

Getting Started with vSphere

Virtualization Quick-start

MOREnet Summit
February 25, 2020

Agenda

VMware Vision

Virtualization Basics

Storage Basics

Network Basics

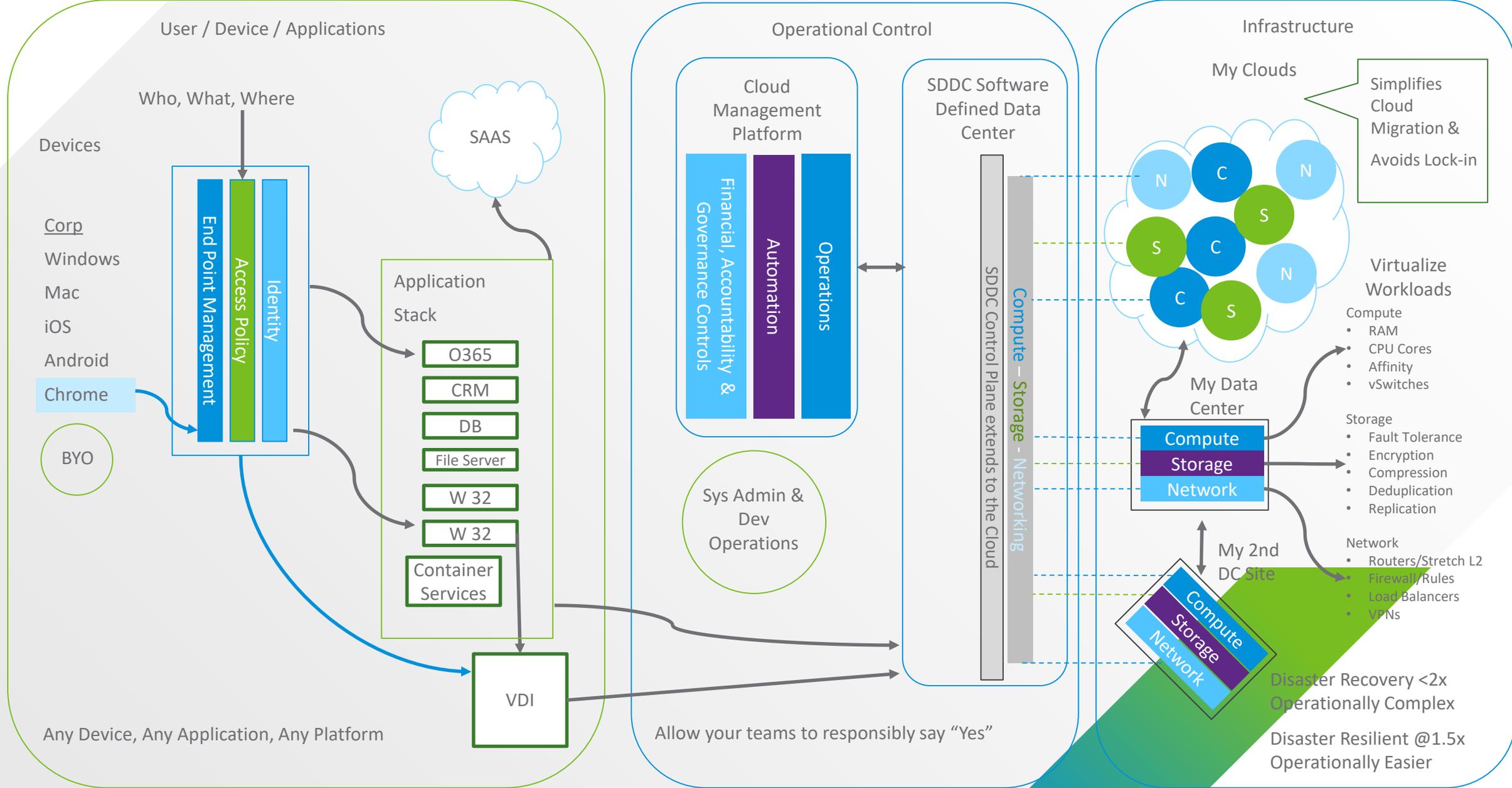
Pre-Install Basics

Install+Config ESXi

Deploy+Config vCenter Server

“Day 2” Operations

VMware Vision

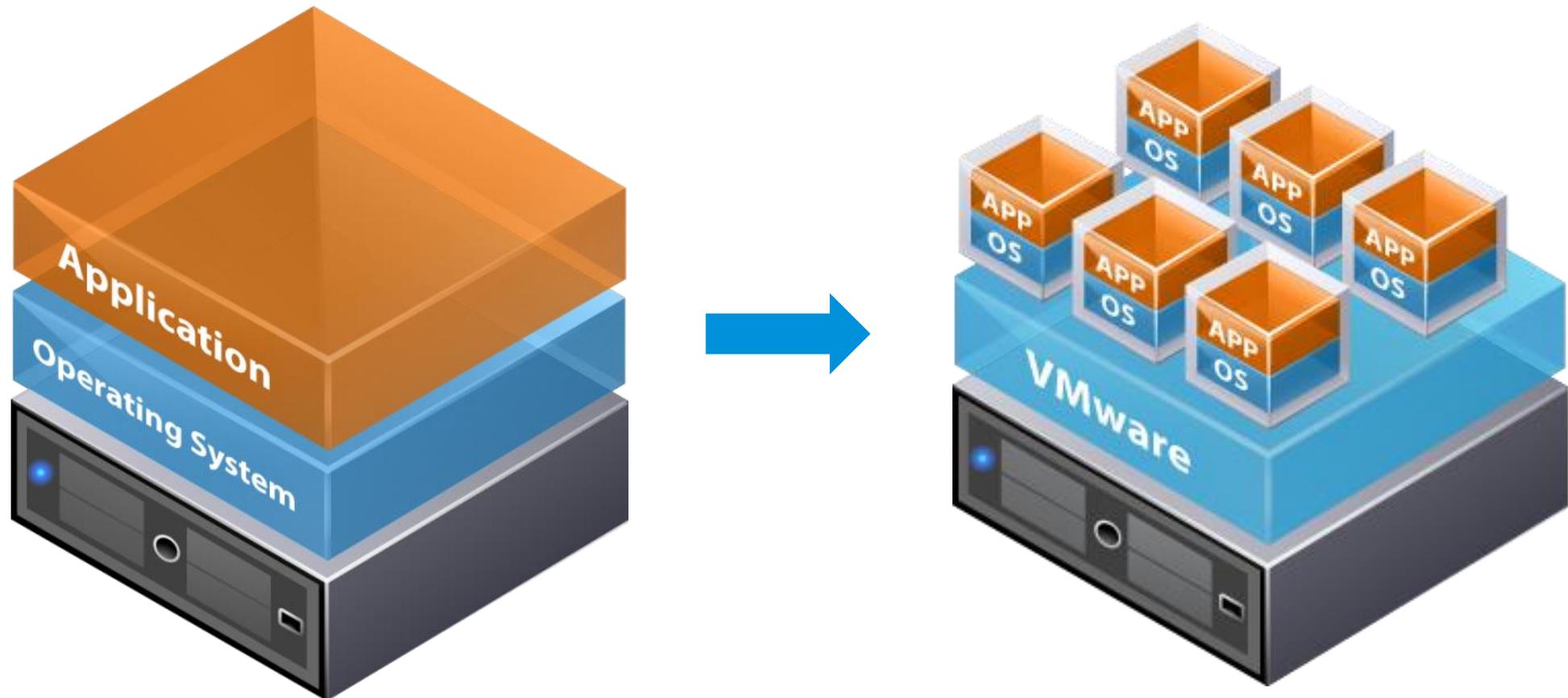


Defined Compliance Models w/ a Least Privilege / Zero Trust Security Model

