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Best Practices for Deploying VMware vSphere on Symmetrix

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Agenda

- Why Symmetrix with VMware and vSphere
- Connectivity and Pathing
- Performance and Storage
- Virtual Provisioning and EMC Storage Viewer
- Replication Technologies
- Demo

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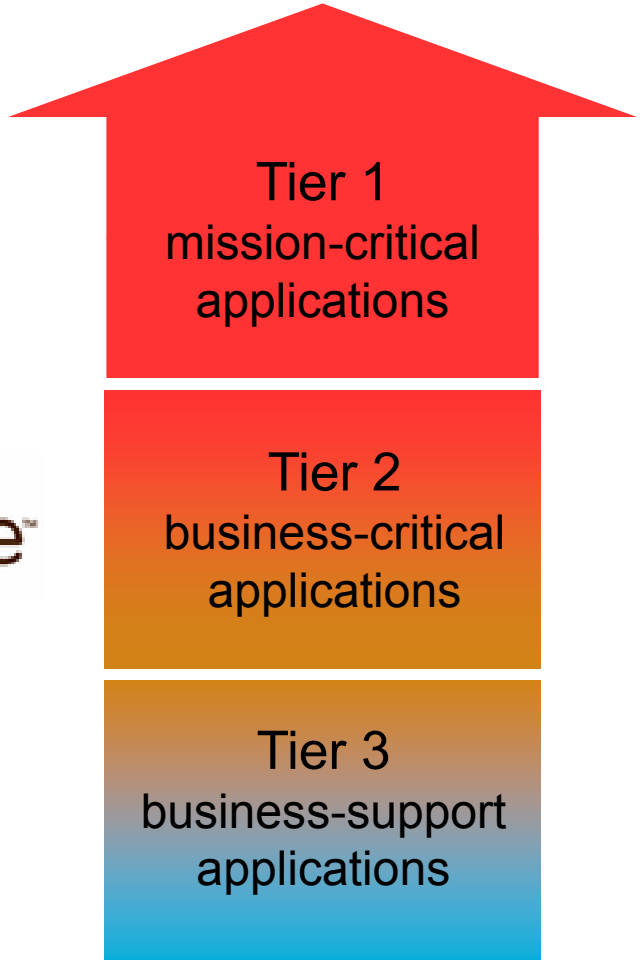
Higher Tier Requirements Need Higher-End Storage



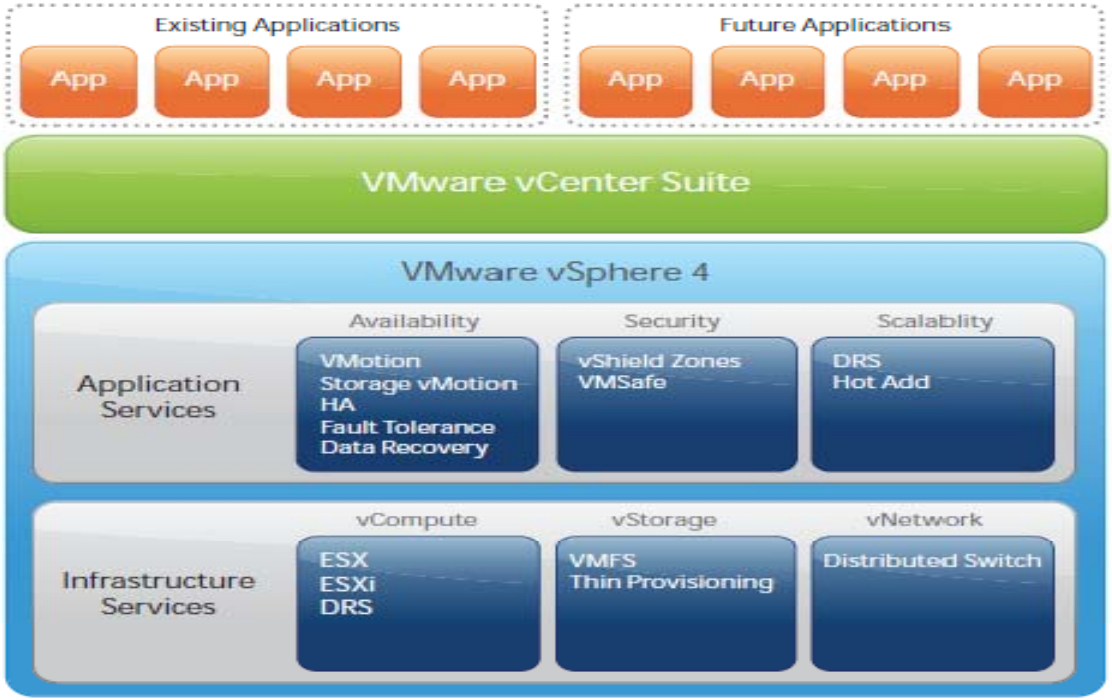
infrastructure requirements
- Disaster recovery and restart
- Service level management
- Server/storage management

infrastructure requirements
- High availability
- Replication (local/remote)
- Storage resource management

infrastructure requirements
- Basic storage connectivity
- Tape-oriented backup & recovery

VMware vSphere Overview

VMware DRS
Pluggable Storage Architecture
Hot add
Hot plug
Hot extend
VMware vNetwork Distributed Switch
VMware vStorage Thin Provisioning.
VMware VMotion
VMware Storage VMotion
VMware High Availability (HA)
VMware Fault Tolerance (FT)
VMFS Volume Grow



EMC Symmetrix Family

	Symmetrix DMX-4 Series	Symmetrix V-Max Series New
Use Case	**Full-featured storage with market-leading management and tiering**	**Storage to support virtual data center requirements**
Key Benefits	Enterprise Flash, Fibre Channel, and SATA drives Key management features—Virtual Provisioning, and Virtual LUN Local, remote, and multi-site replication options ControlCenter to automate and simplify physical and virtual infrastructure management	Scale-out architecture for unmatched performance and hyper-consolidation New “ease-of-use” capabilities to provision thousands of virtual and/or physical servers in minutes Up to 2 PB of usable protected capacity with support for Enterprise Flash, Fibre Channel, and SATA Enhanced Virtual LUN Technology for nondisruptive mobility

