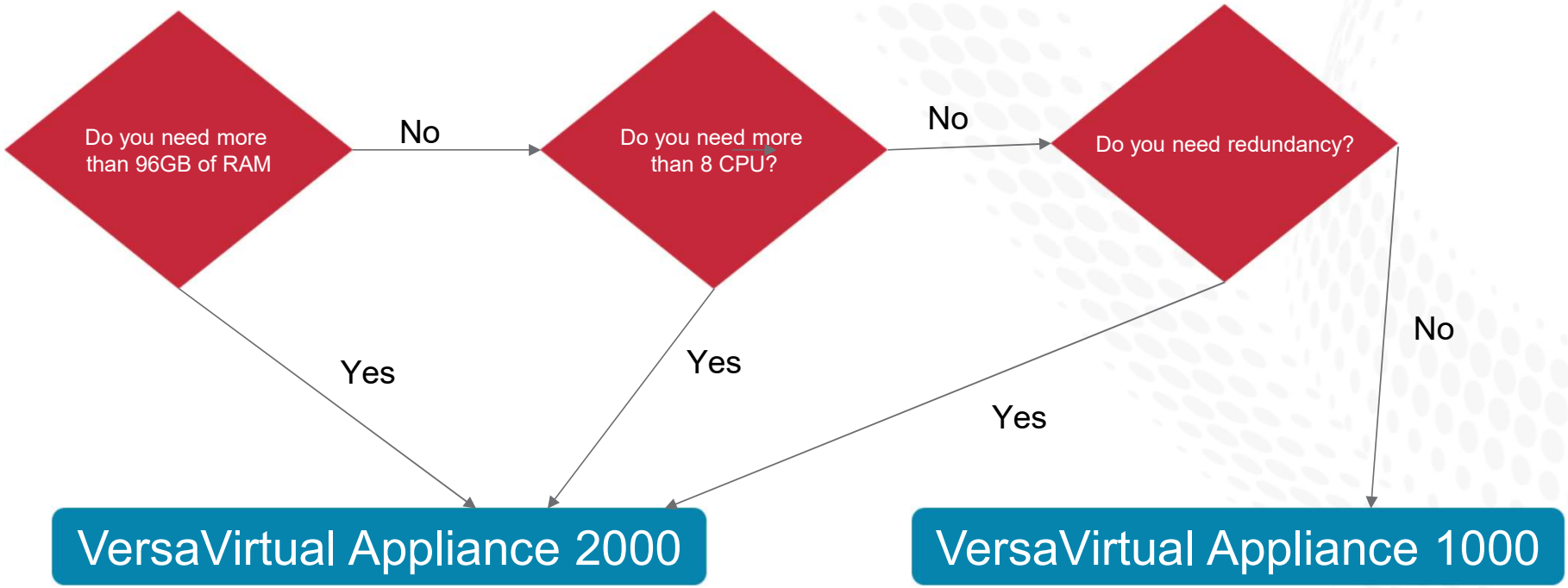
Determine Services Needed

- How many years of monitoring and administration needed
- Startup services (ASP or FSE)
- Services needed for installation of software (through FSE)

Get Quote

- Quote in CSM quoting tool

Determine which SKU is needed



Guidance for Customers

Reference Material

- https://www.vmware.com/pdf/vi_architecture_wp.pdf

Thank you

www.rockwellautomation.com

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