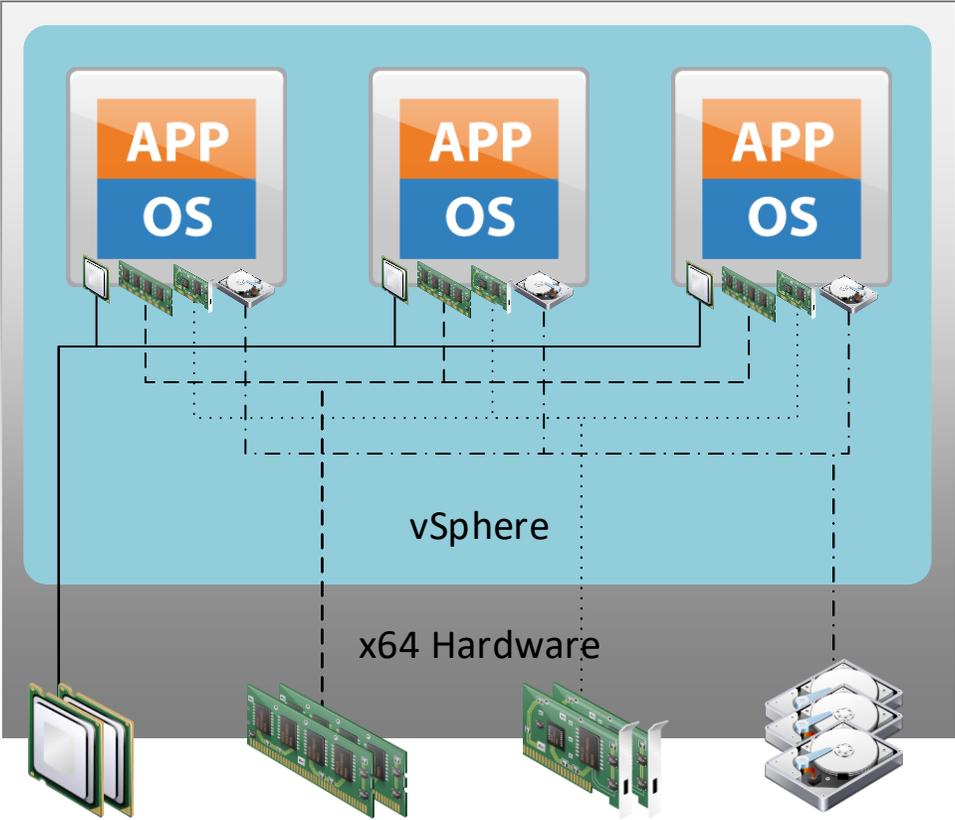
Virtualization Basics

What Is Virtualization?

Virtualization is the *abstraction* of hardware with software.

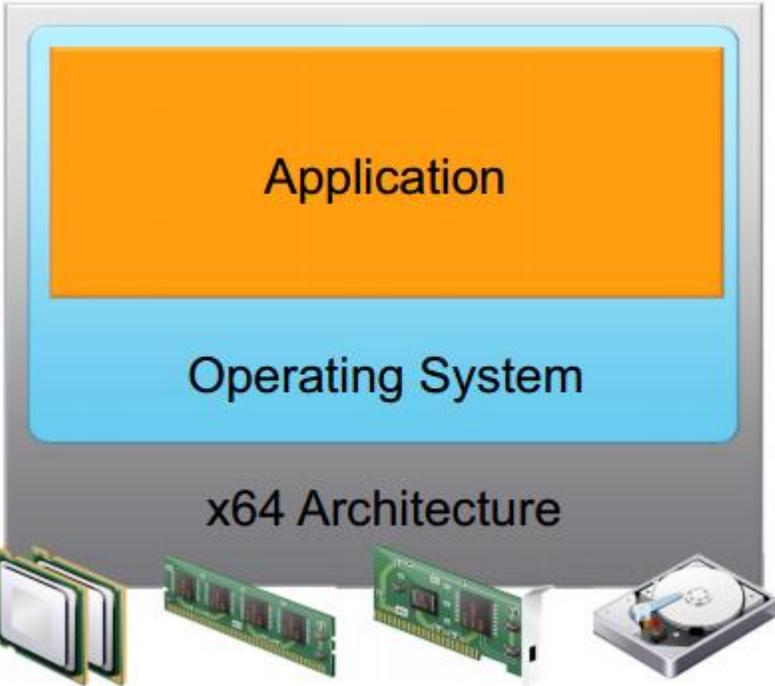


Physical Resource Sharing

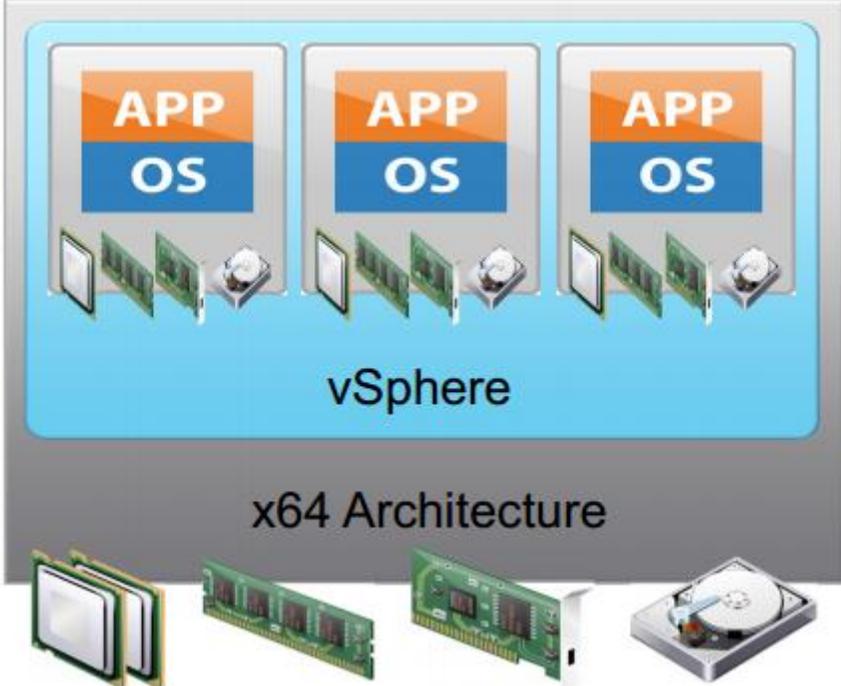


Hardware Virtualization

Physical Infrastructure

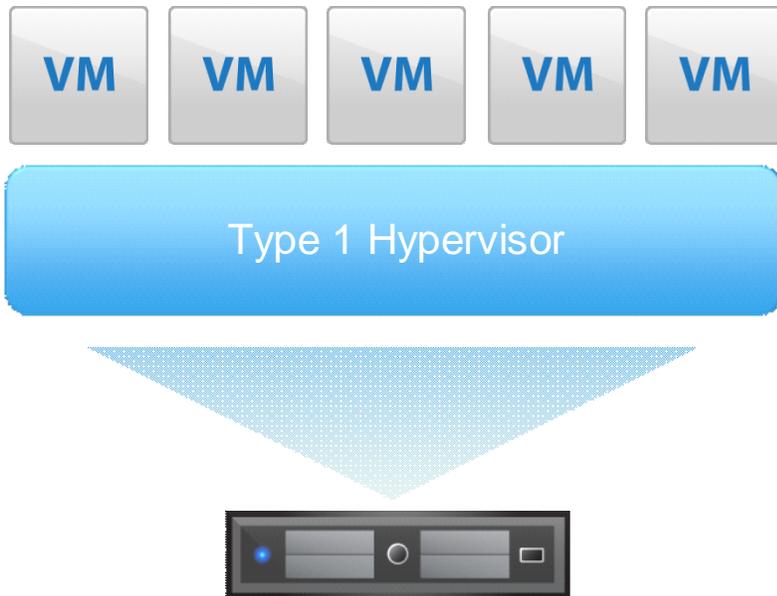


Virtual Infrastructure

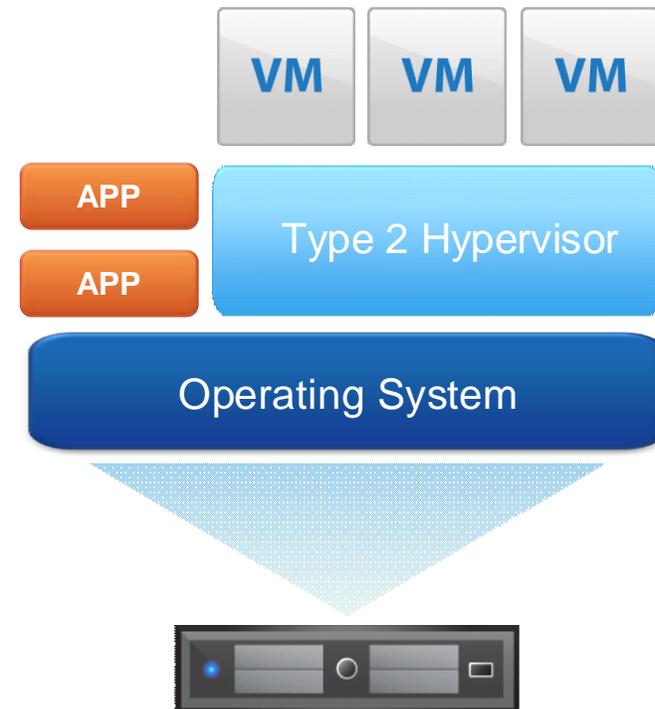


Hypervisor Types

Type 1 "Bare Metal"