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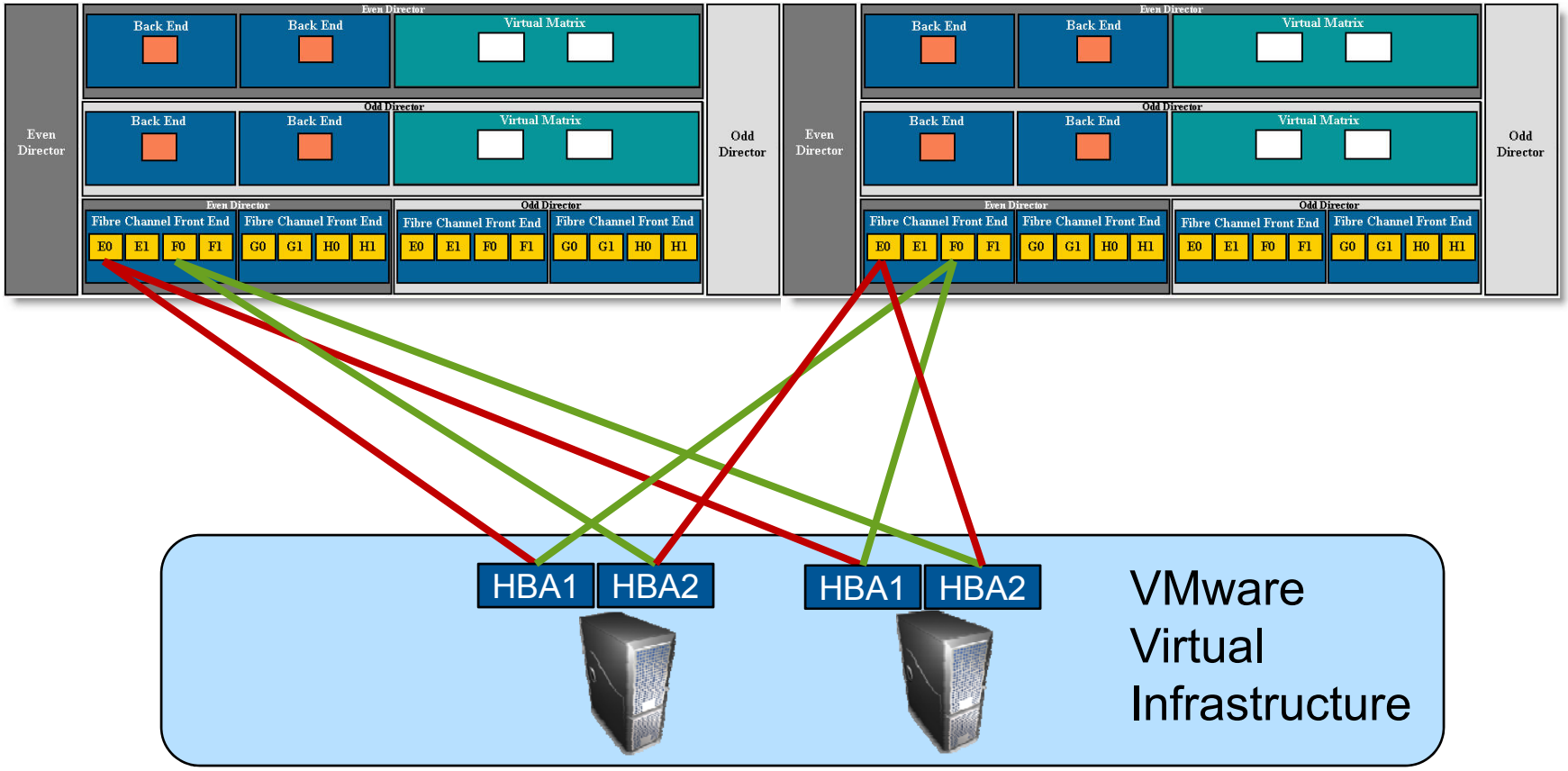
Connectivity Considerations

- VMware ESX Servers should have multiple physical HBA
- VMware Servers should be connected to multiple directors
  - Connections to different directors in different engines in multiple engine configuration
- Connect each HBA to a minimum of two ports on different directors

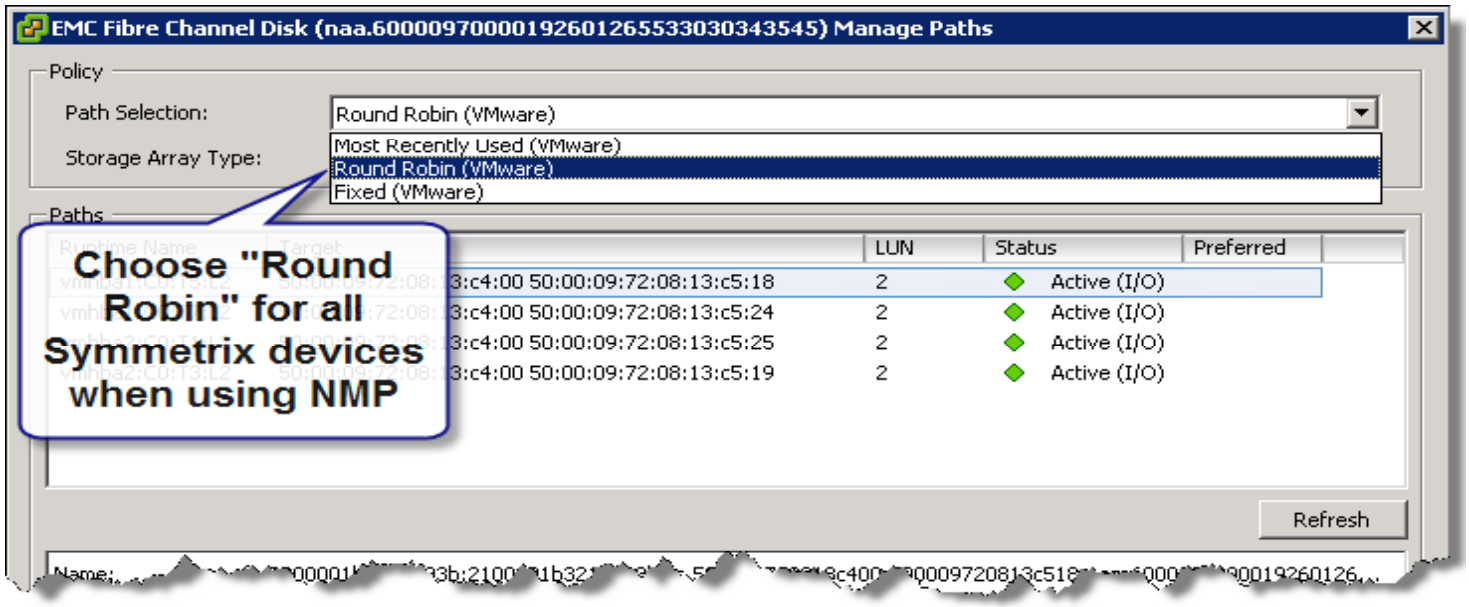
Connectivity Considerations – cont.

2 V-Max Engines



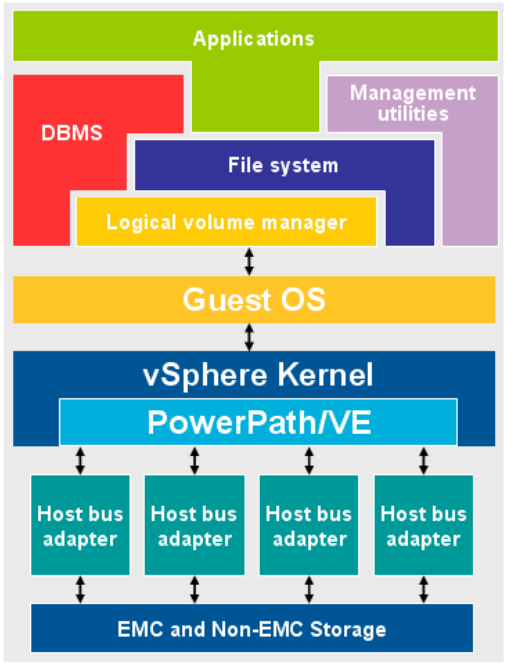
Path Management

- PowerPath/VE is recommended for vSphere environment
- NMP policy is available with vSphere
  - Use Round Robin policy for Symmetrix arrays



PowerPath/VE - Features

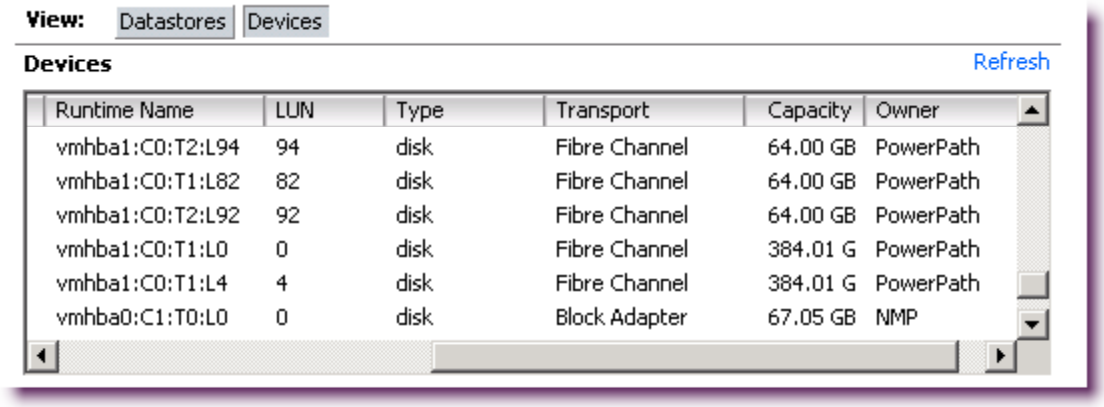
Dynamic load balancing
Auto-restore of paths
Device prioritization
Automated performance optimization
Dynamic path failover and path recovery
Monitor/report I/O statistics
Automatic path testing



