

VIRTUALIZATION ONLINE FORUM

DISCOVER. CONNECT. **VIRTUALIZE.**

Delivering Business Continuity Solutions with VMware Virtualization

Joe Ryan
Product Marketing Manager
VMware



Agenda

Business Continuity Requirements

Minimizing Downtime in the Datacenter

Providing Effective Disaster Recovery

Summary and Next Steps

Business Continuity: The Big Picture

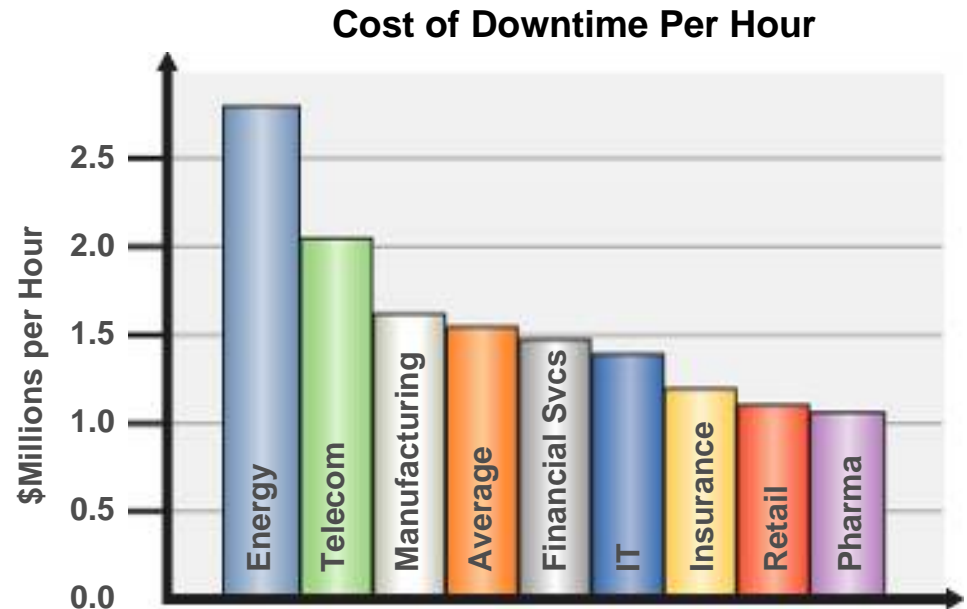
Business Continuity = Minimizing Downtime

Availability expectations continue to increase

- RTO's decreasing from >24 hours to <12 hours

Cost of downtime continues to rise

- Increasing dependence on x86 infrastructure



Source: META Group

Almost 60% of surveyed companies incurred significant financial damage as a result of systems failure in the past year

-- Economist Intelligence Unit

Requirements for Building Business Continuity Solutions

Built on a reliable platform

- Over 85% of customers using for production workloads
- No reliance on OS or arbitrary drivers

Independent of physical infrastructure

- Hardware-independent protection

Protection across operating systems and applications

- Application and OS independent protection

Protection against a broad spectrum of downtime causes

- Protection against planned and unplanned downtime
- Protection against component, server, data, and site failures

Agenda

Business Continuity Requirements

Minimizing Downtime in the Datacenter

- Protection against failures
- Eliminating planned downtime

Providing Effective Disaster Recovery

Summary and Next Steps

Transforming the Cost and Complexity of Business Continuity

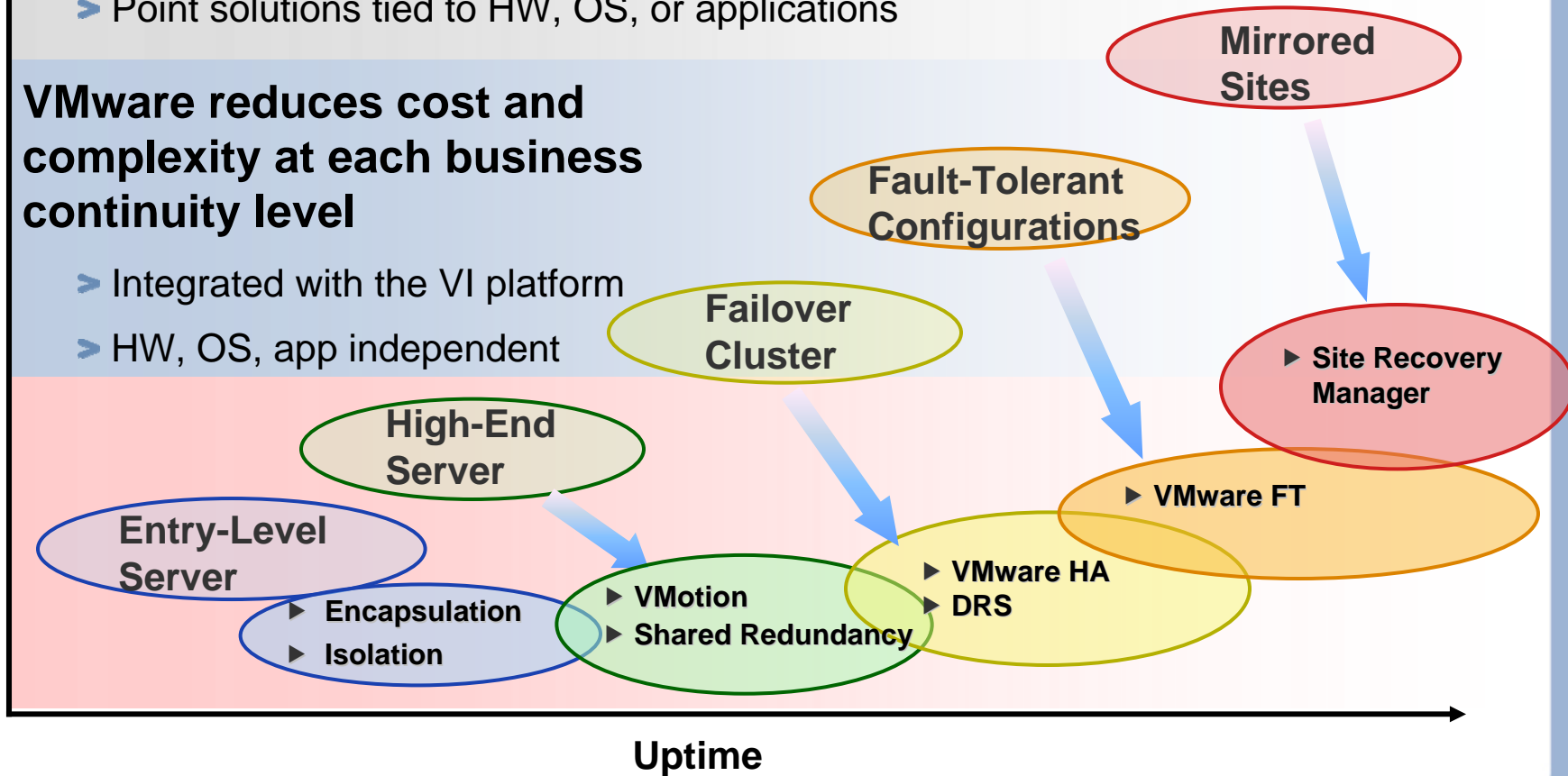
Traditional solutions are costly and complex