Type 2 "Hosted VM"



Benefits of Virtualization

Partitioning

Isolation

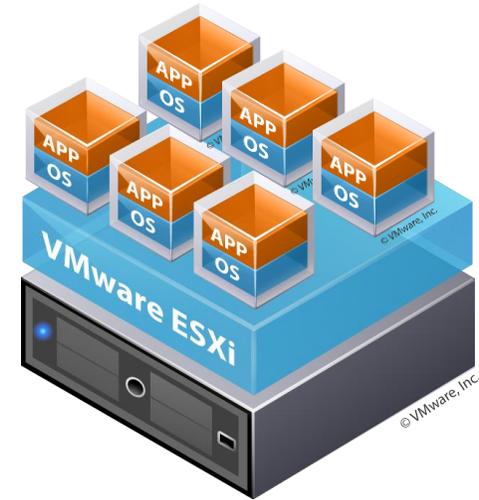
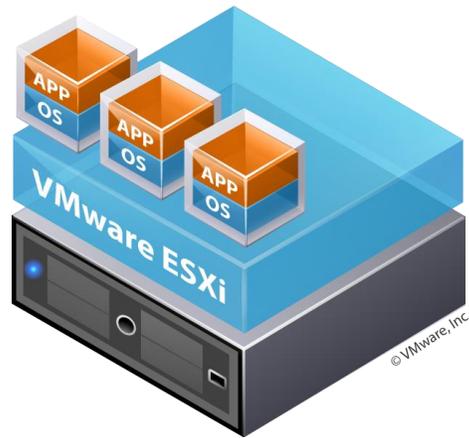
Encapsulation

Hardware Independence

Partitioning

Run multiple operating systems on one physical machine

Divide system resources between virtual machines



Utilization



Utilization

Isolation

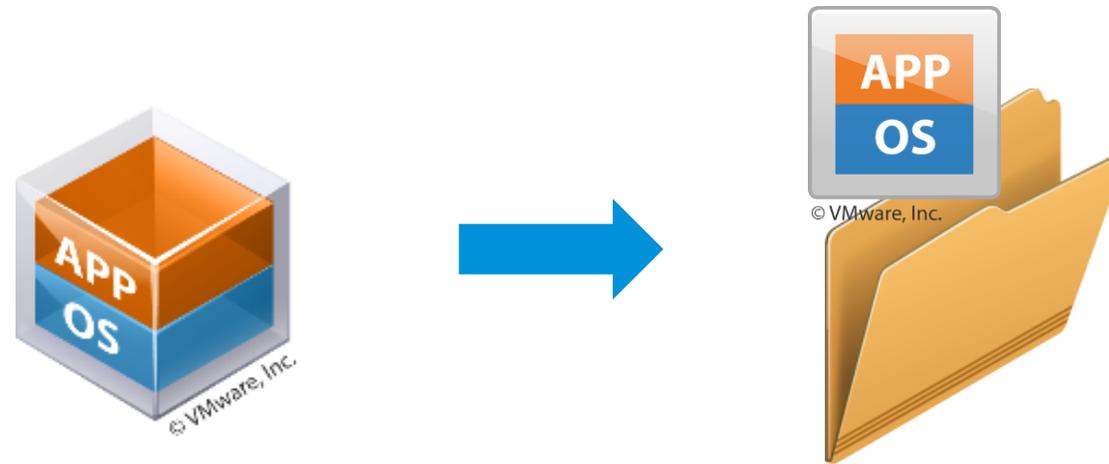
Fault and security isolation at the hardware/OS level



Encapsulation

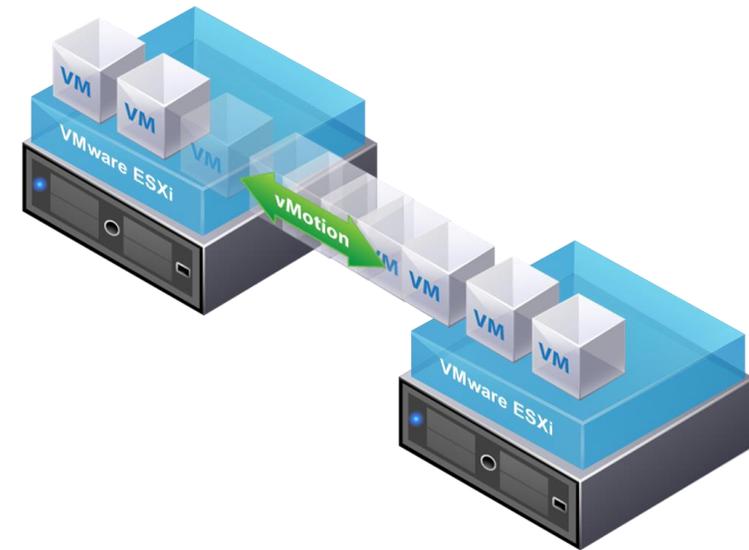
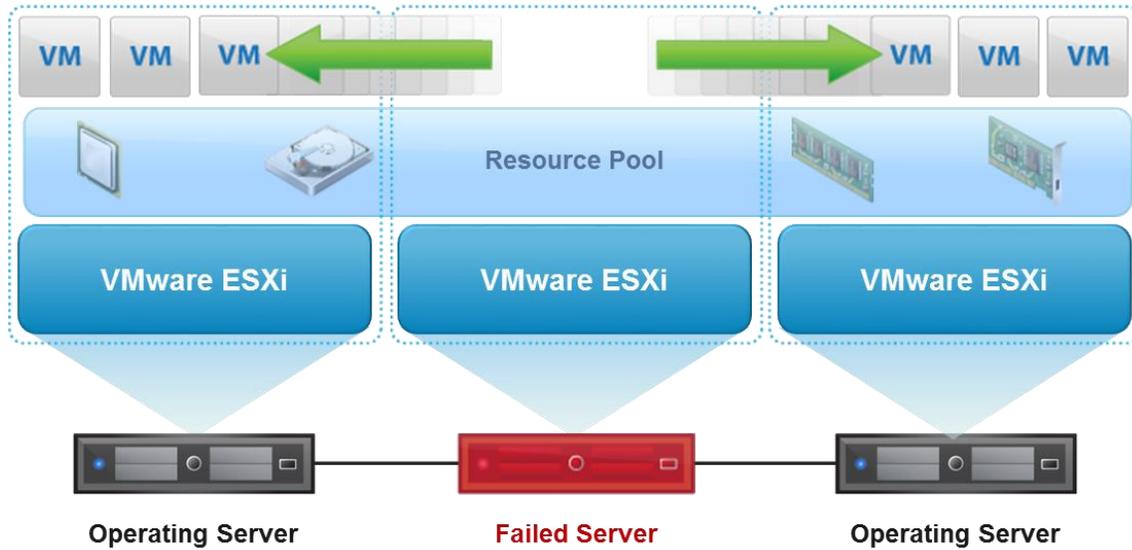
Entire state of the virtual machine can be saved to files

Move and copy virtual machines as easily as moving and copying files



Hardware Independence

Provision or migrate any virtual machine to any similar or different physical host