PowerPath/VE - vSphere

```
C:\>rpowermt display host=<IP_Address> dev=emcpower0

Pseudo name=emcpower0
Symmetrix ID=000192601265
Logical device ID=03A7
Standard UID=naa.60000970000192601265533030334137
state=alive; policy=SymmOpt; priority=0; queued-IOs=0
==============================================================================
---------------- Host ----------------   - Stor -   -- I/O Path -  -- Stats --
###  HW Path                I/O Paths    Interf.   Mode    State  Q-IOs Errors
==============================================================================
   2 vmhba1                 C0:T4:L10 FA 10eB   active  alive      0      0
   1 vmhba2                 C0:T5:L10 FA 10eA   active  alive      0      0
   2 vmhba1                 C0:T2:L10 FA  7eB   active  alive      0      0
   1 vmhba2                 C0:T3:L10 FA  7eA   active  alive      0      0
```



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Performance Considerations

- Physical Disk Size and Protection
- Depends on the IO characteristics of the workload
- LUN Layout
  - Avoid using same set of disks for different applications I/O characteristics

Configuration for I/O intensive application data

  - Follow best practices recommendations for a physical server

Storage Layout Considerations

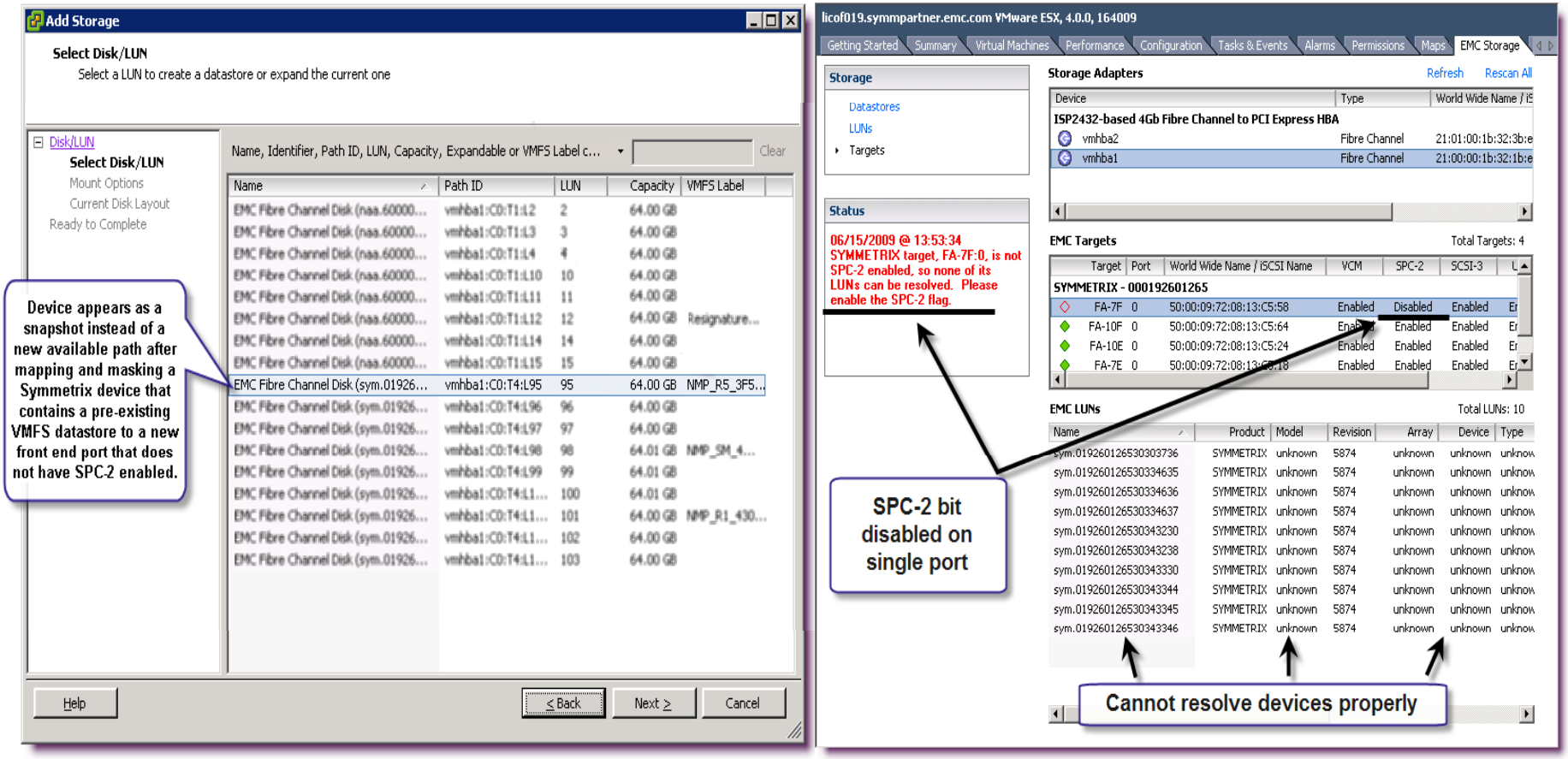
- Do not present SAN storage to ESX server farm as one large SCSI disk
- Metavolumes can be grown non-disruptively with no data loss
- Use of dynamic growth VMFS with dynamic LUN growth mitigates risk