- ▶ Point solutions tied to HW, OS, or applications

VMware reduces cost and complexity at each business continuity level

- ▶ Integrated with the VI platform
- ▶ HW, OS, app independent

Cost



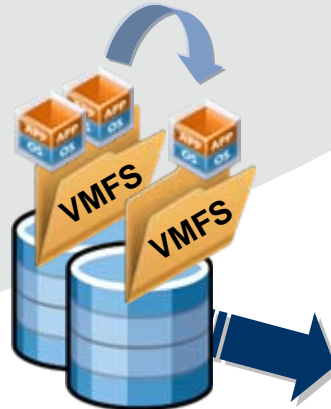
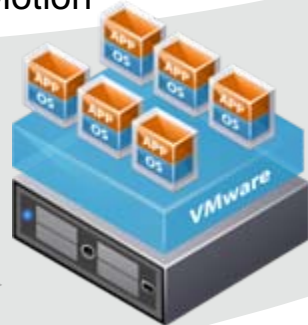
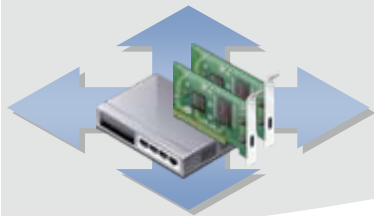
VMware Offers Protection At Every Level

- Protection against hardware failures
- Planned maintenance with zero downtime
- Protection against unplanned downtime and disasters

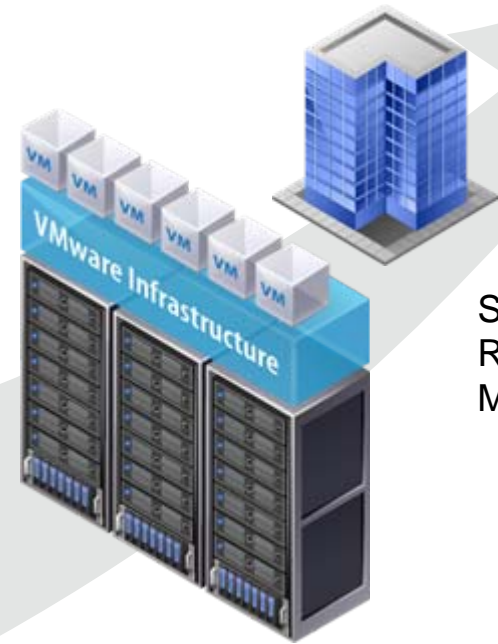
VMware Fault Tolerance,
High Availability,
DRS Maintenance Mode,
VMotion

Storage
VMotion

NIC Teaming,
Multipathing



VCB + 3rd-Party Backup
Solutions,
VMware Data Recovery



Site
Recovery
Manager

Component

Server

Storage

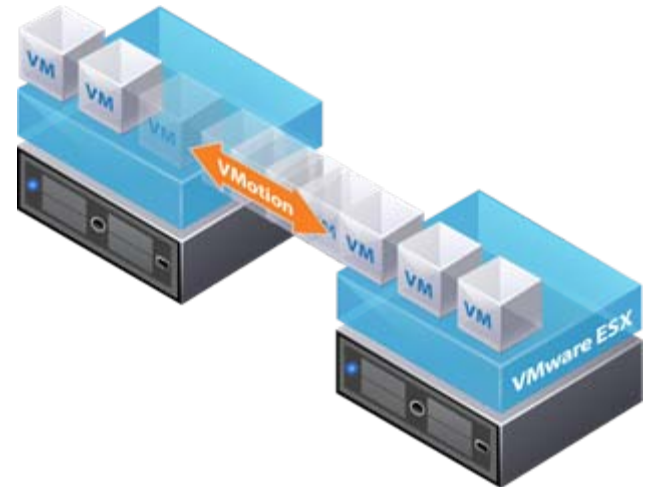
Data

Site

Protection Against Planned Downtime

Server Maintenance

- > VMotion & DRS Maintenance Mode
- > Migrate running VMs to other servers in the pool
- > Automatically distribute workloads for optimal performance



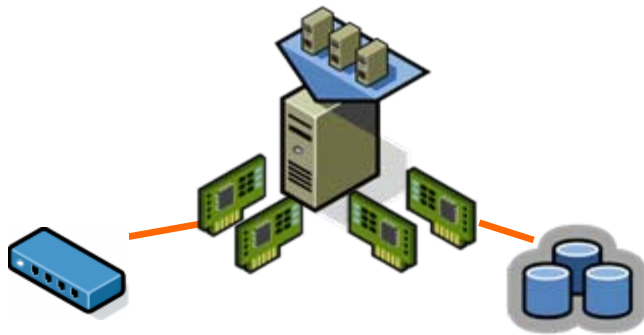
Storage Maintenance

- > Storage VMotion
- > Migrate datastores for running VMs to other storage targets

Key Benefits

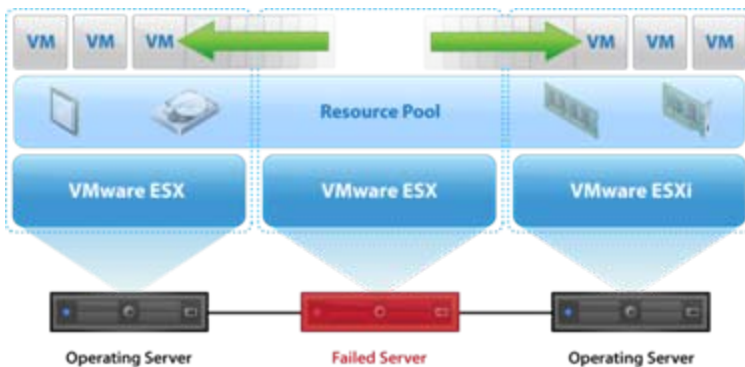
- **Eliminate downtime for common maintenance**
- No application or end user impact
- Freedom to perform maintenance whenever desired

Protection Against Unplanned Downtime



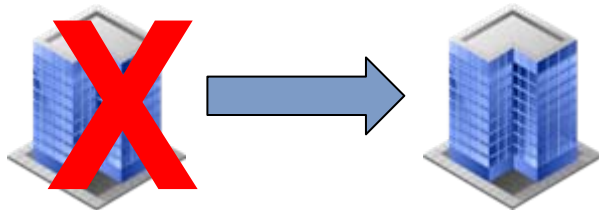
Component Failure

- Leverage redundant network and storage connections
- Share redundancy across workloads



Server Failure

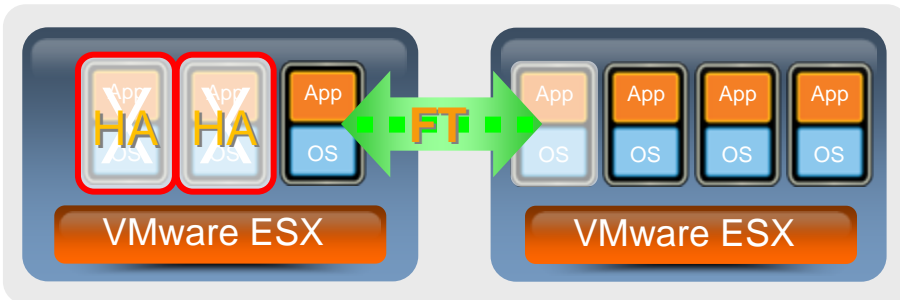
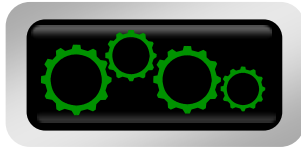
- Automatic restart of virtual machines; VMware High Availability automatically restarts VMs on other servers in the pool
- Continuous protection with VMware Fault Tolerance



Site Failure

- Automated failover with Site Recovery Manager

VMware Fault Tolerance – *New* in vSphere 4!