Storage Basics

Storage Types

Direct-attached

Remote (SAN) attached

Pooled

Direct-attached



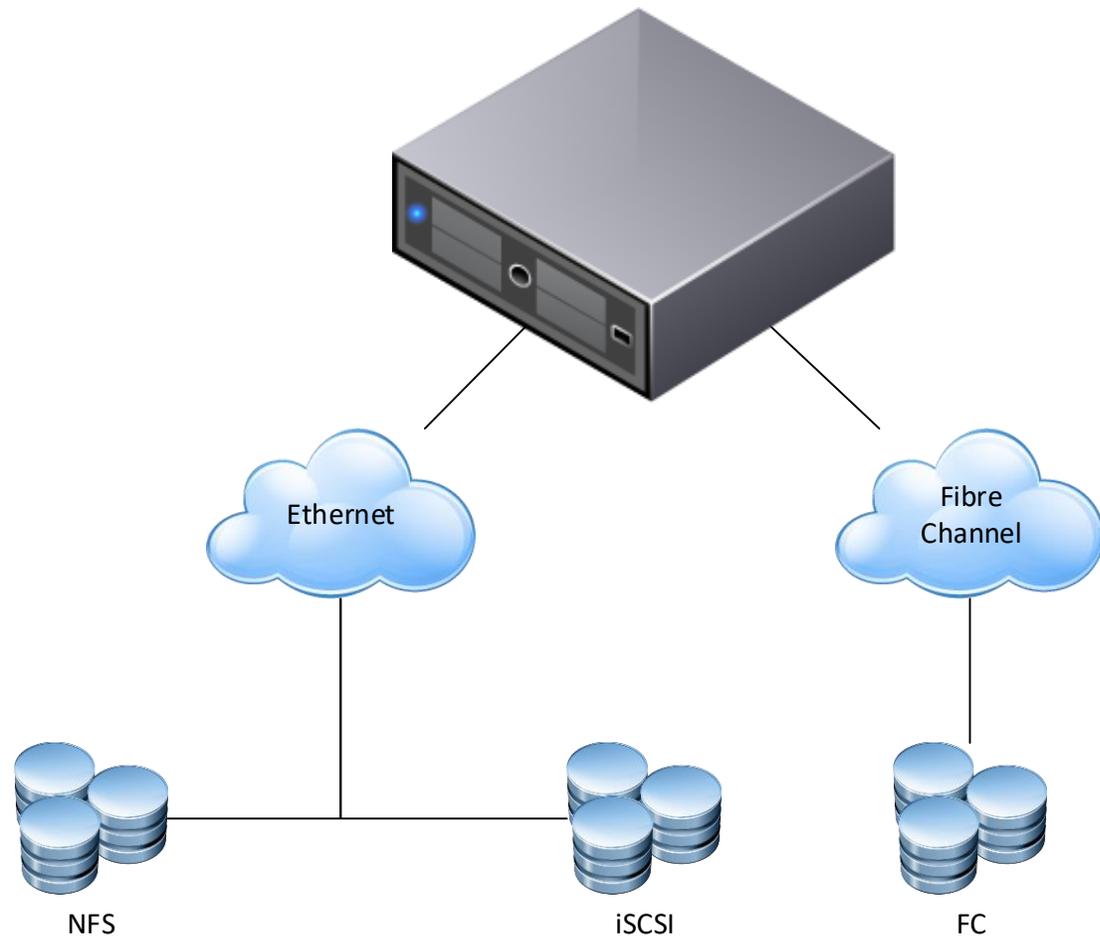
SAS

SATA

SSD

NVMe

Remote (SAN) Attached



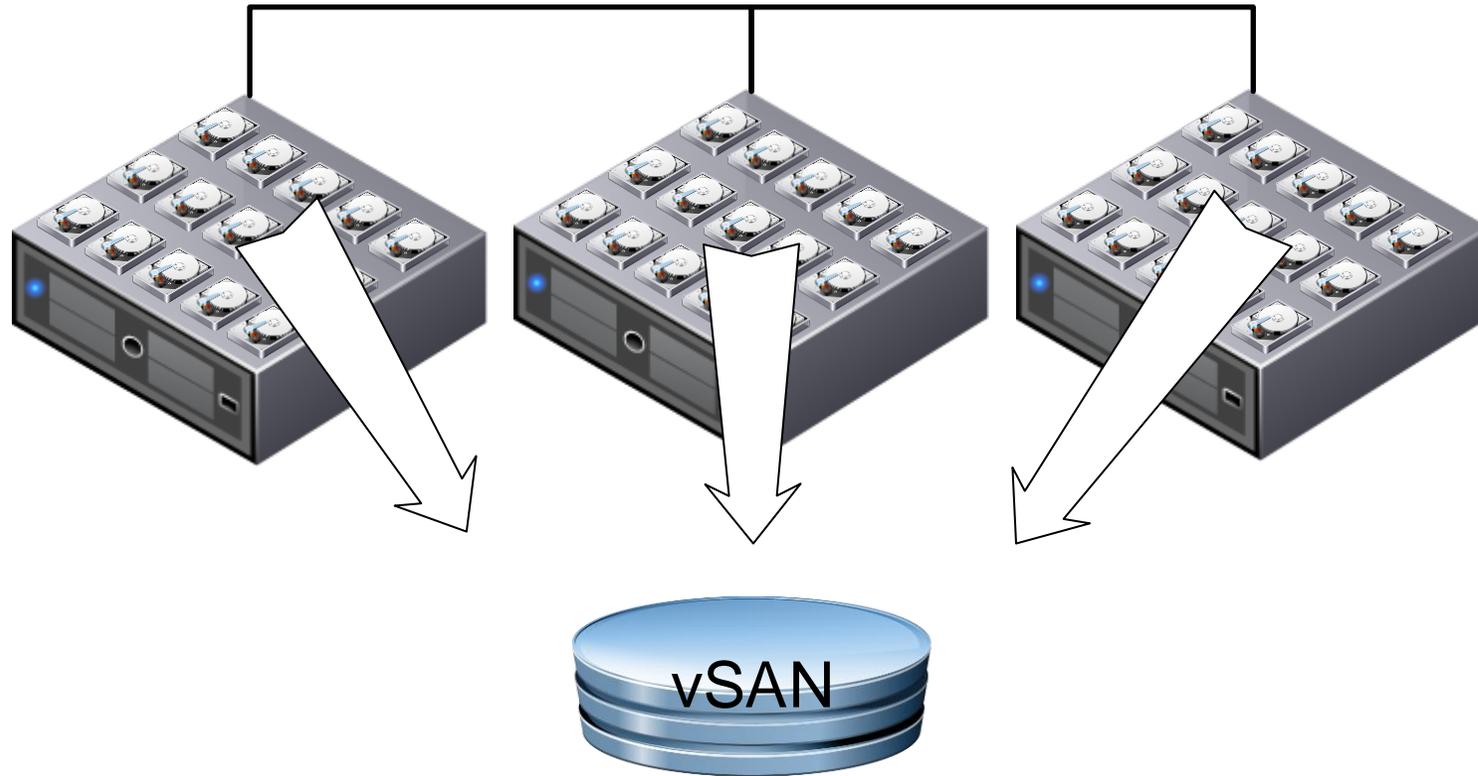
Block

- Fibre-channel
- iSCSI
- SAS

Block

- NFS v3
- NFS v4.1

Pooled Storage (vSAN)