Storage - SPC-2

Turned on per Fibre Channel port or per initiator

Do not activate in a live system if not previously set

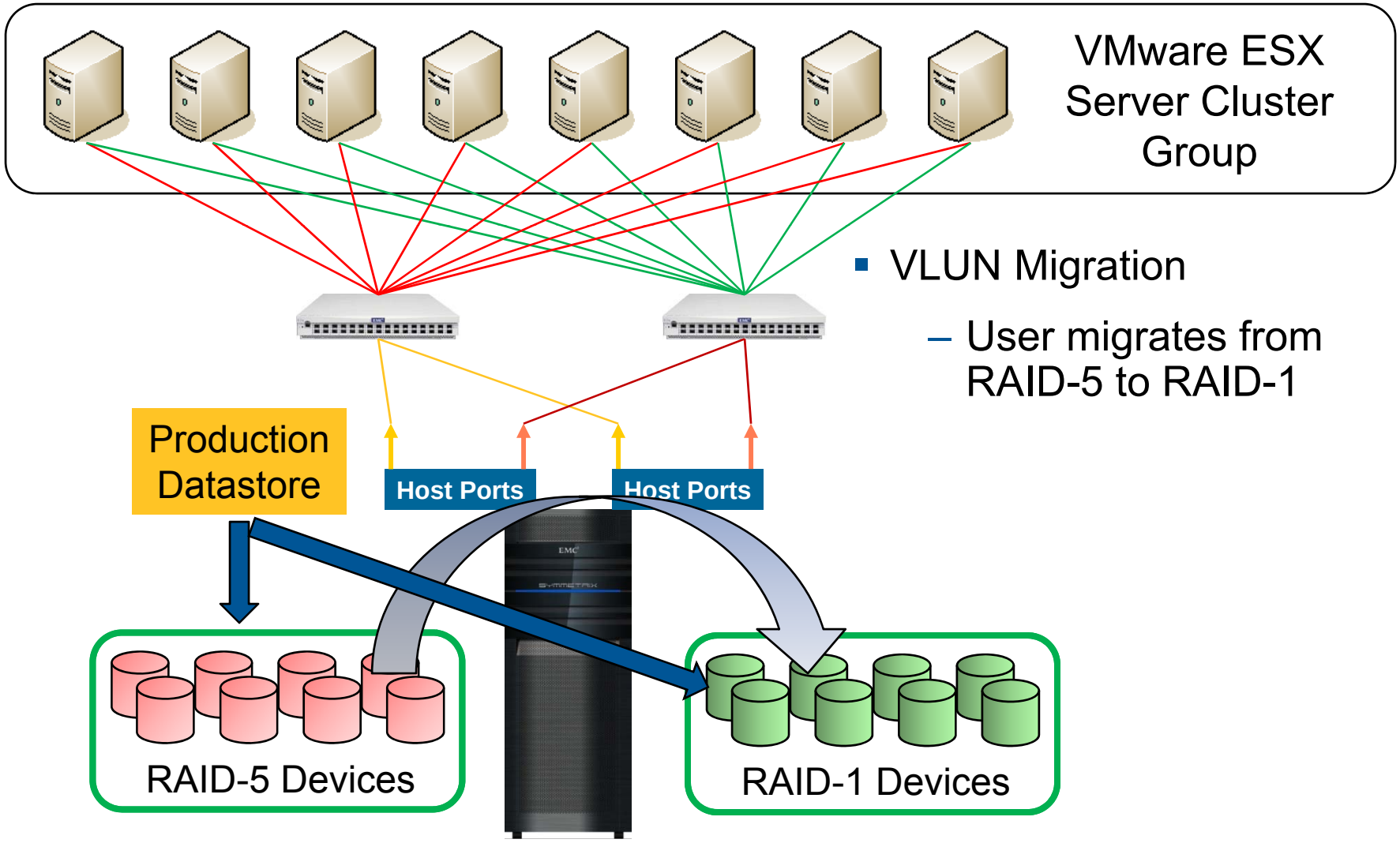
Default in 5773 (DMX-4), all V-Maxs have SPC-2 enabled



Enhanced Virtual LUN Technology

- Raid Virtual Architecture (RVA)
  - Virtualizes the RAID protection
- Value of business data changes with time
- VMs running applications accessing the data also have life cycle
- VMware clusters allow setting and changing resources for VMs
- Enhanced Virtual LUN Technology transparently migrates data in-array
- Storage vMotion can provide non-disruptive migration
  - Uses host cycles
  - Migration large amount of data can be tedious

Enhanced Virtual LUN Technology – Changing RAID Protection Type



- VLUN Migration
  - User migrates from RAID-5 to RAID-1

Auto-provisioning Groups

- Symaccess Command
- Simplifies provisioning of storage
  - Very beneficial for large VMware vSphere environment
- Can still accommodate complex configurations
  - Cascaded initiator groups
- Highly scalable

VMFS Datastore Expansion - Dynamic

Can expand the size of a VMFS – Metavolumes

Online

- Concatenated
- Striped – requires use of BCV

```
Meta Configuration       : Concatenated
Meta Device Members (4)  :
    {
    ----------------------------------------------------------------------
                             BCV  DATA                    RDF  DATA
                  ----------------------------  -------------------------
    Sym    Cap    Std Inv BCV Inv Pair          R1  Inv R2  Inv Pair
    Dev    (MB)   Tracks  Tracks  State         Tracks Tracks State
    ----------------------------------------------------------------------
--> 044D  65537       -       -  N/A               -      - N/A
    044E  65537       -       -  N/A               -      - N/A
    044F  65537       -       -  N/A               -      - N/A
    0450  65537       -       -  N/A               -      - N/A
    -------------------------------------------------------------
         262148       -       -                    -      -
    }
```

Metavolume Total Size

```
Meta Configuration       : Concatenated
Meta Device Members (6)  :
    {
    ----------------------------------------------------------------------
                             BCV  DATA                    RDF  DATA
                  ----------------------------  -------------------------
    Sym    Cap    Std Inv BCV Inv Pair          R1  Inv R2  Inv Pair
    Dev    (MB)   Tracks  Tracks  State         Tracks Tracks State
    ----------------------------------------------------------------------
--> 044D  65537       -       -  N/A               -      - N/A
    044E  65537       -       -  N/A               -      - N/A
    044F  65537       -       -  N/A               -      - N/A
    0450  65537       -       -  N/A               -      - N/A
    0451  65537       -       -  N/A               -      - N/A
    0452  65537       -       -  N/A               -      - N/A
    ----------------------------------------------------------------------
         393221                                           -
    }
```

