

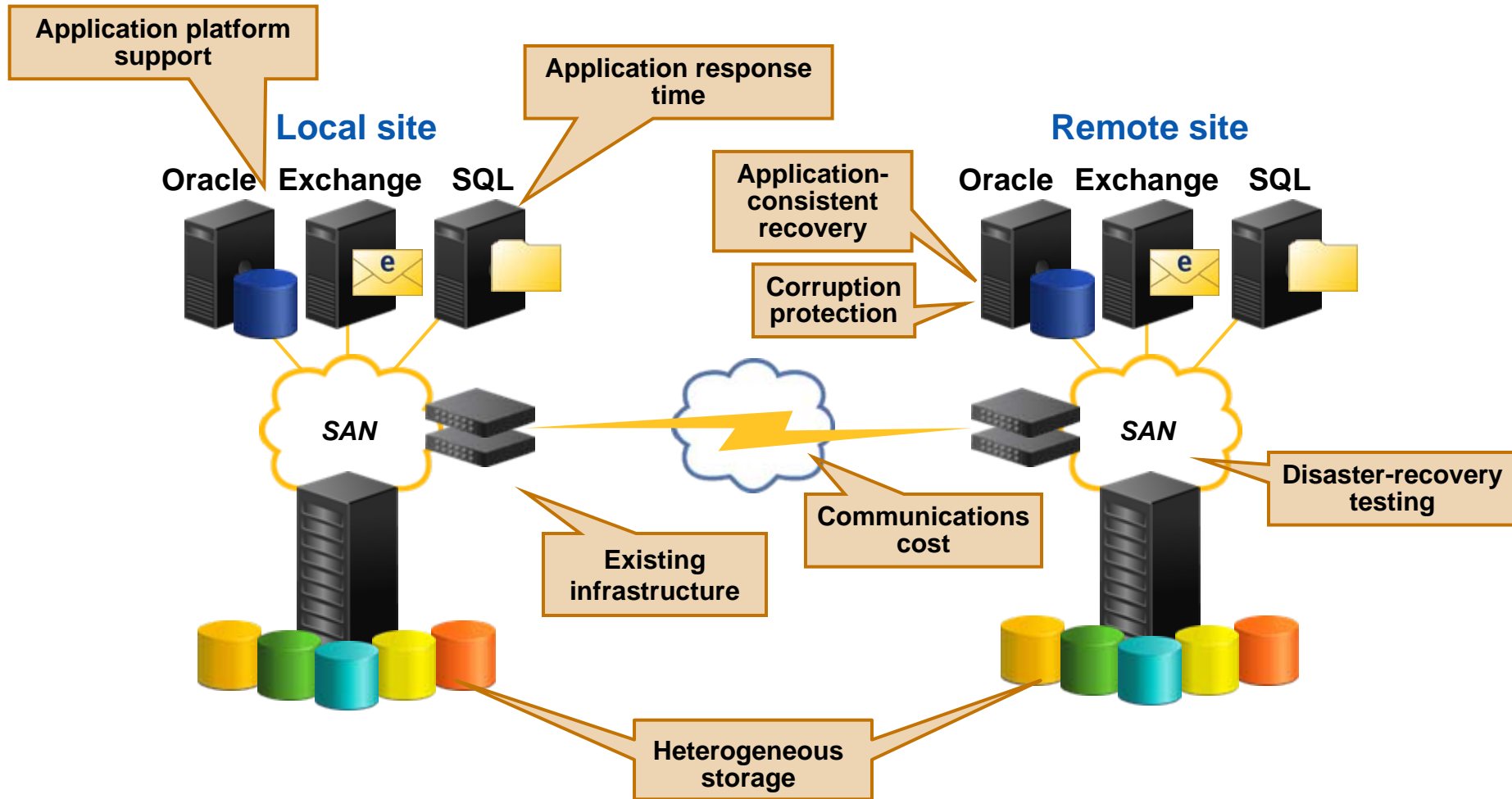
EMC Business Continuity and Disaster Recovery Solutions

Comprehensive Data Protection

Rick Walsworth
Director, Product Marketing
EMC Cross Platform Replication

- Data Protection Challenges
- EMC Continuity Solutions
- SRDF for DMX Symmetrix
- RecoverPoint for CLARiiON and Heterogeneous Environments
- Customer Use Cases
- Q&A