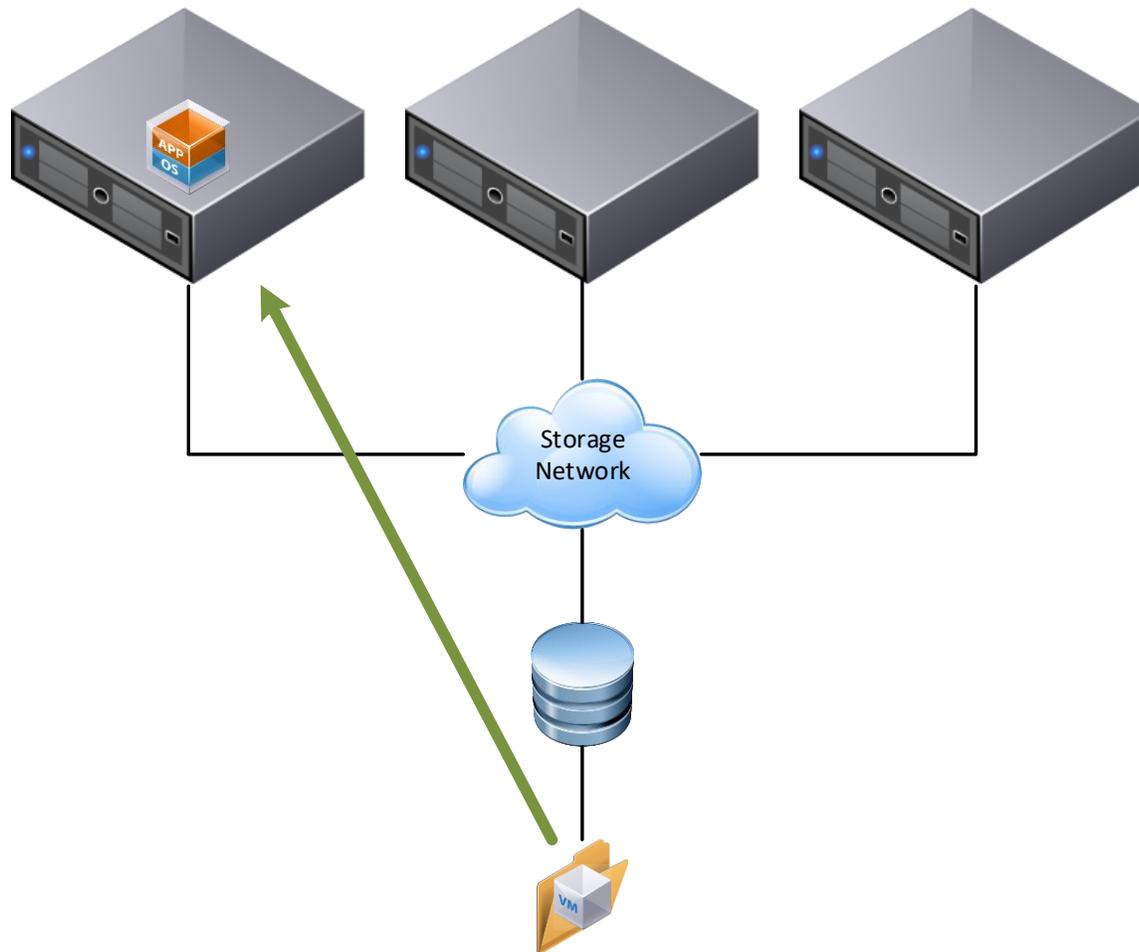


Locally-attached
devices

Pooled via software

Redundant Array of
Independent **N**odes
(RAIN)

Shared Storage



Proactive movement
(vMotion)

Reactive Restarts
(High Availability)

Storage Tips

Multipath: eliminate single points-of-failure

- Be sure your bindings are correct for iSCSI
- Aggregate links will not add performance with NFS 3
- Follow array manufacturer's guidance on storage network
 - This includes use of PSP (path selection policy) providers!
- Understand hybrid array's elevation algorithm before enabling Storage DRS

Avoid RDM (raw device mapping)