- > Single identical VMs running in lockstep on separate hosts
- > **Zero downtime, zero data loss** failover for all virtual machines in case of hardware failures
- > Integrated with VMware HA/DRS

- > No complex clustering or specialized hardware required
- > Single common mechanism for all applications and operating systems

Agenda

Business Continuity Requirements

Minimizing Downtime in the Datacenter

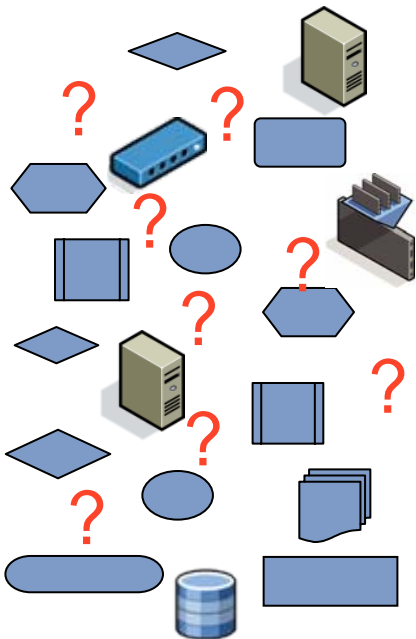
Providing Effective Disaster Recovery

- Disaster Recovery Challenges and Requirements
- Using VMware Products to Build Disaster Recovery Solutions

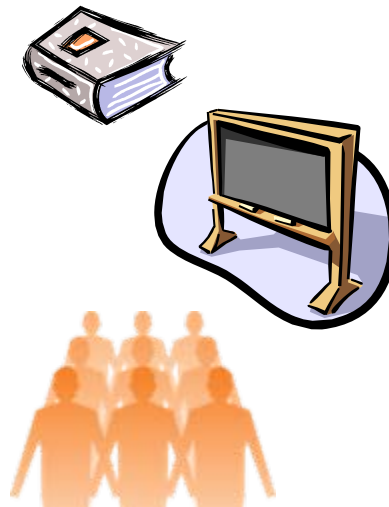
Summary and Next Steps

Challenges of Traditional Disaster Recovery

Complex recovery processes and infrastructure



Dependent on perfect training, documentation, and execution



Failure to meet recovery requirements

- > Recovery takes days to weeks
- > Recovery tests often fail
- > Significant IT time and resources consumed

Disaster Recovery Risk

Drivers of risk

- New applications or changing app/infrastructure configuration
- Gap between current configuration and last revision of the DR plan
- Human error and manual steps during DR testing & failover
- Availability of key DR staff
- Lengthy recovery time
- Increasing complexity of managing the DR solution

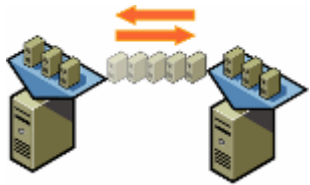
Associated costs

- Lost business & productivity for each hour of downtime
- (Unpredictable) staff overtime
- Application end-users disrupted by testing & outages; inability to meet SLAs

DR Risk Mitigation

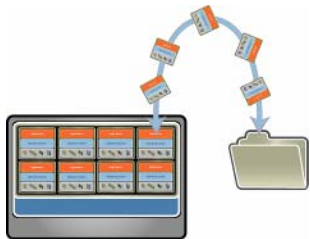
- **Frequent testing** to ensure DR plan correct & successful
- **Automation** to minimize mistakes and speed up recovery time
- Tight **integration** between infrastructure management and DR solution
- **Multiple layers of downtime protection** at all levels of the datacenter

Key Features of Virtualization for Disaster Recovery



Hardware-Independence

- Reliably recover a virtual machine to any hardware
- Enable waterfalling of equipment to recovery site



Encapsulation

- All information about a system is stored as data on disk
- Entire systems can be protected with data protection tools



Partitioning and Consolidation

- Reduced hardware requirements at production and DR site
- Can use higher consolidation ratios at DR site

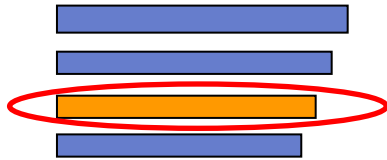


Resource Pooling

- Transparently share and allocate hardware resources
- Automatic resource optimization

VMware for Disaster Recovery

Customers



55% of customers using virtualization for BC/DR

(#1 reason for virtualization behind consolidation/resource utilization)

Press



VMware Site Recovery Manager

2008 Gold Award for Backup and Disaster Recovery Software and Services (Storage Magazine)



VMware Infrastructure

“Best Disaster Recovery Product of 2006” (TechTarget)

“Using VMware Infrastructure in our disaster recovery plans, we’ve been able to reduce the time it takes to recover our critical systems by 50 percent.”

-- Ted Duncan, Education Datacenter, Florida Department of Education

Building Better Disaster Recovery Solutions



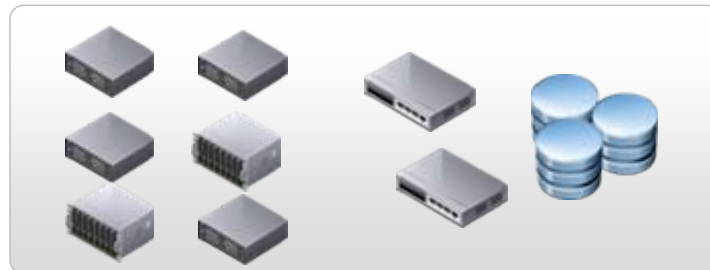
Management

- > **Simplify and automate** implementation, testing, and execution of recovery process



Data

- > **Provide full protection** of configuration, OS, and application data



Infrastructure

- > **Reduce cost and complexity** of providing infrastructure necessary to ensure successful recovery

Reduce Cost and Complexity of Recovery Infrastructure

Eliminate hardware dependencies

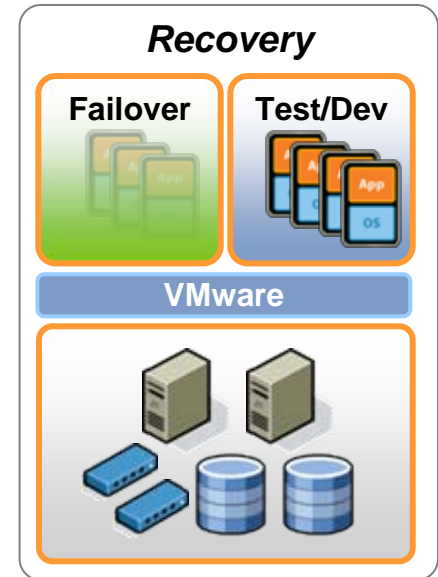
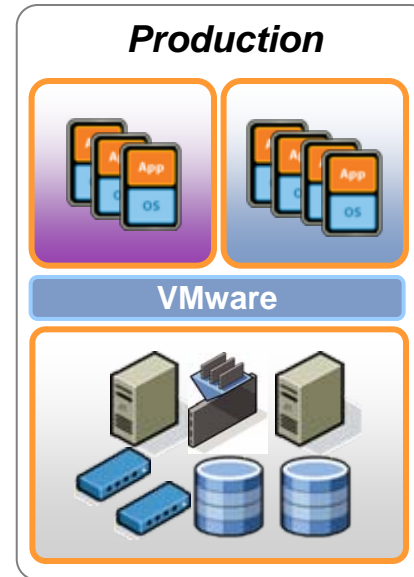
- Reduce risk of failures during recovery
- Reduce ongoing management burden

Reduce infrastructure requirements

- Consolidate production and recovery
- Reuse servers from production for recovery