Disaster Recovery Challenges



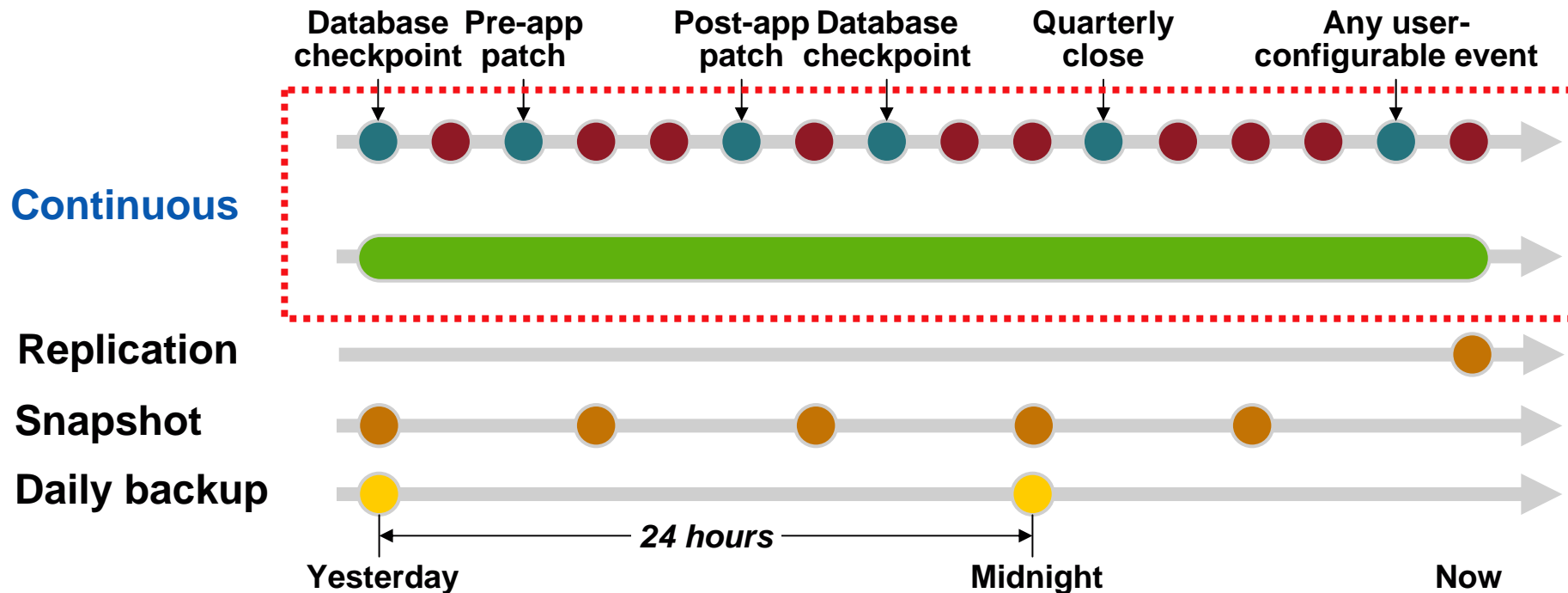
Remote-Replication Benefits

- Protect against local and regional site disruptions
 - Continuous data availability
 - Multiple remote-recovery sites
 - Meet regulatory requirements
 - Support multiple service levels with tiered storage
- Migrate, consolidate or distribute data across storage platforms
 - Data center consolidations
 - Technology refreshes
- Enable fast recovery
 - Application restart
 - Business resumption



Continuous Protection for Instant Recovery

- Daily backup** *Daily recovery points—from tape or disk*
- Snapshots** *More frequent disk-based recovery points*
- Any point in time** *All recovery points*
- Significant point in time**

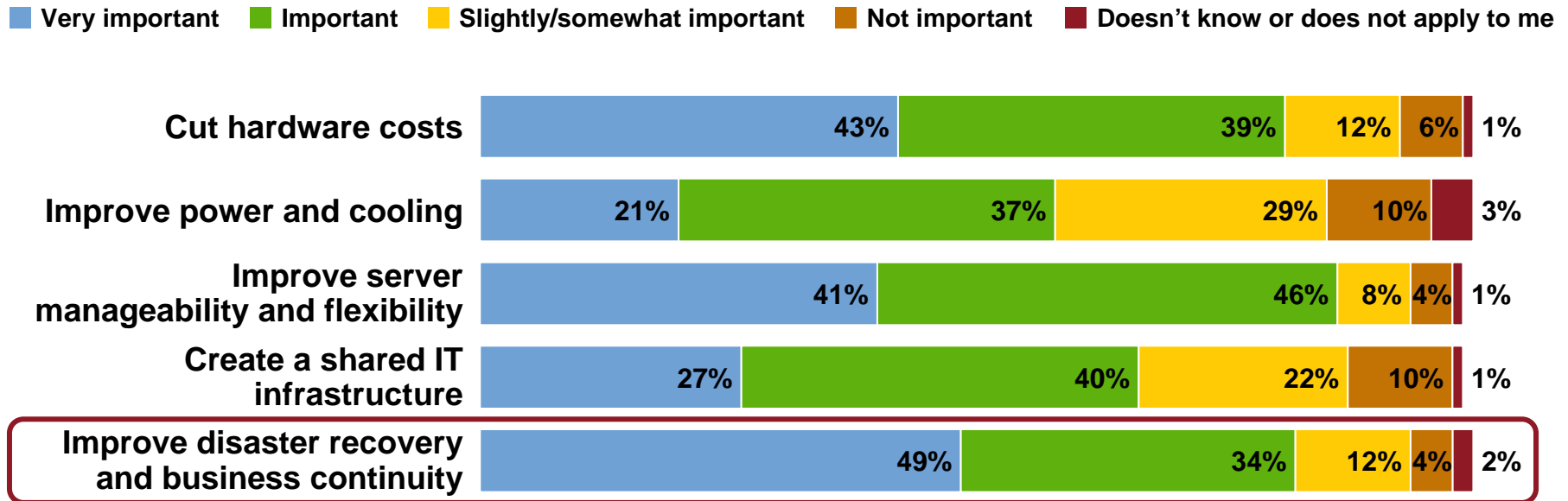


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Market Dynamics—Disaster Recovery is a Top VMware Requirement

“How important are the following motivations for adopting server virtualization?”