Independent switching hardware *–or–* hardware designed for storage+data use

Ethernet Jumbo Frames (MTU: 9000) ← *caution!*

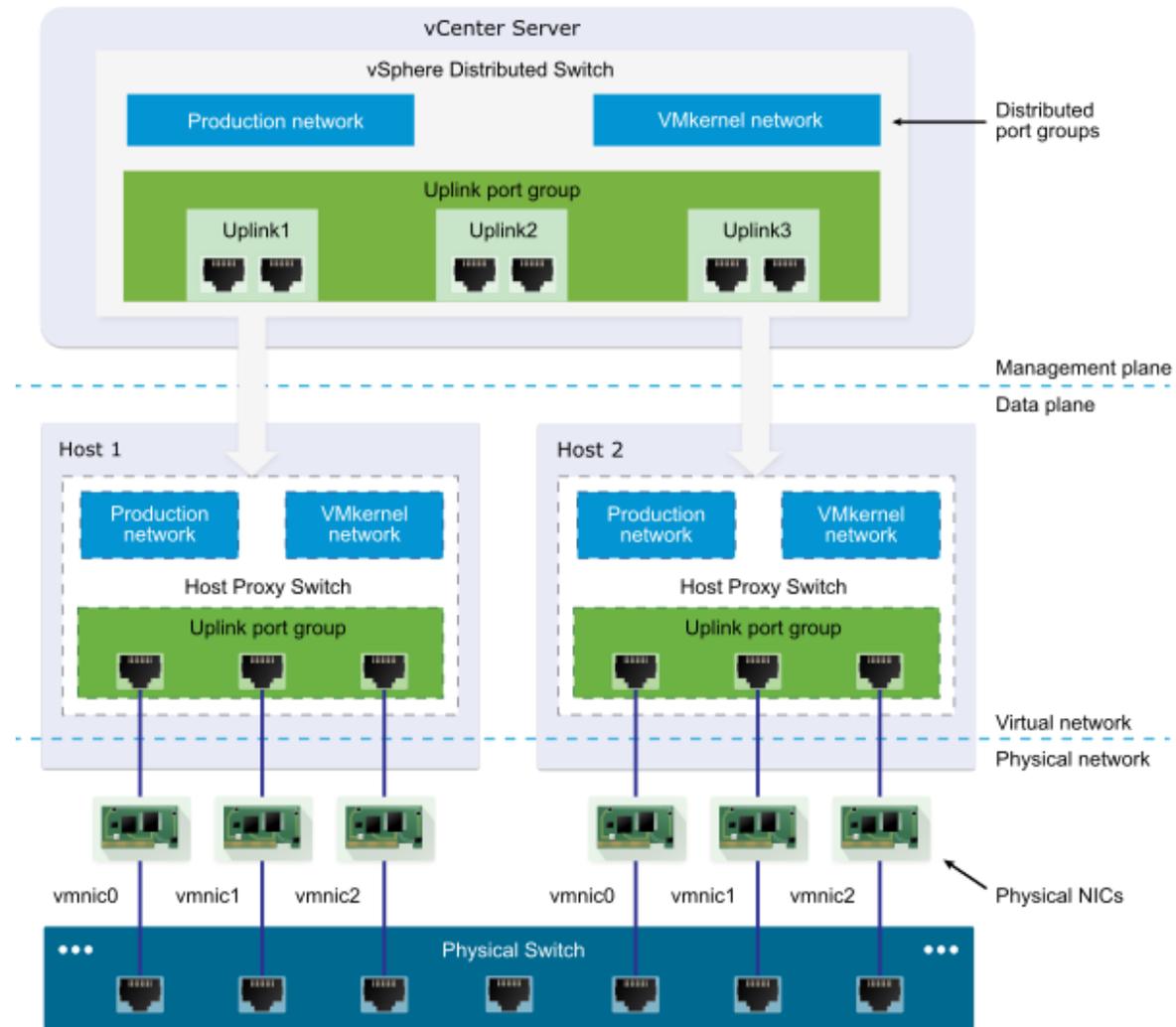
Network Basics

Distributed Virtual Switch

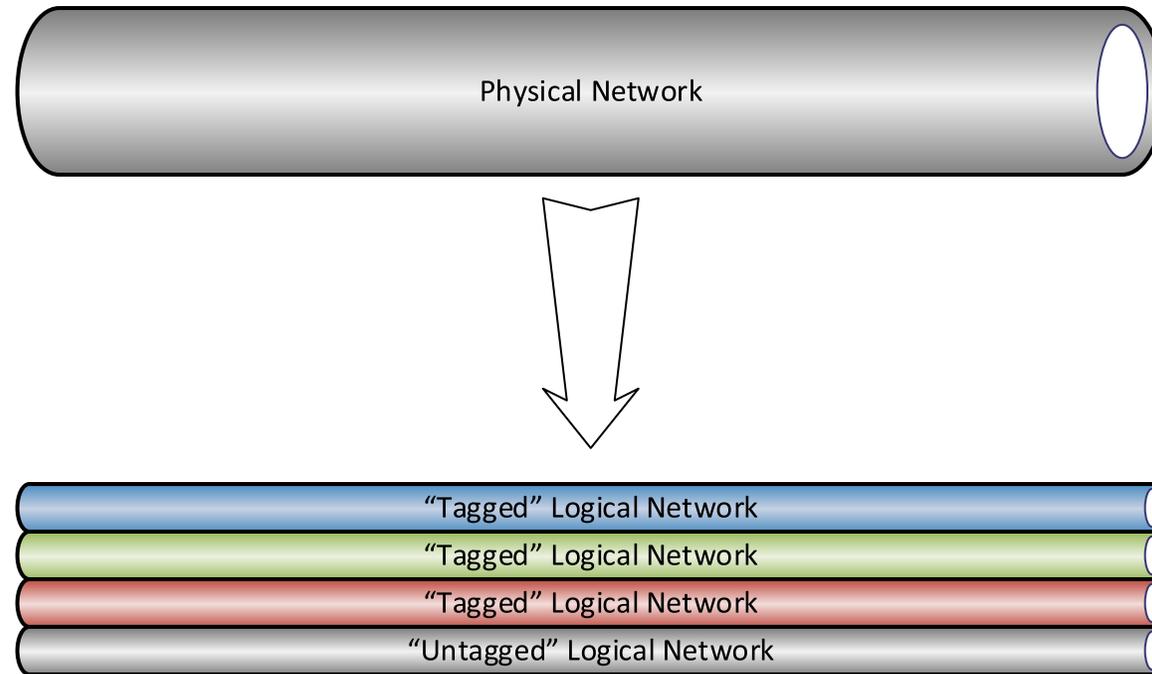
Reduce management motions

True load balancing

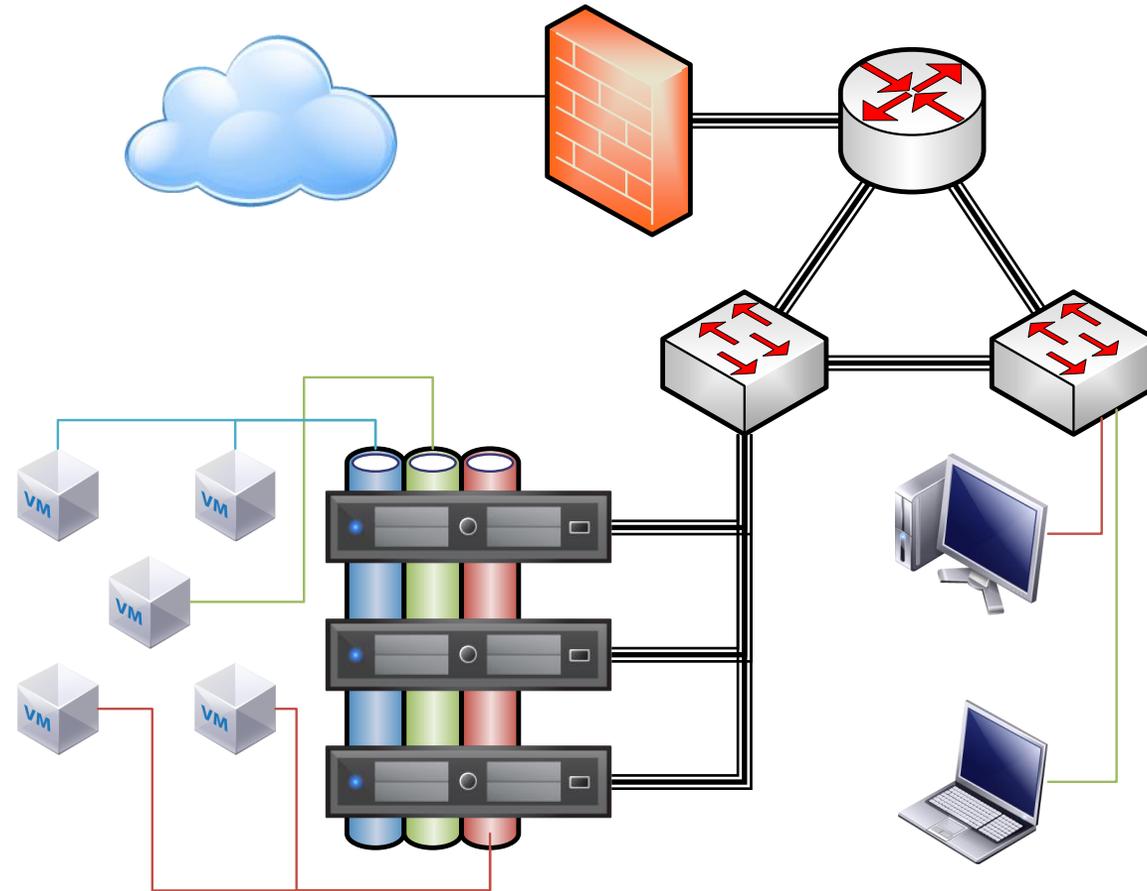
NetFlow & SPAN support



VLAN: virtual local area network

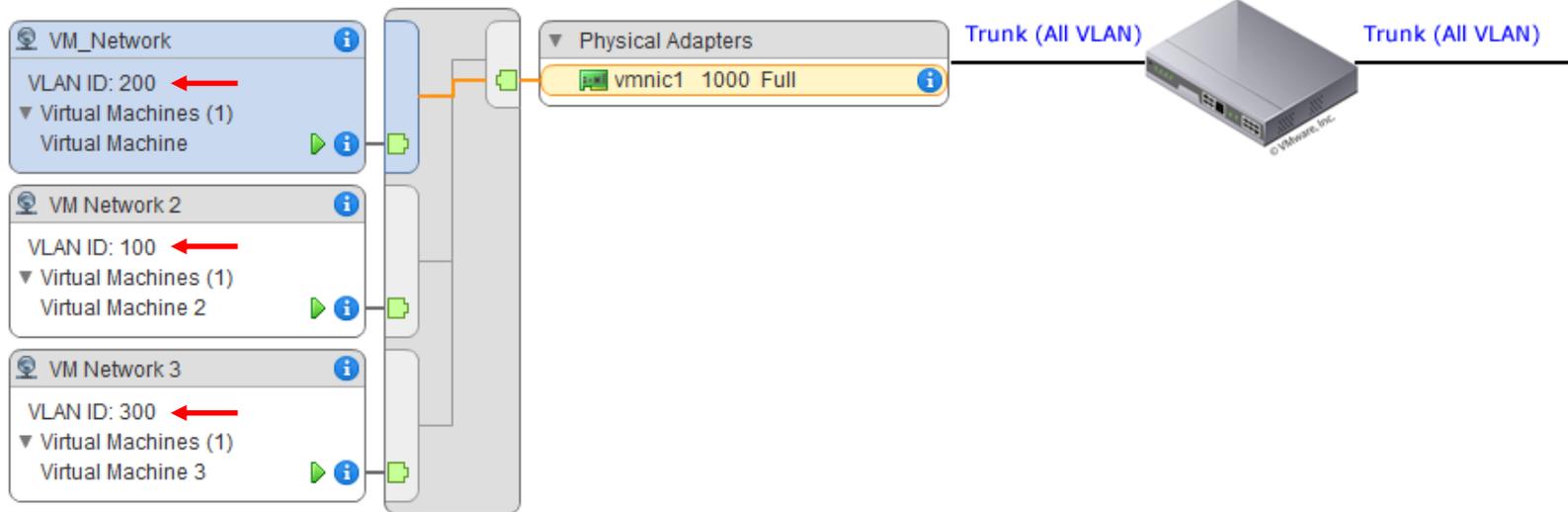


VLANs in Action



VLAN Support in vSphere

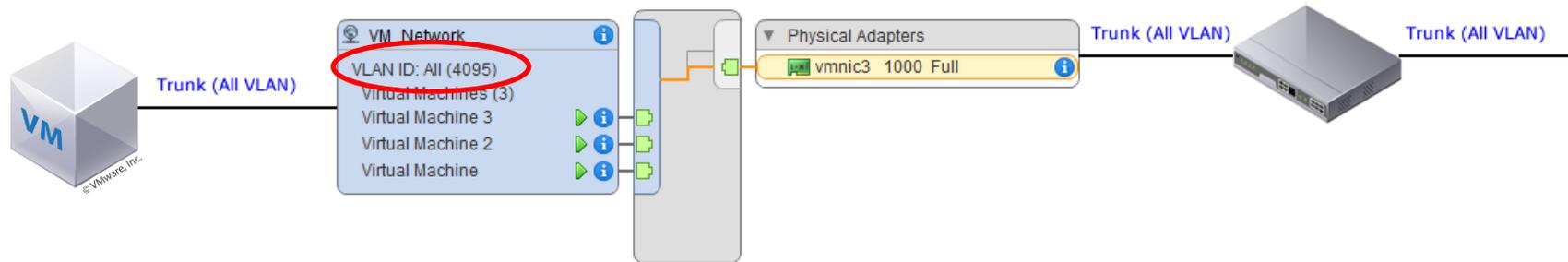
Virtual Switch Tagging (VST)



Most common

VLAN Support in vSphere

Virtual Guest Tagging (VGT)