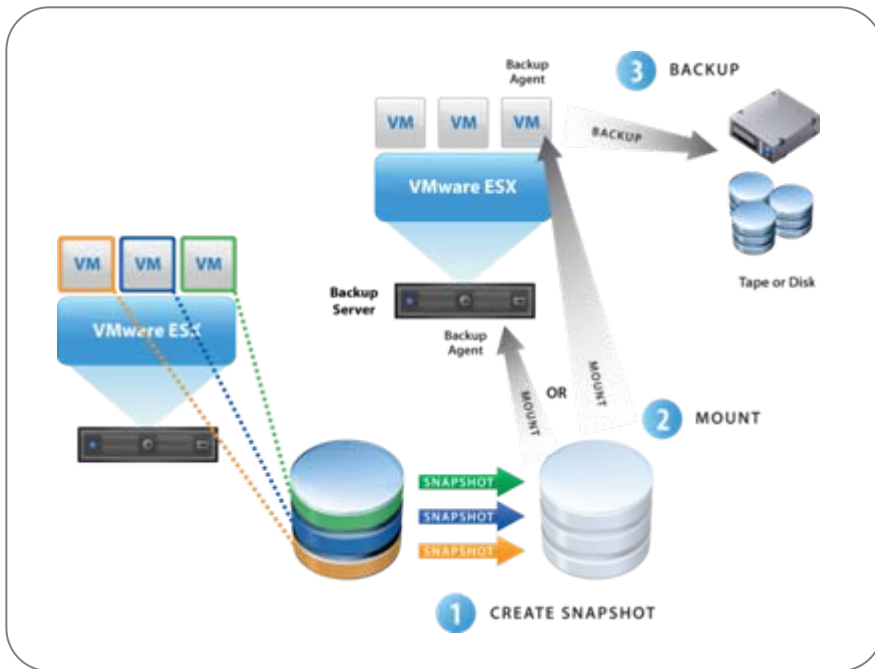
Turn recovery site into productive resource

- Leverage recovery site for other workloads
- Resource guarantees ensure predictable resource allocation



Improving Data Protection

VMware enables scalable, non-disruptive backup and simple, reliable restore to any hardware



Traditional backup

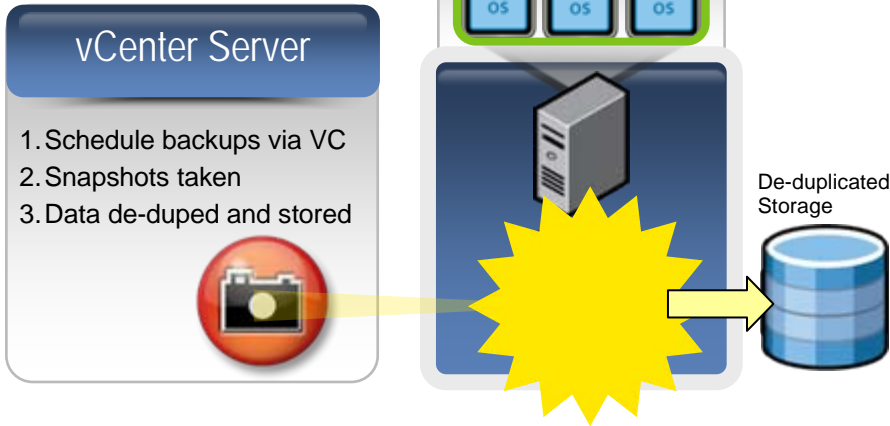
- Disruptive to applications and users
- Slow, complex process for full restore

Backup with VMware vSphere

- Non-disruptive to applications & users
- Enables off-host backup with standard backup software
- Enables image and file-level backup of virtual machines

VMware Data Recovery – *New* in vSphere 4!

1. Backup



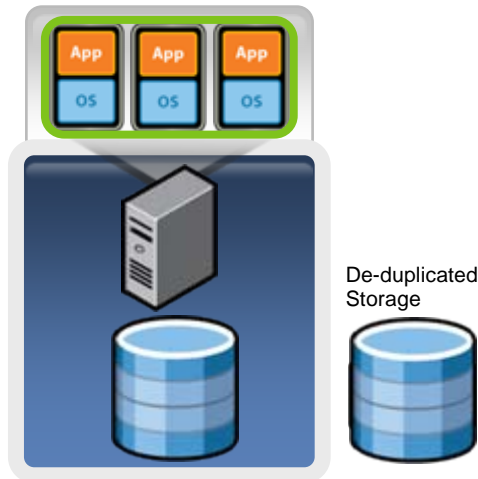
- > Agent-less, disk-based backup and recovery of your VMs
- > VM or file level restore
- > Incremental backups and data de-dupe to save disk space

VMware Data Recovery – *New* in vSphere 4!

1. Backup

vCenter Server

1. Schedule backups via VC
2. Snapshots taken
3. Data de-duped and stored

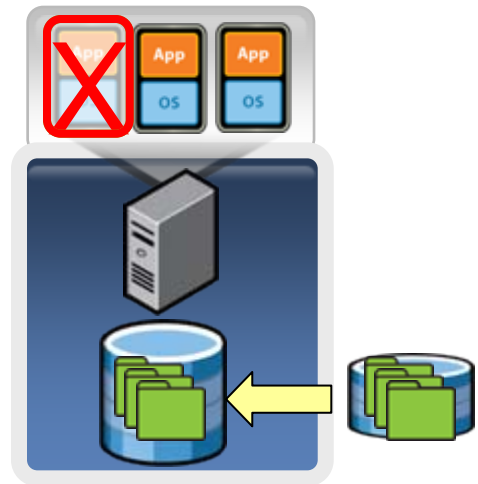


- > Agent-less, disk-based backup and recovery of your VMs
- > VM or file level restore
- > Incremental backups and data de-dupe to save disk space

2. Restore

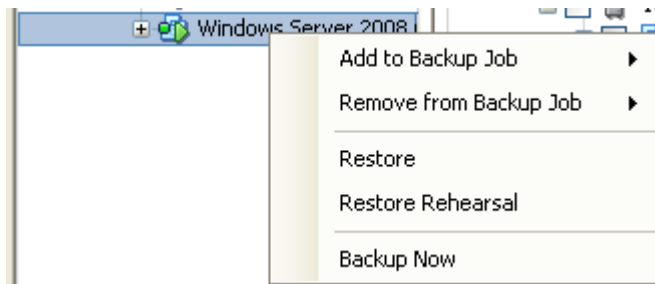
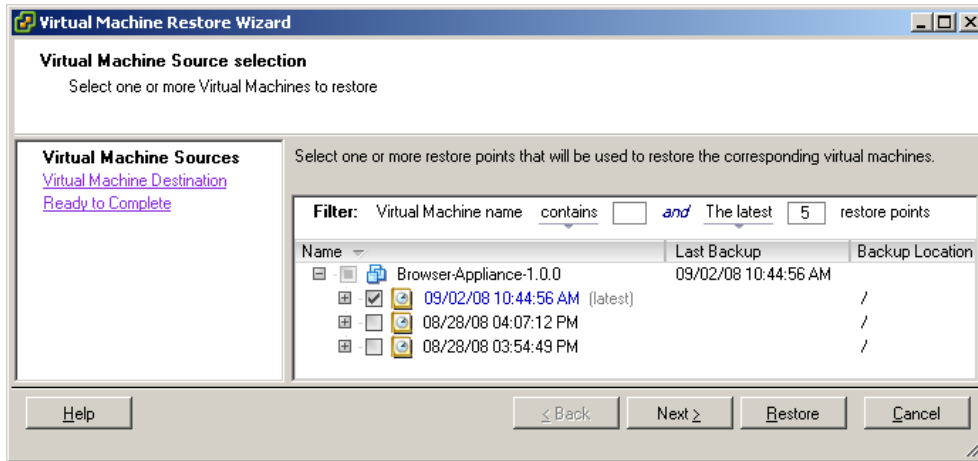
vCenter Server