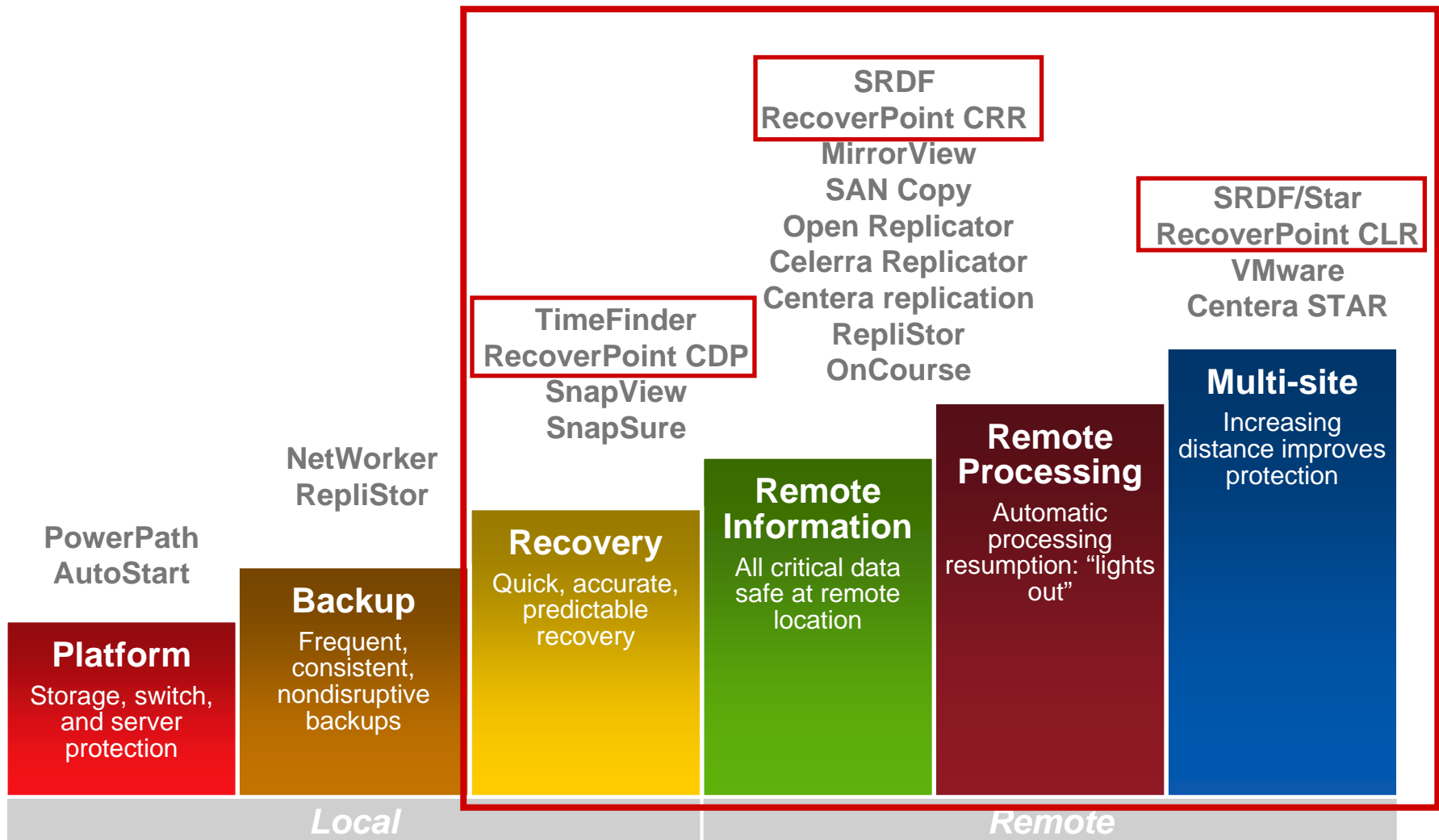


Base: 197 server decision-makers at North American and European enterprises that are interested in, are implementing in the next 12 months, or have already implemented server virtualization for x86 servers (percentages may not total 100 because of rounding)

Source: Enterprise and SMB Hardware Survey, North America and Europe, Q3 2007; Forrester Research, Inc.

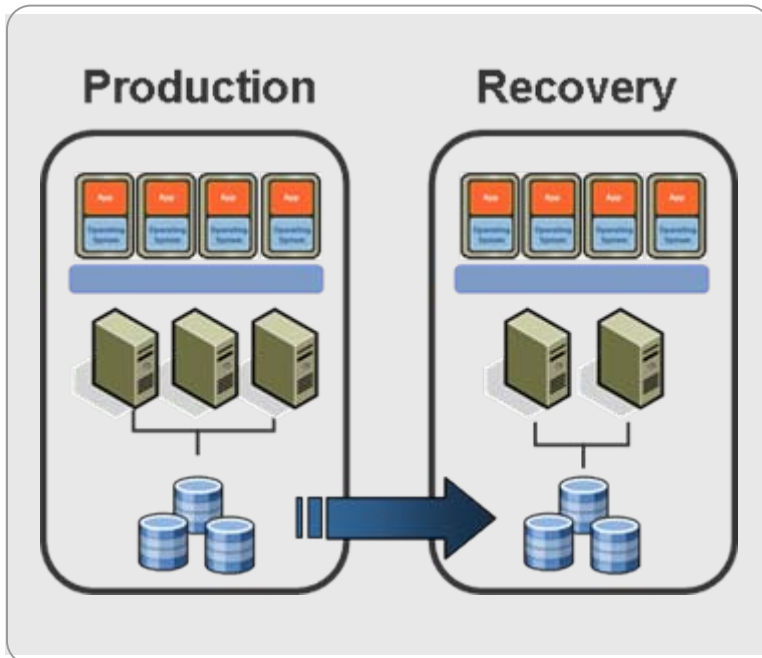
Portfolio: EMC Continuity Technologies

Broadest and Deepest in the Industry



Enabling Technology— VMware Site Recovery Manager

*Site Recovery Manager leverages
VMware Infrastructure and EMC advanced replication
software to automate disaster recovery*