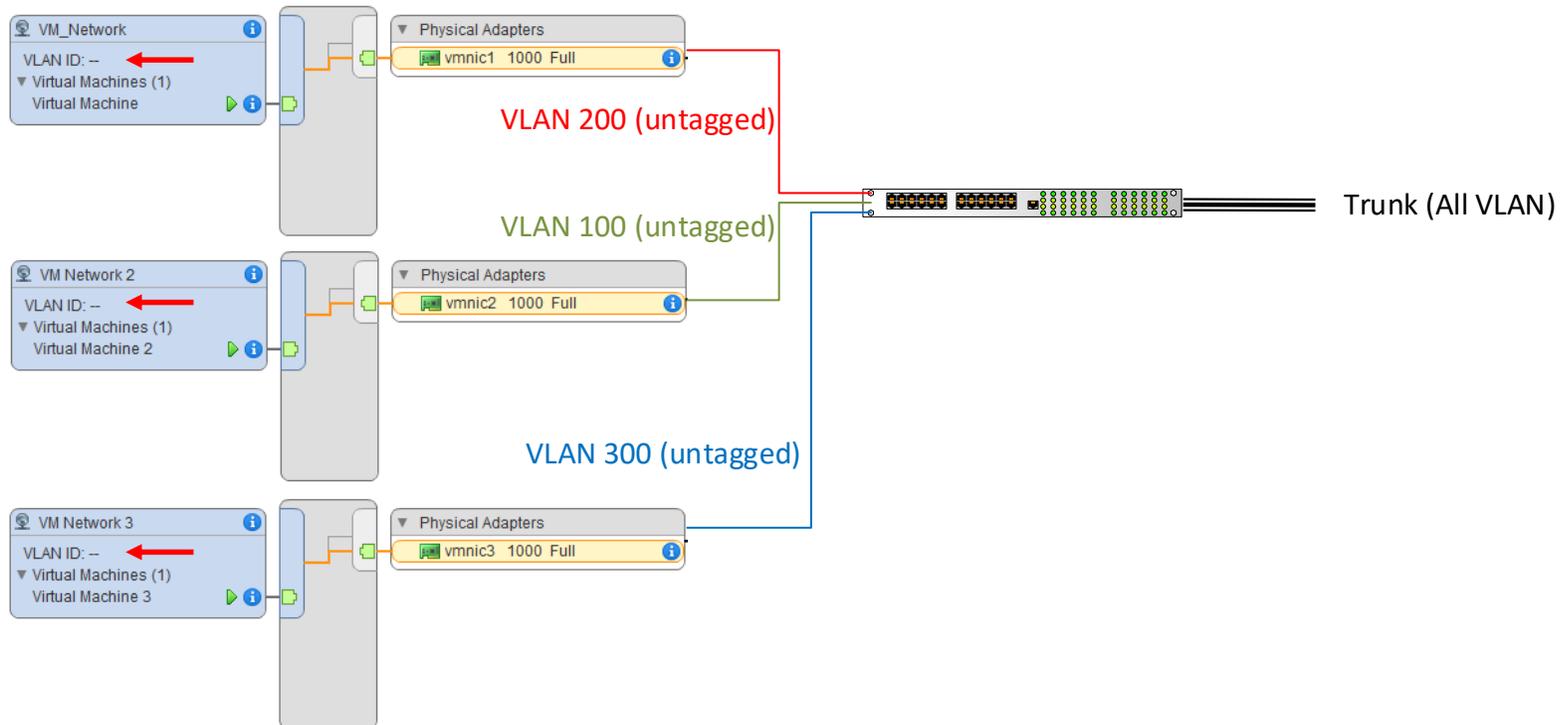


Uncommon

Used for special applications where guest must see tagged VLAN or multiple VLANs on a single uplink.

VLAN Support in vSphere

External Switch Tagging (EST)



Rare

Consumes far more switch/NIC ports

Used where physical isolation is required *or* where no VLANs are in use

Network Tips

Multi-home hosts

- Increases availability
- Reduces contention*

10Gbps (or better) for VMkernel networks

Use the Distributed Virtual Switch for VM networks (if licensed)

Keep VMkernel ports on Standard Switches if you have the uplinks available

Create “ephemeral” distributed port groups for VMkernel emergency use

Use tagged VLANs for **everything** for “self-documenting” config.

Install+Configure ESXi

Deploying your host

It's as easy as...



Prepare



Install



Configure

Prepare

Validate hardware against HCL (<https://www.vmware.com/resources/compatibility/search.php>)

ESXi ISO with drivers pre-installed

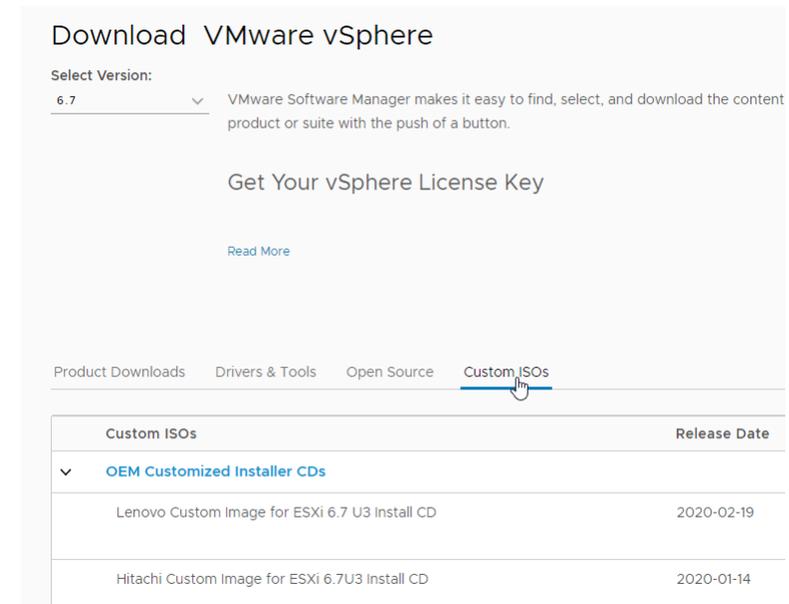
- From host manufacturer
- From VMware

Local Storage (8GB+)

Network uplinks cabled & configured

Unique machine details

- Hostname in DNS (forward & reverse!)
- Management IP address
- Root password



The screenshot shows the VMware vSphere download page. At the top, it says "Download VMware vSphere". Below that, there is a "Select Version:" dropdown menu set to "6.7". To the right of the dropdown, there is a paragraph of text: "VMware Software Manager makes it easy to find, select, and download the content product or suite with the push of a button." Below this text is a link "Get Your vSphere License Key" and another link "Read More". At the bottom of the page, there is a navigation bar with tabs: "Product Downloads", "Drivers & Tools", "Open Source", and "Custom ISOs". The "Custom ISOs" tab is selected. Below the navigation bar is a table with two columns: "Custom ISOs" and "Release Date". The table contains three rows of data:

Custom ISOs	Release Date
OEM Customized Installer CDs	
Lenovo Custom Image for ESXi 6.7 U3 Install CD	2020-02-19
Hitachi Custom Image for ESXi 6.7U3 Install CD	2020-01-14

Install

Using the host console

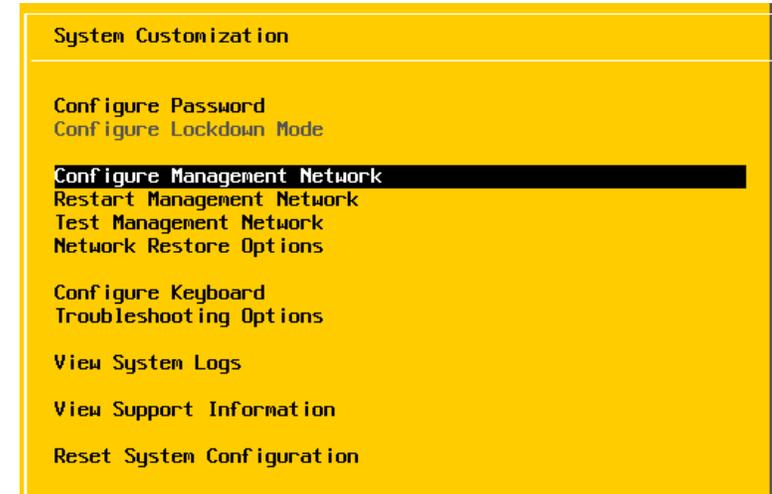
1. Mount & Boot ISO
2. Select “Install” & accept EULA
3. Select storage
4. Select keyboard layout
5. Provide root password*
6. Confirm installation
7. Dismount ISO & restart

(yes, it really is that simple)

Initial Configuration

Using the host console

1. Log on using DCUI (direct console user interface)
2. Configure Management Network
 1. Select/deselect NICs
 2. Set VLAN
 3. Set static IP, mask, gateway, & DNS
 4. Set hostname
 5. Disable IPv6 (optional, requires reboot)



Final Configuration (no vCenter)

Using the host web client

1. Log on using Host Web Client on management IP
2. Configure NTP (Host→Manage→System→Time & Date)
3. Configure host networking
 1. Create virtual switches for physical NICs
 2. Create port groups for virtual switches
 3. Add VMkernel NICs for services
4. Configure host storage (optional)
 1. Bind iSCSI
 2. Mount/connect existing datastores
 3. Connect new LUNs & initialize
5. Deploy vCenter

DEMO TIME!