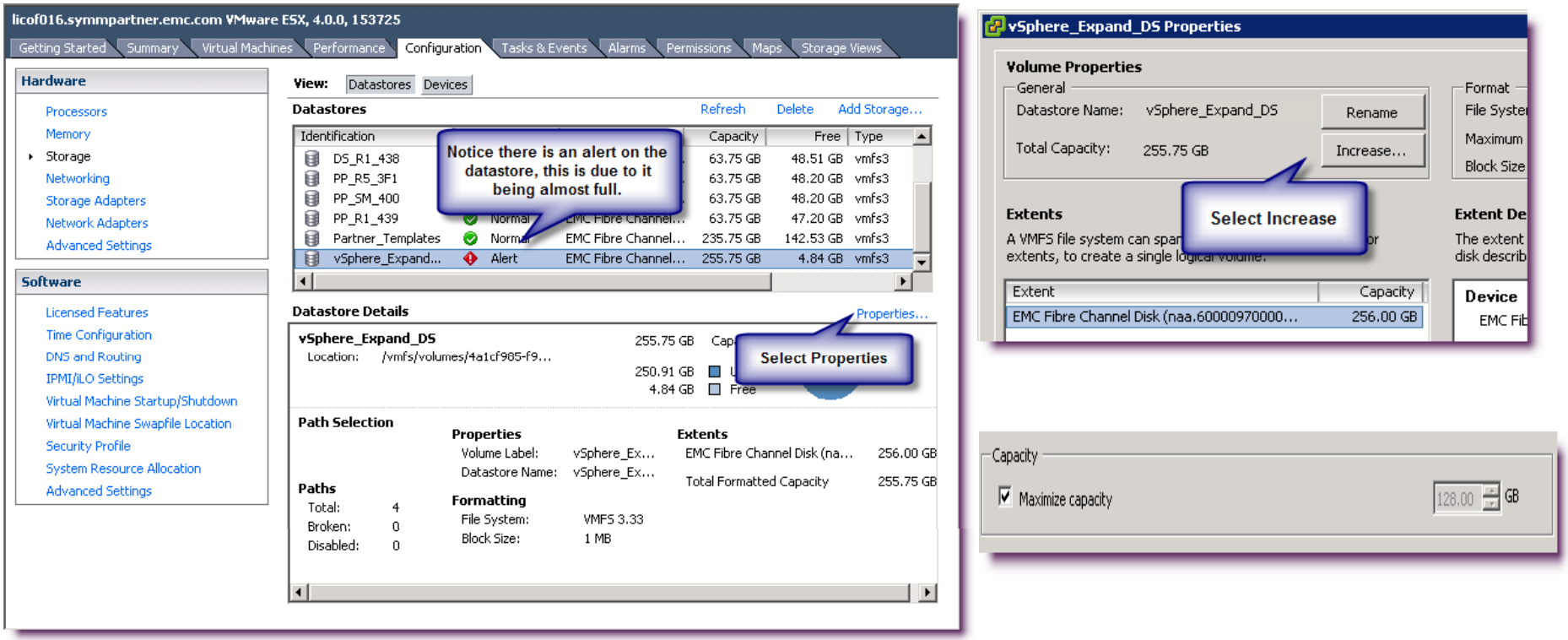
Two added members

Expanded Metavolume Total Size

Dynamic Expansion of VMFS in vSphere

Locate Datastore

Increase to total available capacity



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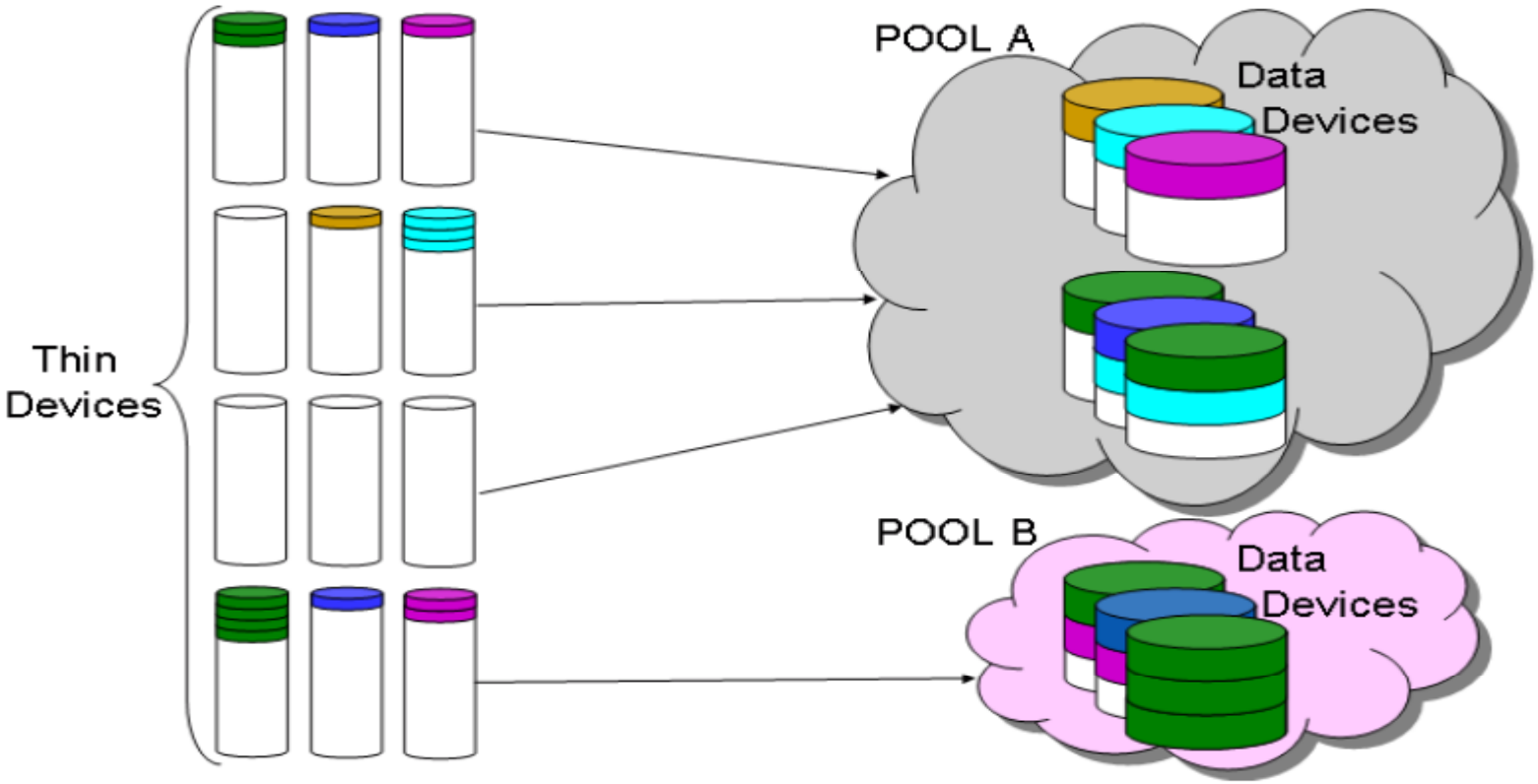
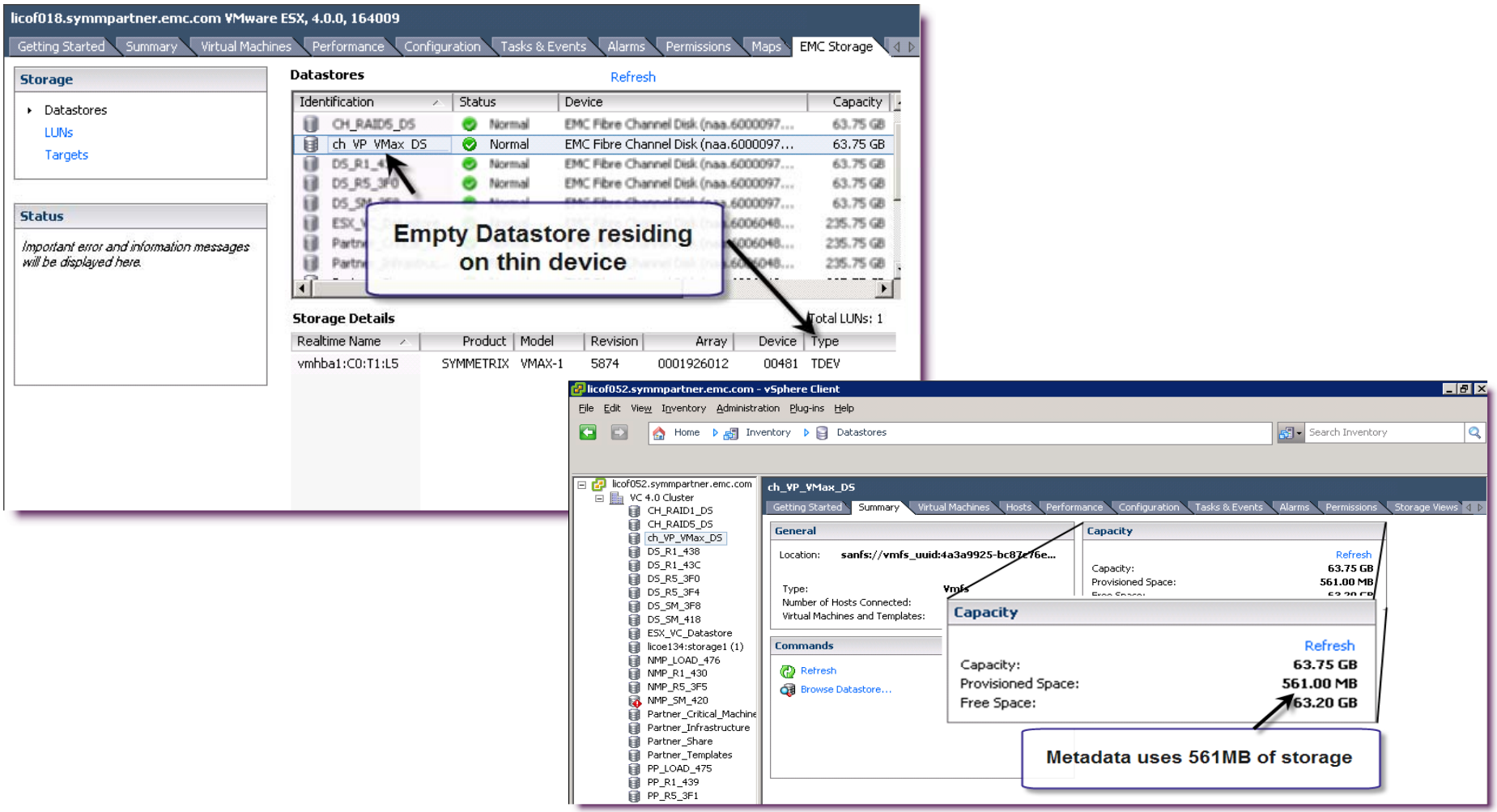
Virtual Provisioning in Symmetrix