SRM Requires Replication Technology

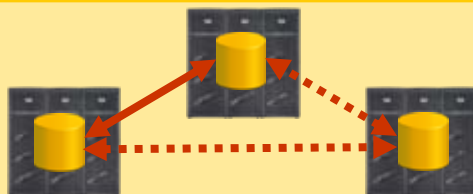
Symmetrix SRDF --- CLARiiON MirrorView
Celerra Replicator --- EMC RecoverPoint

- **Turns complex manual recovery runbooks into automated recovery plans**
- **Delivers central management of recovery plans from VirtualCenter**
- **Simplifies and automates disaster recovery workflows:**
 - Setup, testing, failover

**Makes disaster recovery rapid,
reliable, manageable, affordable**

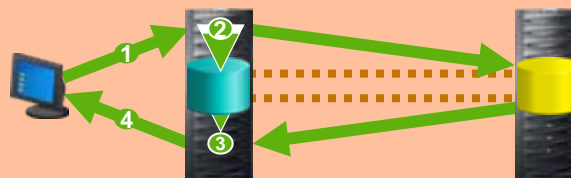
Enabling Technology— EMC Advanced Replication Technologies

The ultimate BC/DR
solution for Symmetrix



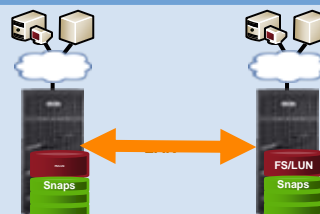
SRDF

Synch/Async replication
for CLARiiON Storage



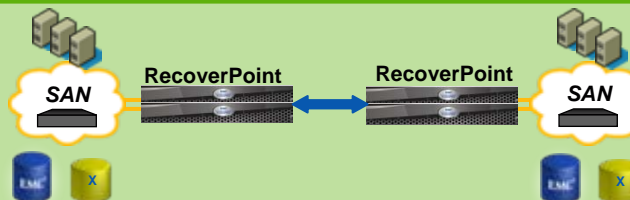
MirrorView

IP replication with QoS
For Celerra



Celerra Replicator

Continuous Replication
for CLARiiON and
Heterogeneous storage



RecoverPoint

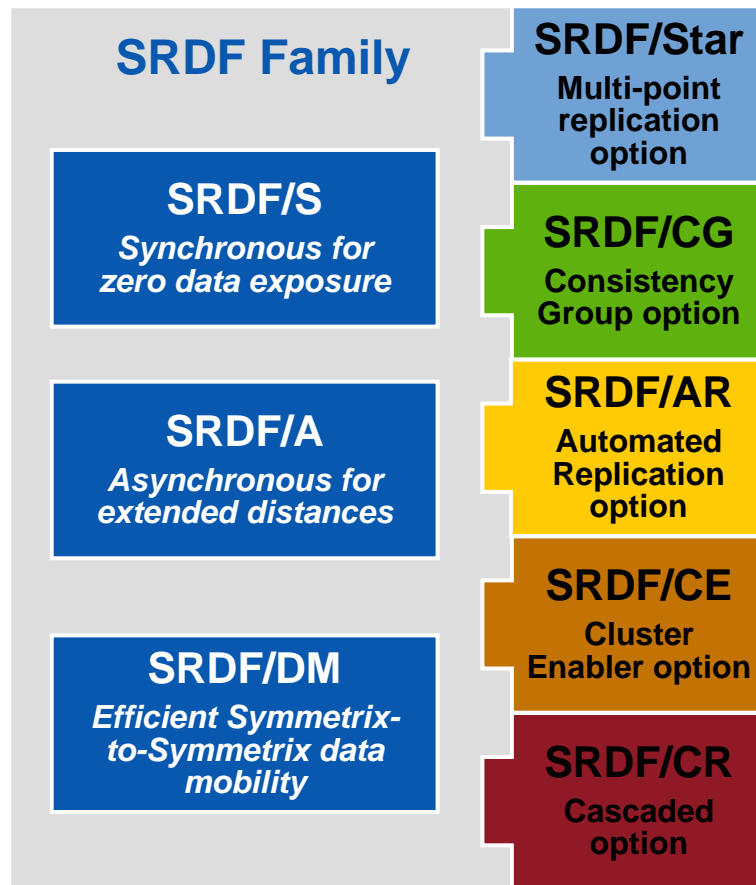
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Symmetrix Remote Data Facility (SRDF) Family

Industry Leading Remote Replication

- Protects against local and regional disruptions
- Increases application availability by reducing downtime
- Minimizes/eliminates performance impact on application and host
- Improves RTOs and RPOs with automated restart solutions
- More than 33,000 licenses shipped