1. VM goes down
2. Select VM images/files to recover
3. Restore...VM running in seconds



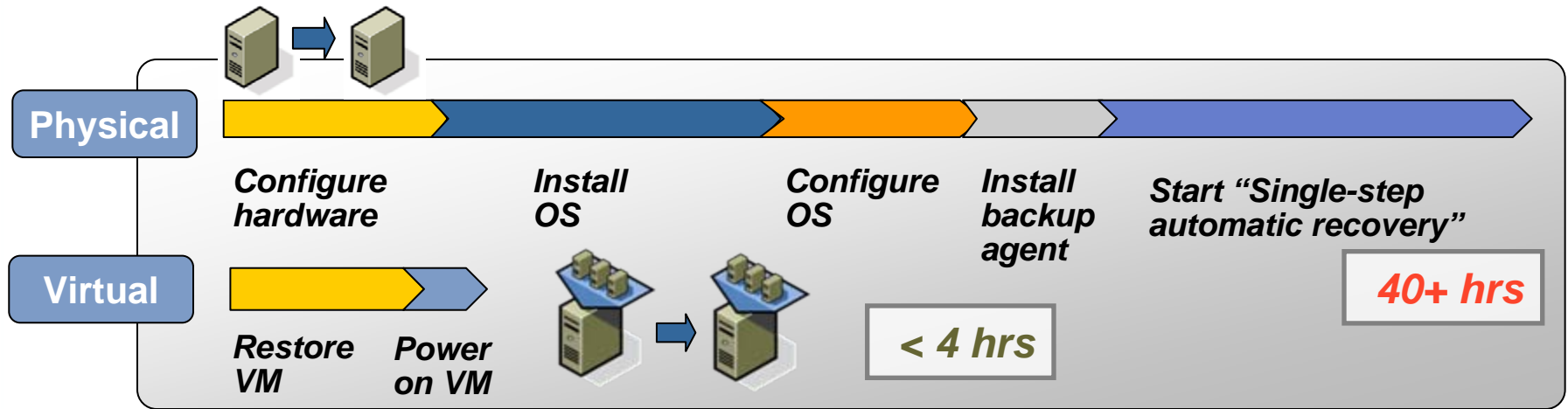
- > Quick, simple and complete data protection for your VMs
- > Centralized Management through VMware Infrastructure client
- > Cost-effective use of storage for backup data

Improved Recovery with Data Recovery



- > **Backups and restores can run simultaneously**
- > **Highly customizable image level restore**
 - Replace a lost VM
 - Restore to a different location/datastore
 - Select disks to restore
- > **Fast “roll back”:**
 - Use change tracking to roll back a virtual disk/Virtual Machine to an earlier state
 - Only transfers modified blocks for fast restore
- > **Restore Rehearsal:**
 - Run a restore of a VM to a different datastore and disable networking

Simplifying the Disaster Recovery Process



Eliminate recovery steps

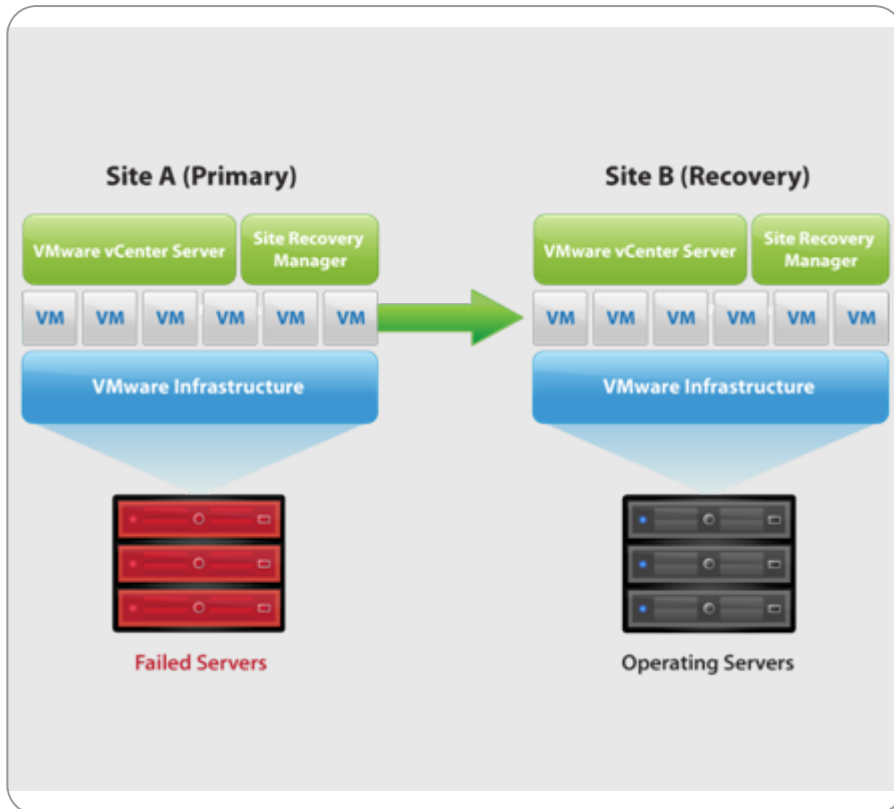
- No operating system re-install or bare-metal recovery
- No time spent reconfiguring hardware

Standardize recovery process

- Consistent process independent of operating system and hardware

VMware vCenter Site Recovery Manager

Site Recovery Manager leverages VMware Infrastructure to deliver advanced disaster recovery management and automation



- > **Simplifies and automates disaster recovery workflows:**
 - Setup, testing, failover
- > **Turns manual recovery runbooks into automated recovery plans**
- > **Provides central management of recovery plans from the VMware Infrastructure Client**

Works with VMware Infrastructure to make disaster recovery **rapid, reliable, manageable, affordable**

Site Recovery Manager Key Components

Site Recovery Manager

- > Manages and monitors recovery plans
- > Tightly integrated with vCenter Server