- Data Devices and TDEVs



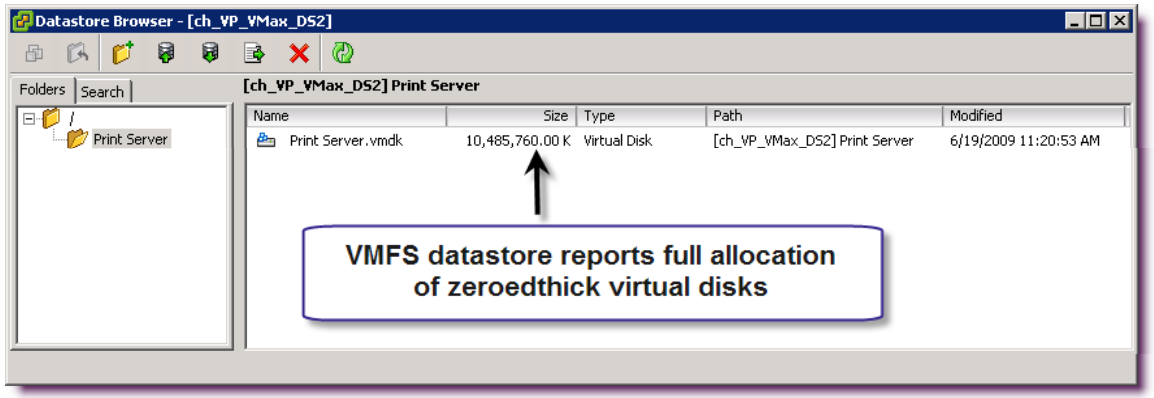
Virtual Provisioning in vSphere

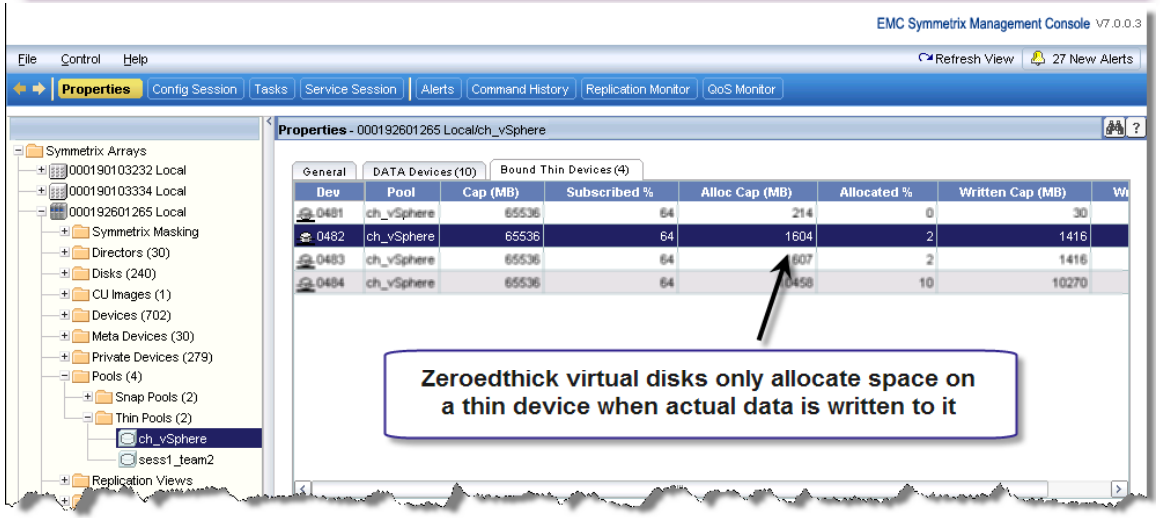
- Datastore only allocates metadata



Virtual Provisioning – VMs

- vSphere reports created size but disk space is allocated as needed in thin pool