EMC offers choice and flexibility to meet any service-level requirement

SRDF/S Overview

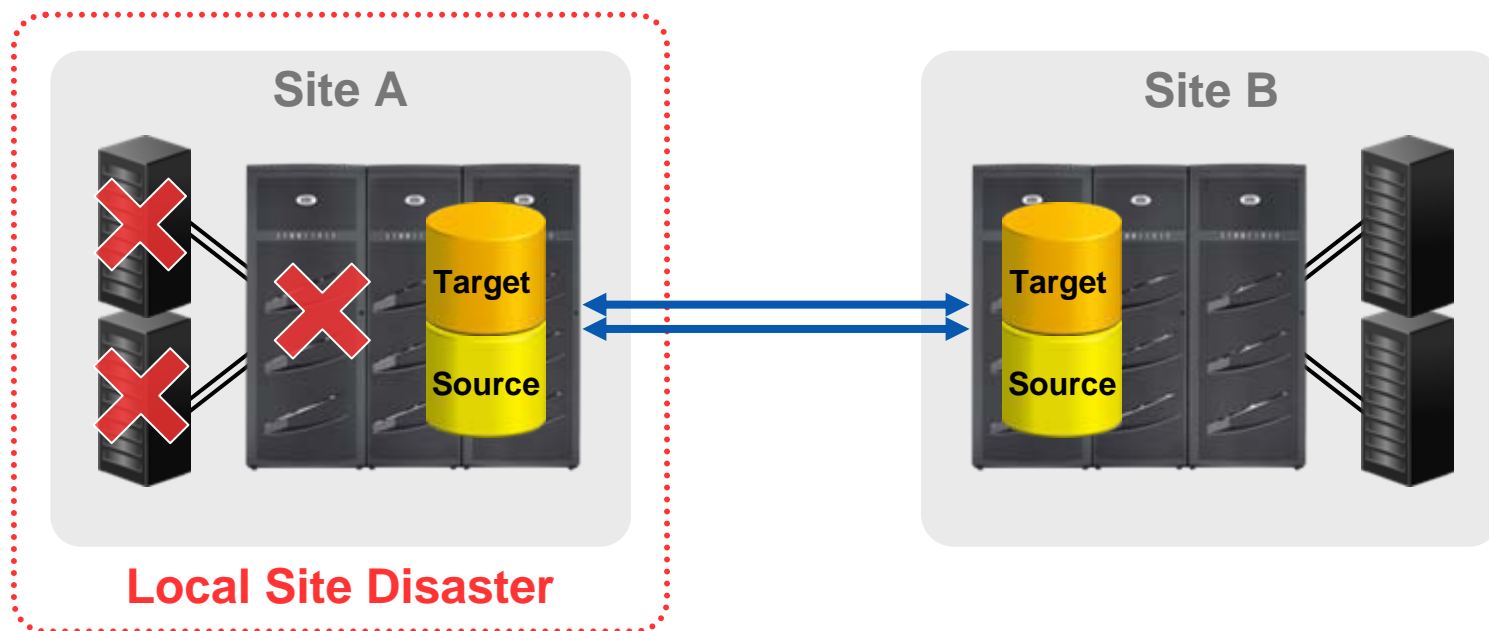
- Provides for a no-data-loss solution (RPO = 0) in event of local disaster
 - Recovery-time objective of less than one hour
 - Restart times are application dependent
- Provides Concurrent SRDF/S capability
 - Single source volume mirroring to a multiple SRDF target volume concurrently
 - Can use one relationship to test disaster restart readiness with DR service provider for adherence to SLA or business objectives
- Integrated with UNIX and Windows open system cluster solutions
 - Automated and semi-automated disaster restart
 - Cluster design will determine restart methodology



Synchronous Remote Replication and Local Disasters

Primary requirement: Provide for a no-data-loss solution (RPO = 0) in event of local disaster

Objective achieved: Yes, with Site B available for disaster restart



Synchronous replication provides for no data loss at Site B with disaster restart

SRDF/Asynchronous Overview

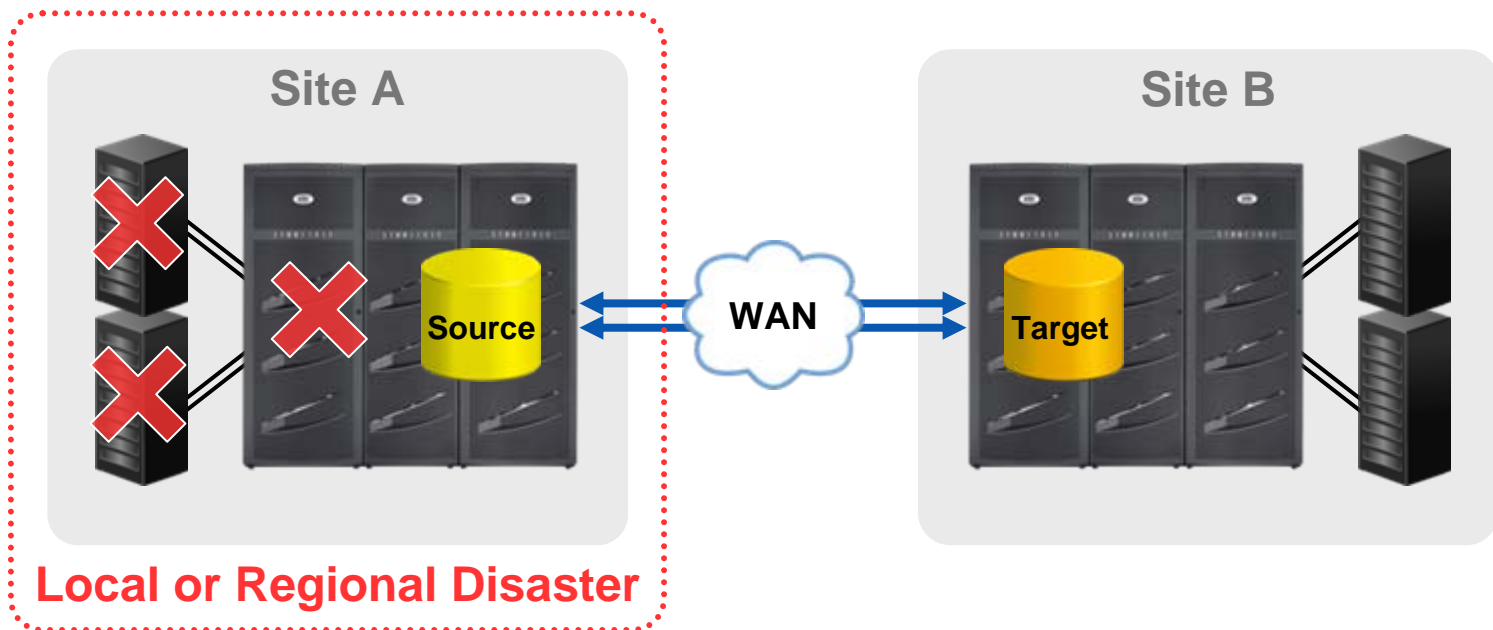
- Host independent asynchronous remote mirroring solution
 - No additional local host application latency for remote mirror operation
 - Application response time not impacted by distance
- SRDF proven framework foundation to provide for asynchronous operations
 - Software intercepts local writes addressed to SRDF/A devices
 - Sends data in Delta Sets with multiple updates to same block sent only once
- Provide measurable and predictable data currency timeframes
 - Software provides minimum time for SRDF/A Delta Sets
 - Delta Set intervals can be as low as 1 second
- Management and control
 - SRDF Invalid Tracks Table for changed track resync
 - SRDF/A integrated with existing SRDF management capabilities
 - Standard SRDF management and control operations