VMware Infrastructure

- > Builds on top of VMware ESX and vCenter Server platform

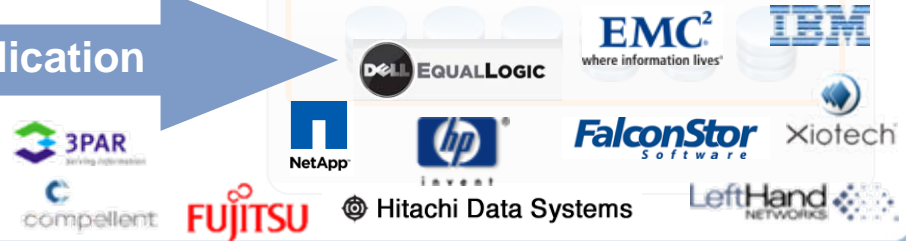
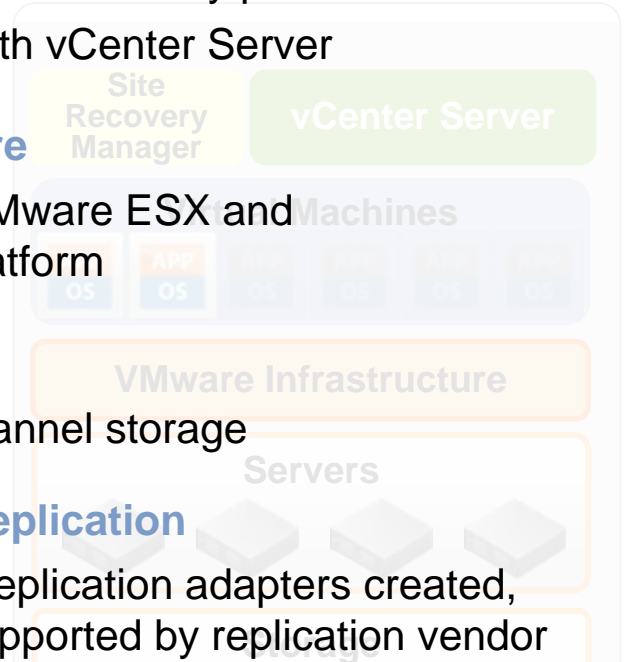
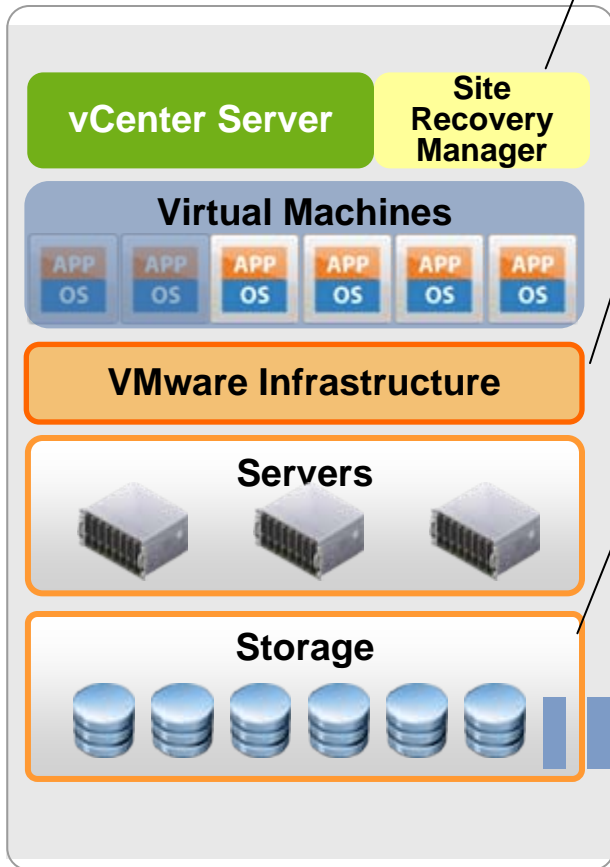
Storage

- > iSCSI or FibreChannel storage

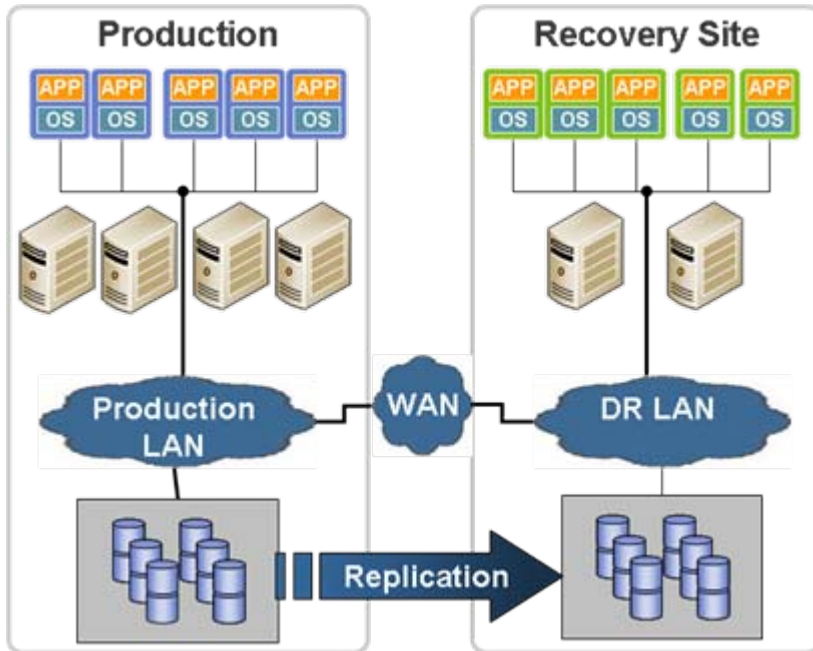
Storage Partner Replication

- > Integrated via replication adapters created, certified and supported by replication vendor

Partner Replication



Disaster Recovery Setup



Integrate with replication

- Identify which virtual machines are protected by replication configuration

Map recovery resources

- Server resources, network resources, management objects

Create recovery plans

- For virtual machines, applications, business units
- Convert manual runbook to pre-programmed response
- Customizable with scripting and callouts

- *Simplify configuration of recovery infrastructure and process*
- *Simplify coordination of replication with virtual environment*

Site Recovery Manager: User Interface

dr-vc-vim22.eng.vmware.com - VMware Infrastructure Client

File Edit View Inventory Administration Plugins Help

Inventory Scheduled Tasks Events Administration Maps Consolidation Site Recovery

Site Recovery

- Protection Groups
- Protection Group 1
- Recovery Plans

vim22

Summary Alarms Permissions

Local Site		Paired Site	
VC Server:	dr-vc-vim22.eng.vmware.com:443	VC Server:	dr-vc-vim23.eng.vmware.com:443
SRM Server:	10.17.195.234:8095	SRM Server:	10.17.195.235:8095
Site Name:	vim22	Site Name:	vim23

Protection Setup

Use the steps below to configure protection for this site.

Connection:	Connected	Configure Break
Array Managers:	Configured	Configure
Inventory Mappings:	Configured	Configure
Protection Groups:	1	Create

Recovery Setup

Create recovery plans for protection groups on the paired site.

Recovery Plans:	No Plans Created	Create
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Managed through vCenter plug-in

Key configuration steps

Site Recovery Manager: Creating and Editing Recovery Plans

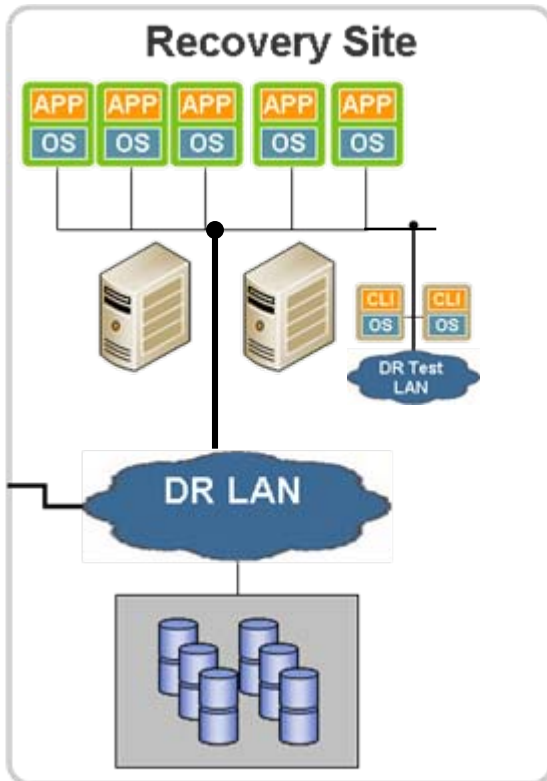
The screenshot displays the VMware Site Recovery Manager interface. On the left, a tree view shows the hierarchy: Site Recovery > Protection Groups > Recovery Plans. Three recovery plans are listed: Recovery Plan 1, Recovery Plan 2, and Recovery Plan 3 - Complete Site Failover. A context menu is open over the third plan, with options: Edit Recovery Plan, Remove Recovery Plan, and Add Permission... An orange box labeled "Recovery plans for failure scenarios" points to this list.