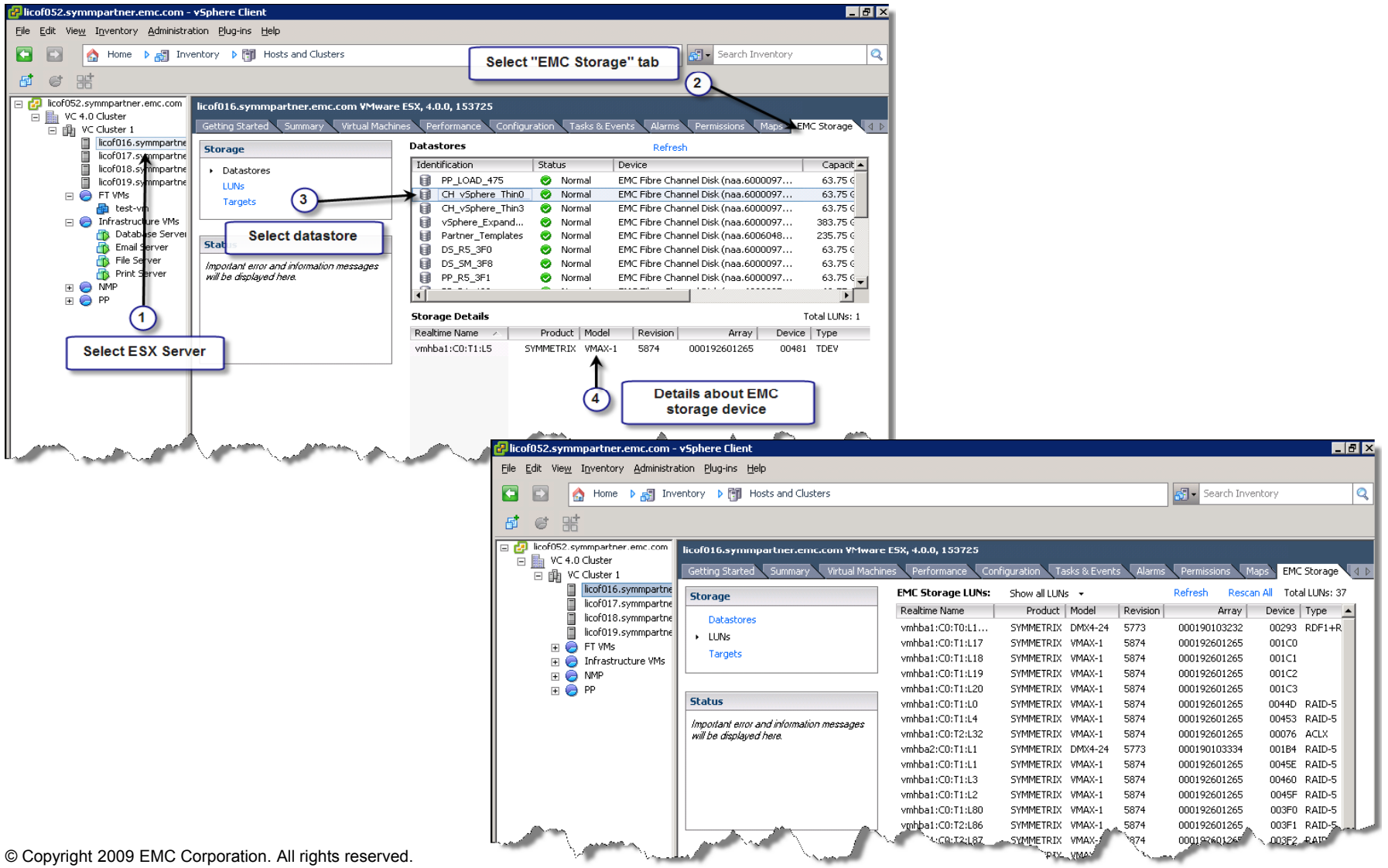




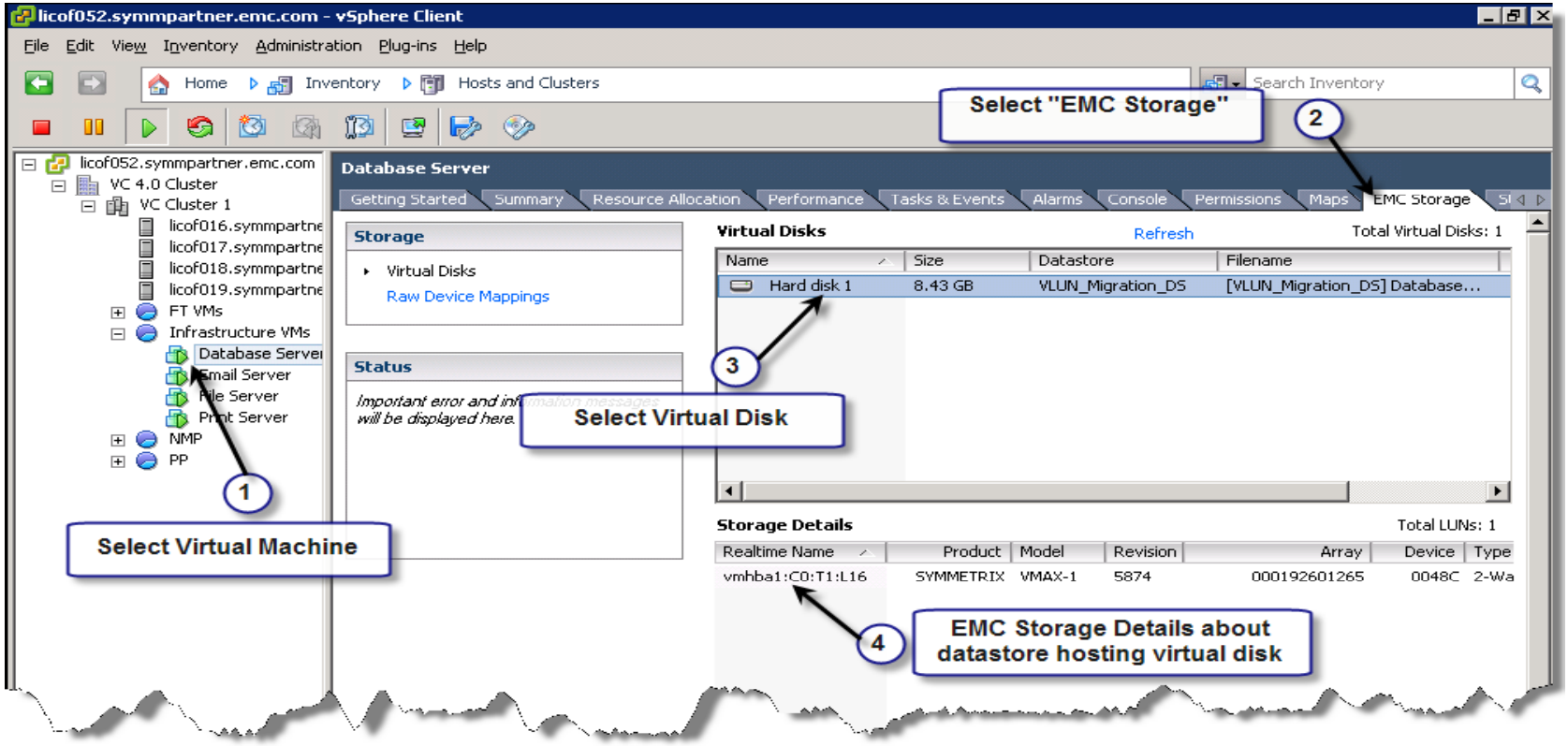
EMC Storage Viewer

- Solutions Enabler enhancements provide storage admin with CLI tools
- GUI functionality provided through EMC Storage Viewer
- .NET based VC Client side plug in
- Extends storage related information displayed in Virtual Center Client (vCenter)
  - Makes management of storage easier for server administrator
  - Facilitates communication between storage and VMware administrator
- Uses Solutions Enabler and VC

EMC Storage Viewer – ESX Server Information



EMC Storage Viewer – VM Information



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ESX Server with Array Based Replication

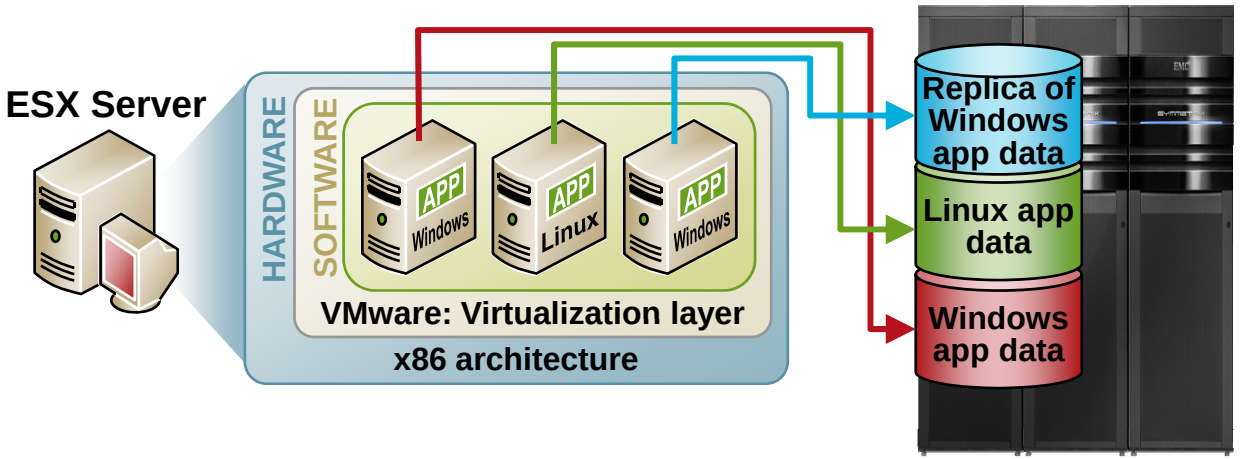
Replication products are supported with RDMs and VMFS volumes: TimeFinder Clone/Mirror/Snap, SRDF/S/A/AR

- Advanced replication modes of SRDF fully supported with VMware vSphere environments