Built on proven SRDF framework to provide highest level of data integrity with predictable and minimal data loss exposure

Asynchronous Remote Replication and Local or Regional Disasters

Primary requirement: Provide for minimal data loss (RPO = less than two minutes) at any geographical distance in event of a local or regional disaster

Objective achieved: Yes, with Site B available for disaster restart



Asynchronous replication will provide disaster restart in the event of a regional disaster if the restart site is located a safe distance from primary site

Concurrent SRDF Overview

- Supports ability to concurrently mirror from a single primary volume to two remote secondary volumes
 - Concurrent SRDF/S
 - SRDF/S and SRDF/A
 - SRDF/S and Adaptive Copy
 - Concurrent Adaptive Copy
- Supported with ESCON, Fibre Channel and Gigabit Ethernet (GigE)
- Building block for SRDF/Star using Concurrent SRDF/S and SRDF/A
 - Can be used in conjunction with stretched cluster solutions

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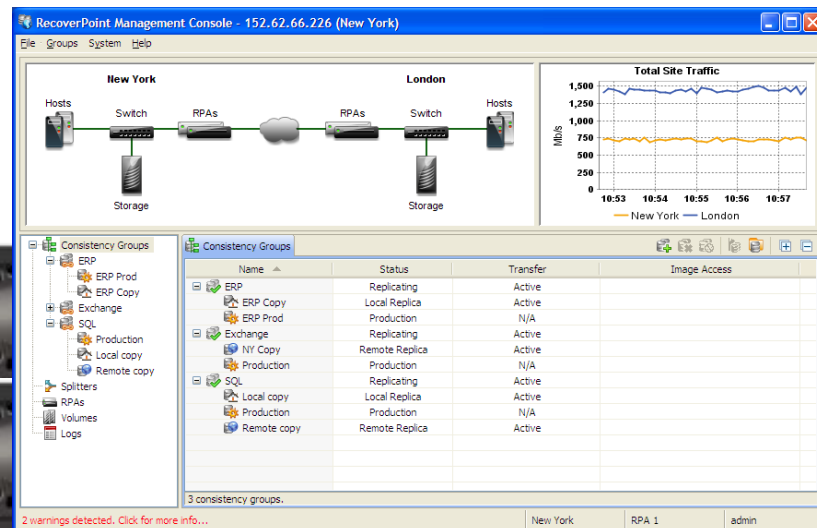
EMC RecoverPoint Family Overview

- **EMC RecoverPoint**
 - Network-based, out-of-band, block-level replication
 - Intelligent Write Splitting (host, CLARiiON, or fabric)
 - Policy-driven consistency groups
- **Continuous Data Protection (CDP)**
 - Local replication across heterogeneous* environments
 - Instantaneous any-point-in-time recovery
- **Continuous Remote Replication (CRR)**
 - Async replication with remote site recovery
 - Policy-based bandwidth reduction
- **Concurrent Local Remote Replication (CLR)**
 - Integrated CDP (local) and CRR (remote)
 - Maintains two consistent copies of data