The main pane shows the "Recovery Plan 3 - Complete Site Failover" editor. It has tabs for Summary, Virtual Machines, Recovery Steps, History, and Permissions. The "Recovery Steps" tab is active, showing a list of 10 steps:

1. Shutdown Protected Virtual Machines at Protected Site "vim22"
2. Prepare Storage
3. Suspend Non-critical Virtual Machines
4. Recover High Priority Virtual Machines
5. Recover Normal Priority Virtual Machines
6. Recover Low Priority Virtual Machines
7. Recover No Power On Virtual Machines
8. Message: Test recovery complete. Please verify the success of the...
9. Cleanup Virtual Machines Post Test
10. Resume Non-critical Virtual Machines

An orange box labeled "Recovery plan editor" points to the top of this pane.

Testing



Replication Management

- Snapshot replicated LUNs before test
- Delete snapshots of replicated LUNs after test

Network Management

- Change all virtual machines to a test port group before powering them on

Customization/extensibility

- Same breakpoints and callouts as failover sequence
- Extra breakpoints and callouts around the test bubble

- *Non-disruptive testing of recovery plans*
- *Testing can incorporate existing/non-virtual DR tools and processes*

Testing and Executing Recovery Plans

Steps in recovery plan

Status and time stamps

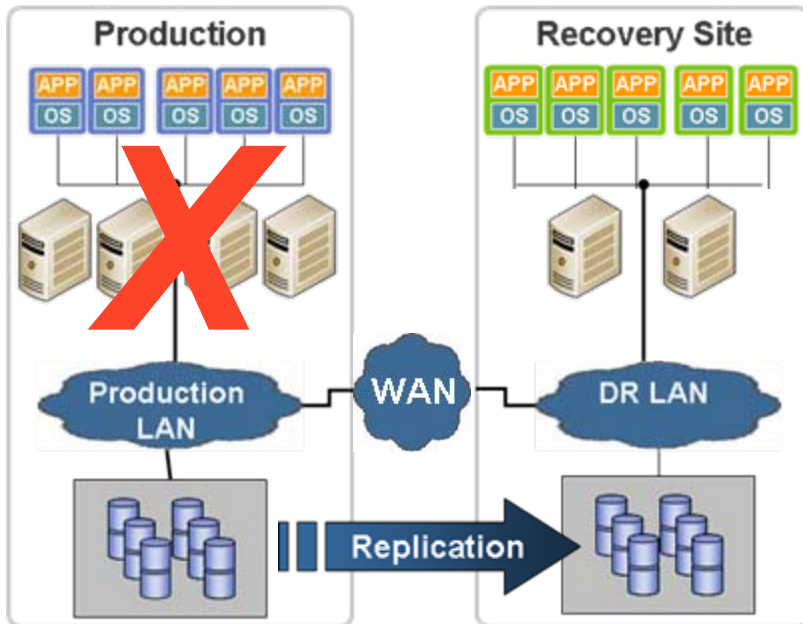
Recovery Step	Status	Task Started	Task Completed	Mode
1. Shutdown Protected Virtual Machines at Protected Site "vm22"				Recovery only
1. Shutdown Low Priority Protected Virtual Machines				Recovery only
2. Shutdown Normal Priority Protected Virtual Machines				Recovery only
3. Shutdown High Priority Protected Virtual Machines				Recovery only
1. Shutdown Primary Site VM "app_vm12"				Recovery only
2. Prepare Storage	Success	4/4/2008 3:11:11 PM	4/4/2008 3:28:15 PM	
1. Attach Disks for Protection Group "Protection Group 2"	Success	4/4/2008 3:11:11 PM	4/4/2008 3:28:15 PM	
3. Suspend Non-critical Virtual Machines	Success	4/4/2008 3:28:15 PM	4/4/2008 3:28:15 PM	
4. Recover High Priority Virtual Machines	Error: Failed to connect NFC service.	4/4/2008 3:28:15 PM	4/4/2008 3:35:10 PM	
1. Recover VM "app_vm12"	Error: Failed to connect NFC service.	4/4/2008 3:28:17 PM	4/4/2008 3:35:10 PM	
5. Recover Normal Priority Virtual Machines	Success	4/4/2008 3:35:10 PM	4/4/2008 3:40:28 PM	
1. Recover VM "app_vm7"	Success	4/4/2008 3:35:19 PM	4/4/2008 3:36:26 PM	
2. Recover VM "app_vm8"	Success	4/4/2008 3:36:26 PM	4/4/2008 3:37:28 PM	
3. Recover VM "app_vm9"	Success	4/4/2008 3:37:28 PM	4/4/2008 3:38:26 PM	
4. Recover VM "app_vm10"	Success	4/4/2008 3:38:26 PM	4/4/2008 3:39:27 PM	
5. Recover VM "app_vm11"	Success	4/4/2008 3:39:27 PM	4/4/2008 3:40:28 PM	
6. Recover Low Priority Virtual Machines	Success	4/4/2008 3:40:28 PM	4/4/2008 3:40:28 PM	
7. Recover No Power On Virtual Machines	Success	4/4/2008 3:40:28 PM	4/4/2008 3:40:28 PM	
8. Message: Test recovery complete. Please verify the success of the...	Waiting for Input	4/4/2008 3:40:28 PM	0%	Test only
9. Cleanup Virtual Machines Post Test				Test only
10. Resume Non-critical Virtual Machines				Test only
11. Reset Storage Post Test				Test only
1. Reset Disks for Protection Group "Protection Group 2"				Test only

When to execute

User confirmation message

Continue Message:
Test recovery complete. Please verify the success of the test. When done, click Continue to clean up the test and return to a ready state.

Failover Automation



Detect site failures

- Raise alert when heartbeat lost

Initiate failover

- User confirmation of outage
- Granular failover initiation

Manage replication failover

- Break replication
- Make replica visible to recovery hosts

Execute recovery process

- Use pre-programmed plan
- Provide visibility into progress

- *Automation for failover (and failback) process*
- *Real-time, step-by-step visibility into execution progress*

Failover Initiation

The screenshot displays the VMware Infrastructure Client interface. The top menu bar includes File, Edit, View, Inventory, Administration, Plugins, and Help. Below the menu is a toolbar with icons for Inventory, Scheduled Tasks, Events, Administration, Maps, Consolidation, and Site Recovery. A secondary toolbar contains control buttons: Test, Pause, Resume, Stop, and Run. The 'Run' button is highlighted with a red box. The left-hand pane shows a tree view under 'Site Recovery' with 'Recovery Plans' expanded, listing 'Recovery Plan 1 - Protection Group 1', 'Recovery Plan 2 - Protection Group 2' (selected), and 'Recovery Plan 3 - Complete Site Failover'. The right-hand pane shows the details for 'Recovery Plan 2 - Protection Group 2', with tabs for Summary, Virtual Machines, Recovery Steps, History, and Permissions. The 'Recovery Steps' tab is active and highlighted with a red box. Below the tabs, the 'General' section shows the name 'Recovery Plan 2 - Protection Gro...' and description 'Partial failover for app_vm7 to a...'. The 'Commands' section lists several actions: Edit Recovery Plan, Test Recovery Plan, Execute Recovery Plan (highlighted with a red box), and Delete Recovery Plan. A red-bordered text box in the lower-left area provides instructions on how to initiate the failover.