Host Install Tips

Don't waste a lot of time with the Host Web Client: Get vCenter deployed and manage the host that way.

If you won't have identical hosts, use your oldest platform (CPU+chipset generation) as your first system & target for vCenter.

Yes, there's a way to bootstrap vSAN for greenfield. There are easier ways to handle it, too.

The temporary deployment license is equivalent to Enterprise Plus. Take advantage of that while you can (60 days).

Secure your host!

- Add the host to Active Directory
- Add AD admins to local groups
- Use a unique root password* for each host
- Enable Lockdown after adding to vCenter

Deploy+Configure vCenter Server

Deploying vCenter

...yup, just like the host...



Prepare



Deploy



Configure

Prepare

VCSA (vCenter Server Appliance) ISO

Admin system (Windows, Mac, or Linux!) with network access to target host

Host credentials (IP address | FQDN, root password)

Unique Appliance details

- VM Name
- root password*
- datastore
- IP address/mask/gateway/DNS, FQDN

SSO Domain parameters

- Domain name \neq Active Directory domain \leftarrow *caution!*
- administrator@<SSO domain> password*

Deploy

Using admin system

1. Mount VCSA ISO
2. Run `\vcsa-ui-installer\<platform>\installer`
3. Select “Install”
4. “Walk the Wizard” to complete Stage 1 (deploy the virtual appliance)
5. “Walk the Wizard” to complete Stage 2 (set up the virtual appliance)
6. Finish: open `https://<vcsa.fqdn>:5480/` and install updates

Configure

Using the vSphere Web Client

1. Using an HTML5-compatible browser, open [https://<fqdn.of.vcsa>/](https://<fqdn.of.vcsa>)
2. Download & install CA certificate(s)
3. Launch vSphere Web Client (HTML5)
4. Configure Licenses
5. Configure Authentication (eg Windows AD authentication)
6. Create a Datacenter + Cluster
7. Configure EVC* on the cluster
8. Add hosts
9. Configure host VMkernel ports for: vMotion, Storage, NSX, vSAN, etc.

Configure

Continued...

10. Configure host NTP
11. Configure/verify shared storage visibility across cluster
12. (optional) Configure Distributed Virtual Switch(es)
13. Configure VM networks
14. Configure Update Manager, attach baselines & remediate hosts
15. Deploy test workload(s)
16. Verify vMotion, Storage vMotion
17. Enable DRS (license dependent)
18. *And more!*

DEMO TIME!

vCenter Tips

No. vCenter is not **mandatory**

Yes. vCenter is absolutely “worth it” and unlocks the true potential of your system

Always upgrade vCenter before its hosts

Always upgrade hosts before updating VM hardware version

DO configure automatic backup

Day 2 Operations

Getting the most of your kit...

EVC: Enhanced vMotion Compatibility

DRS: Distributed Resource Scheduler*

RBAC: Role-Based Access Controls

Templates+Profiles for VM deployment

More!

Enhanced vMotion Compatibility

VMware EVC is Enabled

Mode	
Name	Intel® "Sandy Bridge" Generation
Description	
<p>Applies the baseline feature set of Intel® "Sandy Bridge" Generation processors to all hosts in the cluster.</p> <p>Hosts with the following processor types will be permitted to enter the cluster:</p> <ul style="list-style-type: none">Intel® "Sandy Bridge" GenerationIntel® "Ivy Bridge" GenerationIntel® "Haswell" GenerationFuture Intel® processors <p>Compared to the Intel® "Westmere" Generation EVC mode, this EVC mode exposes additional CPU features including AVX, XSAVE, and ULE.</p> <p>Note: Some "Sandy Bridge" microarchitecture processors do not provide the full "Sandy Bridge" feature set. Such processors do not support this EVC mode; they will only be admitted to the Intel® "Nehalem" Generation mode or below.</p> <p>For more information, see Knowledge Base article 1003212.</p>	

Distributed Resource Scheduler

vSphere DRS is Turned ON

[SCHEDULE DRS...](#)[RESTORE RESOURCE POOL TREE...](#)[EDIT...](#)

▼ DRS Automation	
Automation Level	
Fully Automated	
DRS automatically places virtual machines onto hosts at VM power-on, and virtual machines are automatically migrated from one host to another to optimize resource utilization.	
Migration Threshold	
Apply priority 1, priority 2, and priority 3 recommendations.	
DRS provides recommendations when workloads are moderately imbalanced. This threshold is suggested for environments with stable workloads. (Default)	
Predictive DRS	Predictive DRS is disabled.
	vCenter will not respond to forecasted metrics from vRealize Operations.
Virtual Machine Automation	Individual virtual machine automation levels enabled.
▼ Additional Options	
VM Distribution	Use DRS defaults: DRS distributes virtual machines across hosts to optimally provide resources for running workloads.
Memory Metric for Load Balancing	Use DRS defaults, active memory + percent of idle memory of virtual machines, when load balancing.
CPU Over-Commitment	CPU over-commitment is not configured.

DRS: VM affinity/anti-affinity

VM/Host Rules

+ Add... Edit... Delete

Name	Type	Enabled	Conflicts
Domain Controllers	Separate Virtual Machines	Yes	0
SQL16	Separate Virtual Machines	Yes	0
PreferESX1	Run VMs on Hosts	Yes	0
PreferESX2	Run VMs on Hosts	Yes	0
PreferESX3	Run VMs on Hosts	Yes	0
Netscaler	Separate Virtual Machines	Yes	0
anti-affinity-rule-edge-1	Separate Virtual Machines	Yes	0

VM/Host Rule Details

The listed 2 Virtual Machines must run on different hosts.

+ Add... Details... Remove

Rule Members	Conflicts
dc0	0
dc1	0

Conflicts

Role-Based Access Controls

The screenshot displays the 'Roles' configuration page in VMware. At the top, the 'Roles provider' is set to 'vcsa.home.millard.org'. Below this, there are icons for adding, editing, and deleting roles. A list of roles is shown, with 'Resource pool administrator (sample)' selected. To the right, a table with columns 'DESCRIPTION', 'USAGE', and 'PRIVILEGES' is visible. The 'PRIVILEGES' column is active, showing a list of permissions for the selected role.

Roles provider: vcsa.home.millard.org

+ [Icons] X

- Administrator
- Read-only
- No access
- Content library administrator (sample)
- Datastore consumer (sample)
- Network administrator (sample)
- No cryptography administrator
- Resource pool administrator (sample)**
- Tagging Admin
- Virtual machine power user (sample)
- Virtual machine user (sample)

DESCRIPTION	USAGE	PRIVILEGES
Alarms		<ul style="list-style-type: none">• Create alarm• Modify alarm• Remove alarm
Permissions		<ul style="list-style-type: none">• Modify permission
Datastore		<ul style="list-style-type: none">• Browse datastore
Folder		<ul style="list-style-type: none">• Create folder

Templates + Profiles

The screenshot shows the vSphere interface. On the left, a folder tree shows the path: vcsa.home.millard.org > DC > _Templates_ > _19ltsb_. The main pane displays the details for the template '_19ltsb_'. The 'Summary' tab is active, showing the following information:

- Guest OS: Microsoft Windows Server 201
- Compatibility: ESXi 6.7 and later (VM version
- VMware Tools: Not running, version:11265 (Cur
- DNS Name: _19LTSB_
- IP Addresses:
- Host: esx1.home.millard.org

An 'ACTIONS' menu is open over the template, listing the following options:

- Actions - _19ltsb_ (highlighted)
- New VM from This Template...
- Convert to Virtual Machine...
- Clone to Template...
- Clone to Library...
- Move to folder...
- Rename...

VM Customization Specifications

+ New... Import... | Edit... Duplicate Export Delete

Name	Guest OS
Domain Join, Sysprep	Windows
Static IP, Domain Join, Sysprep	Windows
Static IP, Sysprep	Windows
Sysprep	Windows

Living with vSphere

Some DOs and DON'Ts

DO enable alert emails

DON'T use resource pools to organize workloads; that's what folders are for

DO understand your support entitlement (basic vs production)

DON'T disable EVC when using identical hardware

DO use optimized templates *and keep them updated*

If your licensing allows:

DO enable DRS (Distributed Resource Scheduler)

DON'T complicate the network with LACP/Etherchannel

Living with vSphere

Other tips

BACKUP YOUR VMs!!!

Use strong passwords*, update/confirm vcsa policy

Avoid guest-based AntiVirus

Schrodinger's Backup

“The condition of any backup is unknown until a restore is attempted.”

@nixcraft

DEMO TIME!



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Thank You