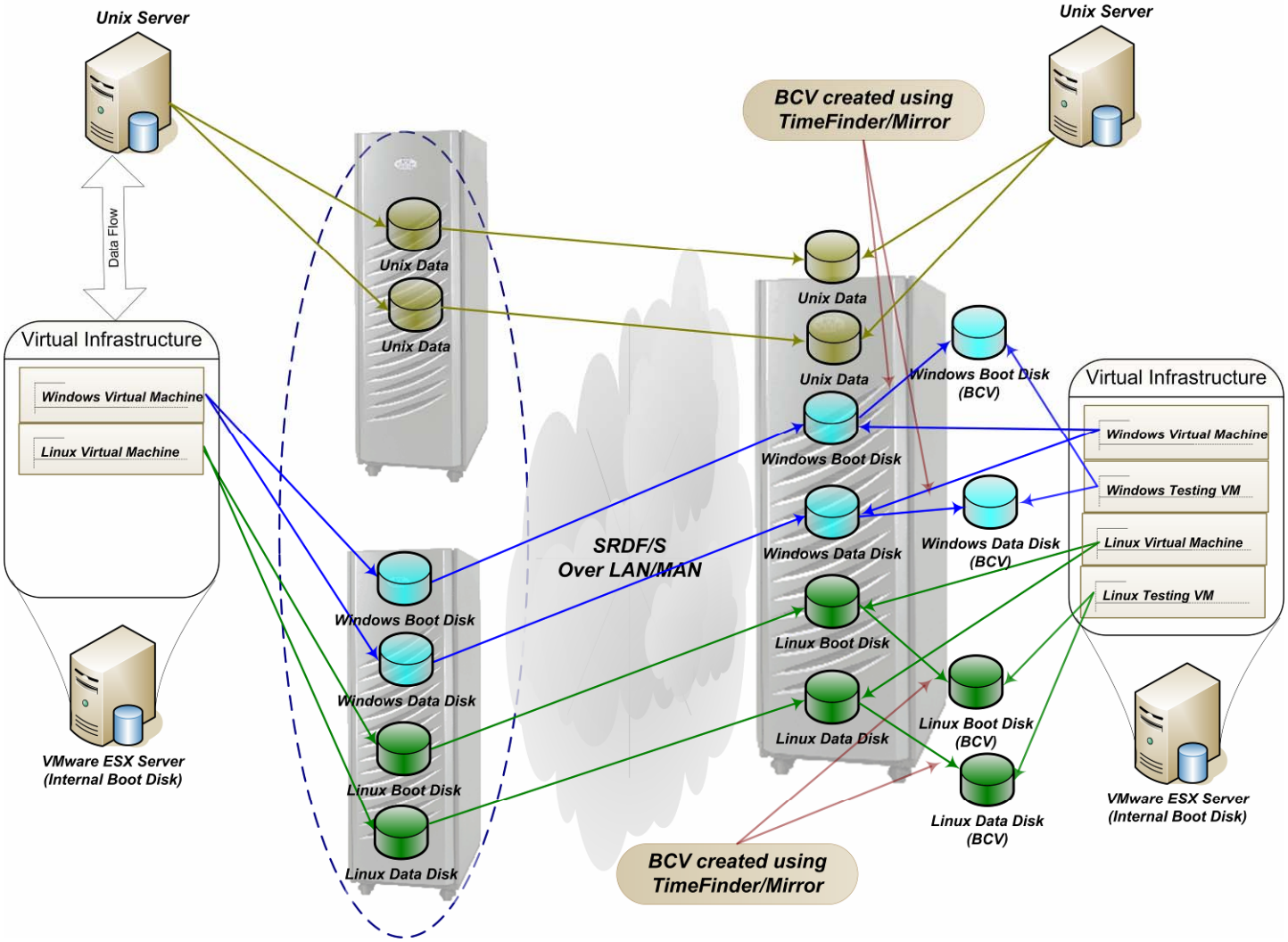
Guest operating system images, as well as the application data, can be replicated

- Replication of VM OS images – crash consistent copies for running VMs

- Testing of DR plans that include VMware vSphere data can be performed using TimeFinder



Disaster Restart Protection for Virtual Infrastructure



Considerations for Array-based replication

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General Recommendations
- Replica assigned to the same ESX server
- Replica assigned to a different ESX server

Local Incremental Replication - refresh

Remote Incremental Replication- DR

VMFS or RDM – transparent to array-based replication technologies

New Features in SRDF SRA for VMware SRM

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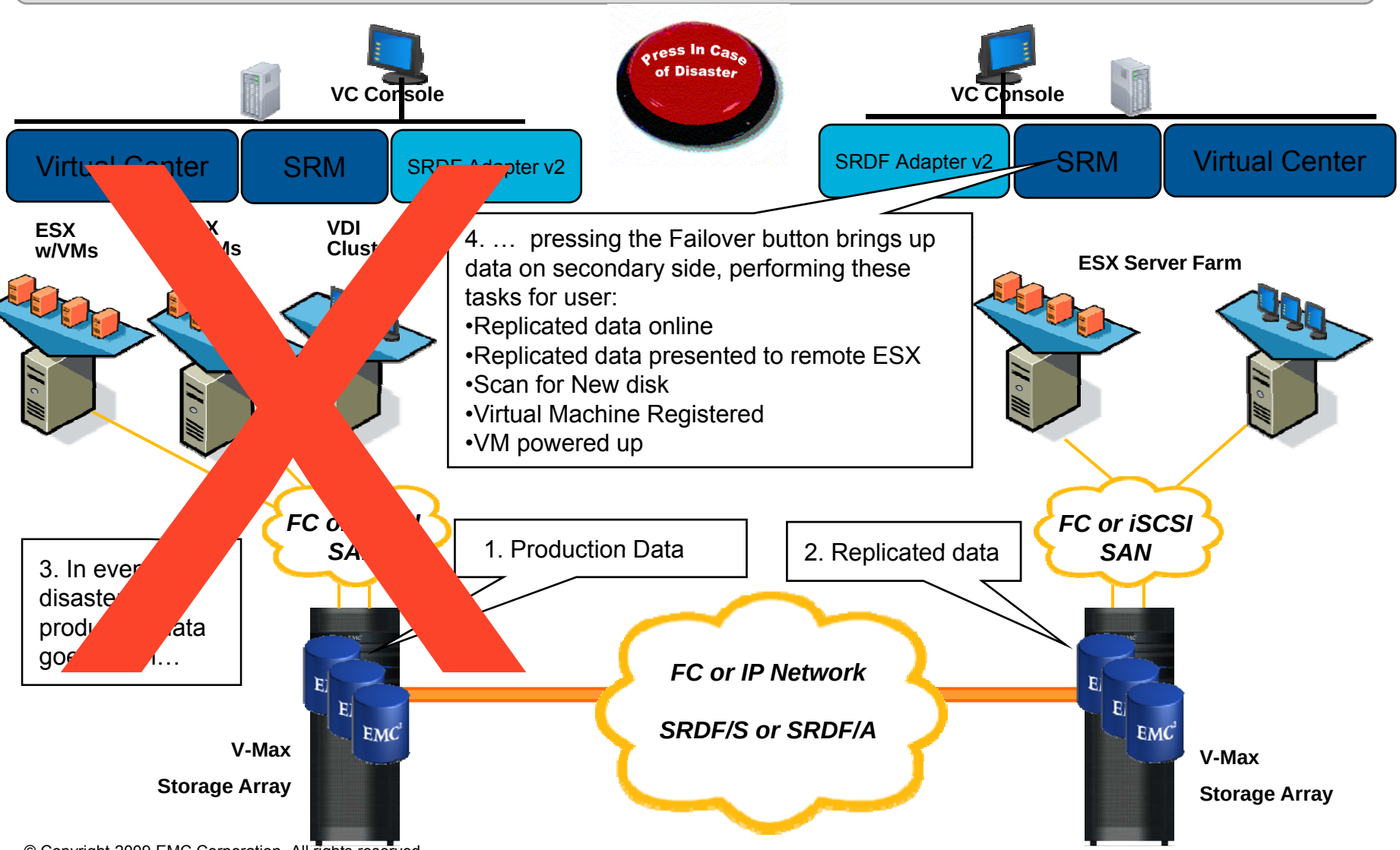
- Provides more robust installer
- New SRA simplifies configuration of the adapter
- Performance optimization
- Support for TimeFinder/Snap for testing recovery plans
  - Only supported with SRDF/S. Enginuity operating environment for Symmetrix limitation.
- Support for gold copies during failover
- Capability to disable automatic swap during failover

Symmetrix V-Max and VMware Site Recovery Manager



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Symmetrix V-Max: **http://www.emc.com/products/detail/hardware/symmetrix-v-max.htm**

Information Infrastructure for VMware: http://www.emc.com/solutions/business-need/virtualizing-information-infrastructure/integrated-infrastructure-vmware.htm

VMware Family: http://www.emc.com/products/family/vmware-family.htm

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Questions