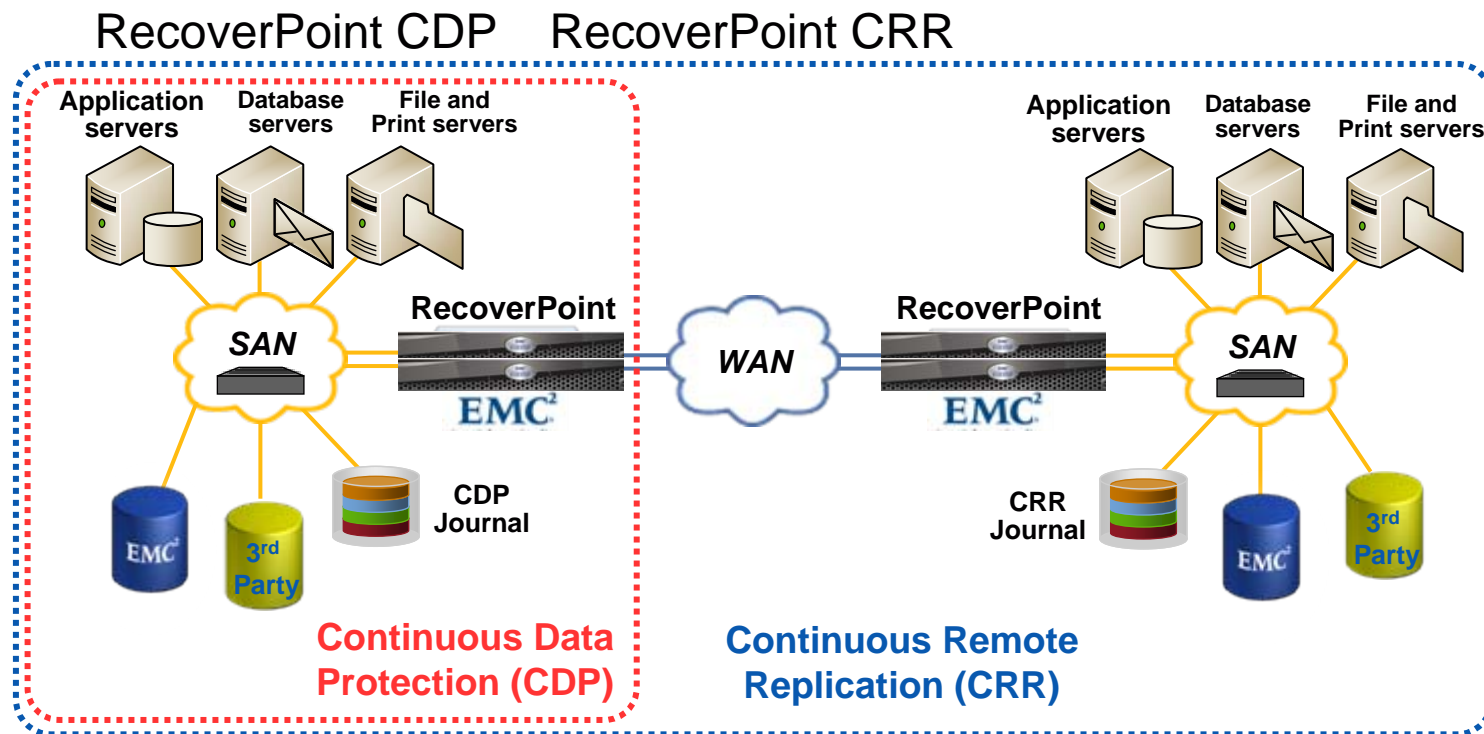
RecoverPoint RecoverPoint S/E

RecoverPoint CDP
Continuous Data Protection
zero data exposure

RecoverPoint CRR
Continuous Remote Replication
extended distances



EMC RecoverPoint Overview



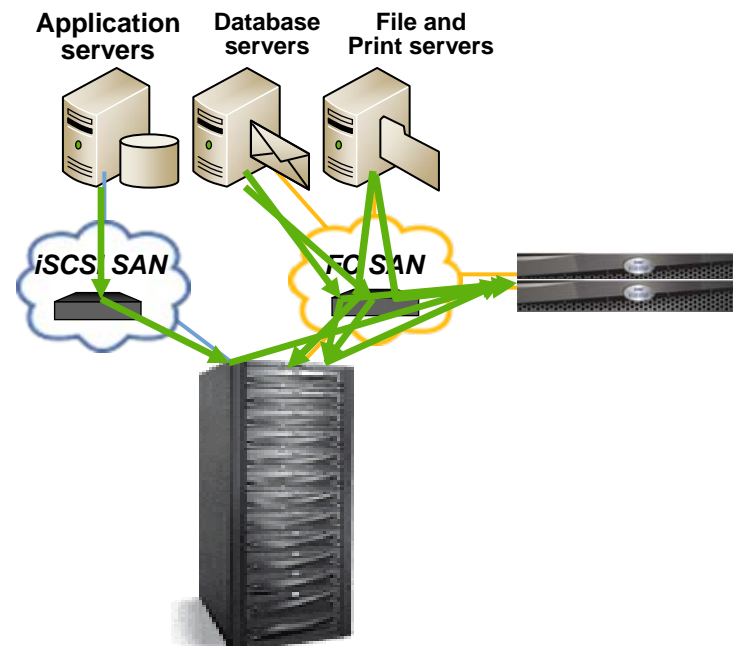
- ❑ Local Continuous Data Protection (CDP)
- ❑ Transactional, any-point-in-time recovery
- ❑ Out-of-band, network-based architecture
- ❑ Bookmarks for application consistency
- ❑ Continuous Remote Replication (CRR) for DR
- ❑ Concurrent Local and Remote (CLR) replication
- ❑ Bidirectional replication across IP networks
- ❑ WAN bandwidth reduction and compression

RecoverPoint Splitter Topologies

- **Host splitter**
 - Lightweight splitter runs on host O/S
 - Windows, Solaris, AIX
 - EMC DMX/CX storage
 - VMware RDM replication