From the VI Client in the recovery site expand Recovery Plans in the left hand pane and select the recovery plan to execute the failover against. The failover can be started by either clicking on the 'Run' button that is highlighted above or by clicking on the 'Execute Recovery Plan' link under the Commands section

Simplified Compliance

Self-documenting recovery plans

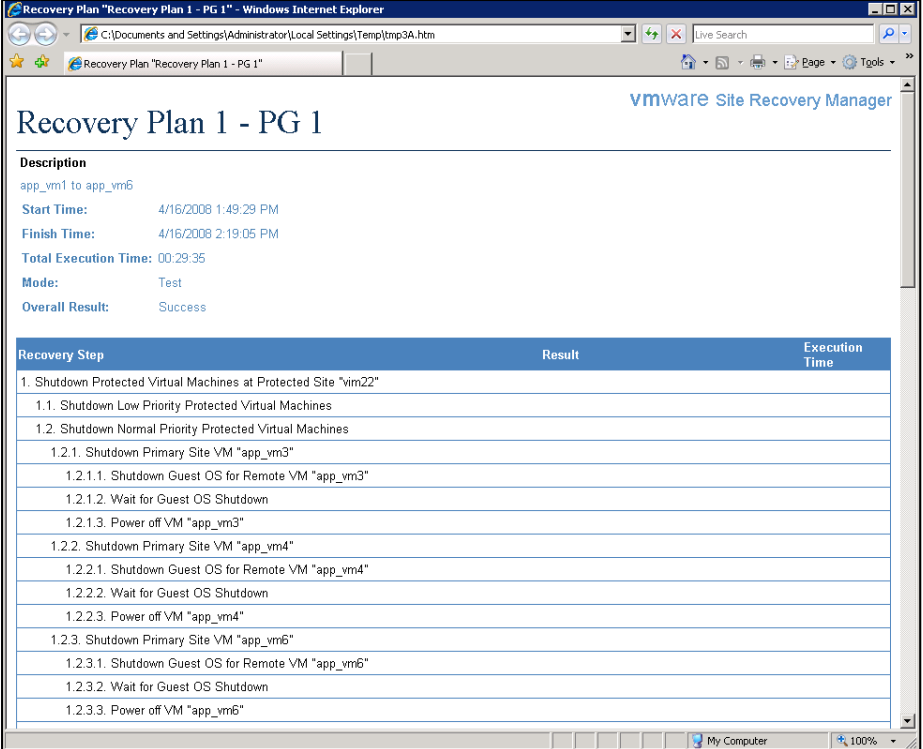
- Centrally managed
- Always current

Easier testing

- Ensure recoverability with realistic testing

Auditable testing and failover

- View and export recovery plans, tests, execution



The screenshot shows a web browser window displaying the VMware Site Recovery Manager interface. The page title is "Recovery Plan 1 - PG 1". The main content area shows a "Description" section with the following details:

- app_vm1 to app_vm6
- Start Time: 4/16/2008 1:49:29 PM
- Finish Time: 4/16/2008 2:19:05 PM
- Total Execution Time: 00:29:35
- Mode: Test
- Overall Result: Success

Below the description is a table with three columns: "Recovery Step", "Result", and "Execution Time". The table contains a list of steps for shutting down protected virtual machines at a protected site named "vim22".

Recovery Step	Result	Execution Time
1. Shutdown Protected Virtual Machines at Protected Site "vim22"		
1.1. Shutdown Low Priority Protected Virtual Machines		
1.2. Shutdown Normal Priority Protected Virtual Machines		
1.2.1. Shutdown Primary Site VM "app_vm3"		
1.2.1.1. Shutdown Guest OS for Remote VM "app_vm3"		
1.2.1.2. Wait for Guest OS Shutdown		
1.2.1.3. Power off VM "app_vm3"		
1.2.2. Shutdown Primary Site VM "app_vm4"		
1.2.2.1. Shutdown Guest OS for Remote VM "app_vm4"		
1.2.2.2. Wait for Guest OS Shutdown		
1.2.2.3. Power off VM "app_vm4"		
1.2.3. Shutdown Primary Site VM "app_vm6"		
1.2.3.1. Shutdown Guest OS for Remote VM "app_vm6"		
1.2.3.2. Wait for Guest OS Shutdown		
1.2.3.3. Power off VM "app_vm6"		

Agenda

Business Continuity Requirements

Minimizing Downtime in the Datacenter

Providing Effective Disaster Recovery

Summary and Next Steps

Site Recovery Manager – Customer References



“If your organization is already taking advantage of virtualization, then adding Site Recovery Manager to handle disaster recovery is a no-brainer.”

Jerry Wilkin

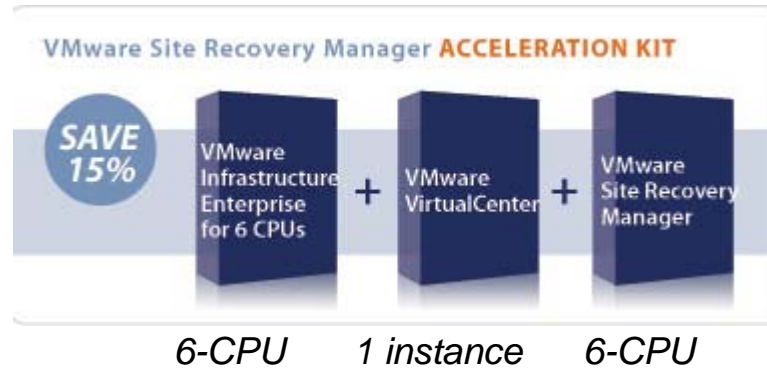
Senior Systems Administrator, Dayton Superior Corporation

Learn more at www.vmware.com/customers/stories

Site Recovery Manager Promotion

Site Recovery Manager Acceleration Kit

*A 15% discount on what you need
for your first purchase of SRM*



***An easy way to get started with
Site Recovery Manager***

Why VMware Software for Business Continuity

Expand protection

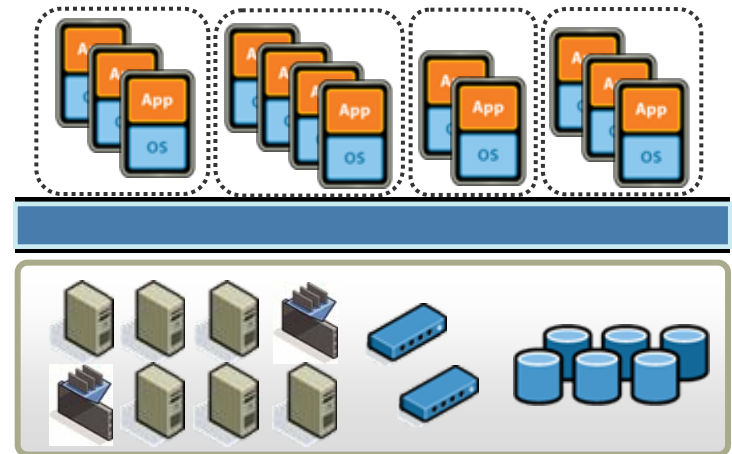
- > Any workload in a virtual machine can be protected with minimal incremental effort and cost

Slash planned downtime

- > Zero-downtime hardware maintenance
- > Non-disruptive virtual machine disk migration

Minimize unplanned downtime

- > Platform reliability built-in
- > Automatic restart after server or OS failure
- > Manageable, automated disaster recovery



VIRTUALIZATION ONLINE FORUM

DISCOVER. CONNECT. **VIRTUALIZE.**

Next Steps

- Learn more
 - Read more about VMware Business Continuity Solutions at <http://www.vmware.com/solutions/continuity/>
 - Find more business continuity customer case studies at http://www.vmware.com/customers/stories/index_continuity.html
- **Start your evaluation**
 - VMware and partners can help you evaluate VMware software
- Get expert help in getting started
 - Contact VMware at: sales@vmware.com or call 1-877-4VMWARE (486-9273) in the U.S. and Canada, 1-650-475-5000 elsewhere