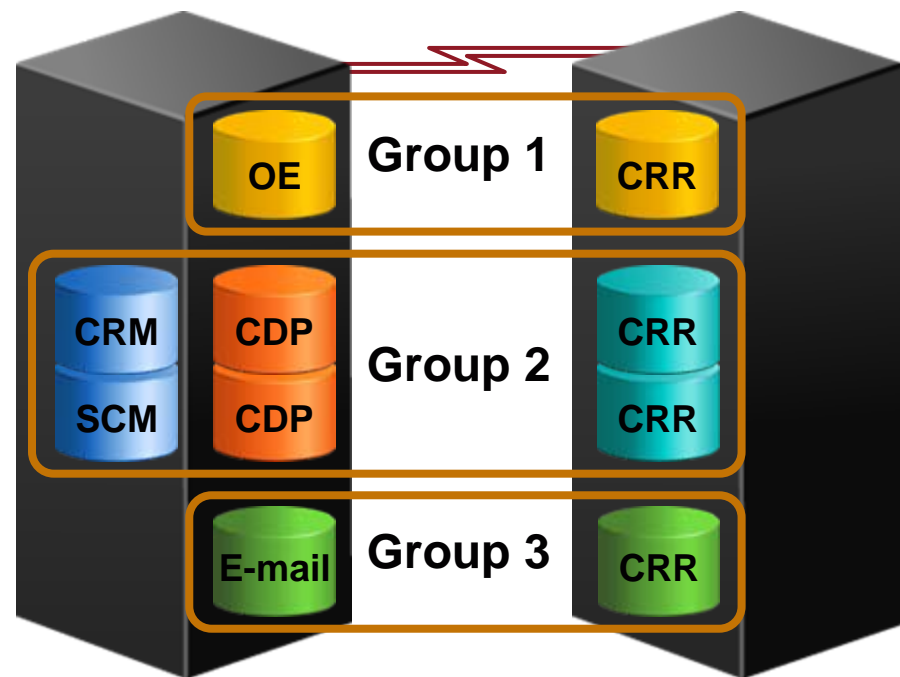
- **Intelligent Fabric splitter**
 - Runs on specialized ASICs
 - Wide O/S coverage
 - Third-party array support
 - VMware VMFS replication

- **CLARiiON splitter**
 - Runs on CLARiiON storage processor
 - Wide O/S Coverage
 - CLARiiON CX3 and CX4 arrays only
 - VMware VMFS replication
 - Supports iSCSI



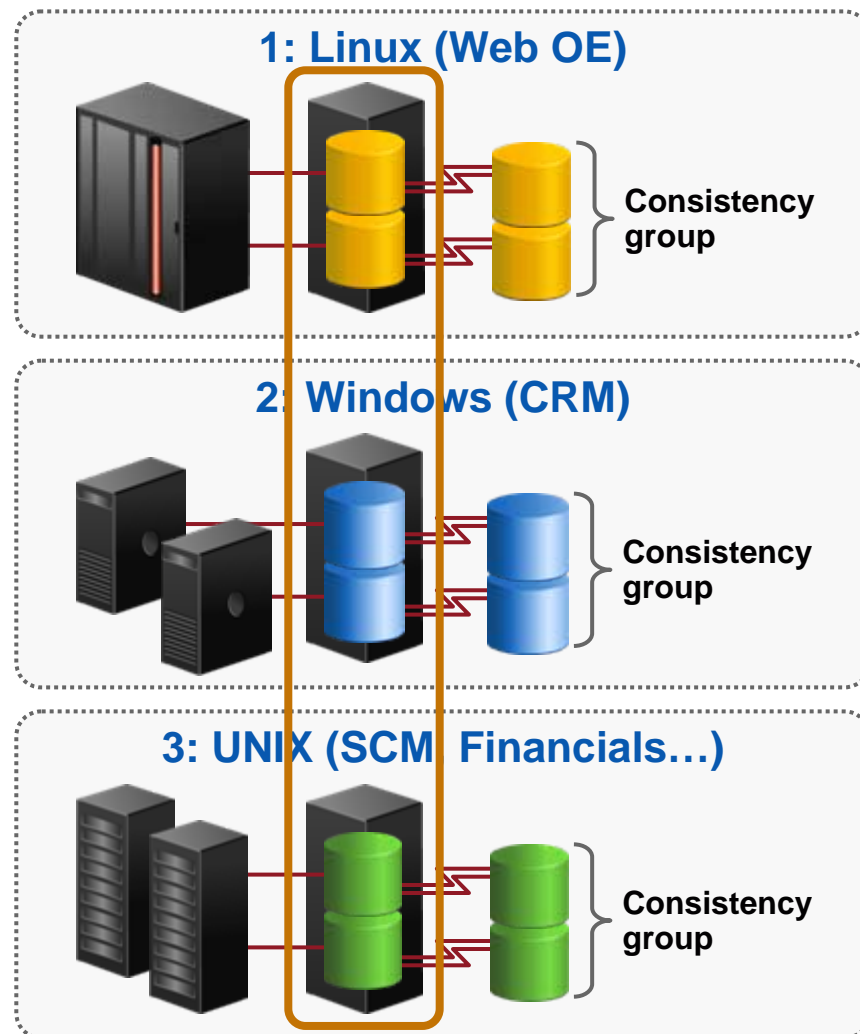
RecoverPoint Consistency Groups

- Allows application recovery to be tiered by service level
 - Multiple volumes per group
 - Mixed recovery point objectives within same infrastructure
- Provides independent replication controls
 - Recover by group
 - Locally or remotely
 - Start/stop by group
- Enables grouping of optimization
 - Importance
 - Resource usage
 - Recovery point and recovery time objectives



Group Sets enable Federated Environments

- Each tier has different service level agreements
 - Consistency groups per tier
 - Operational recovery of tier
- Parallel consistency across tiers
 - Federated environments
 - Recover to a known point for all applications
 - Disaster recovery for tier or application
 - Spans operating systems, applications, storage, and servers
- Enables advanced functions
 - Full environment “cloning”
 - Application upgrade testing
 - Data mining
 - Consistent production rebuild

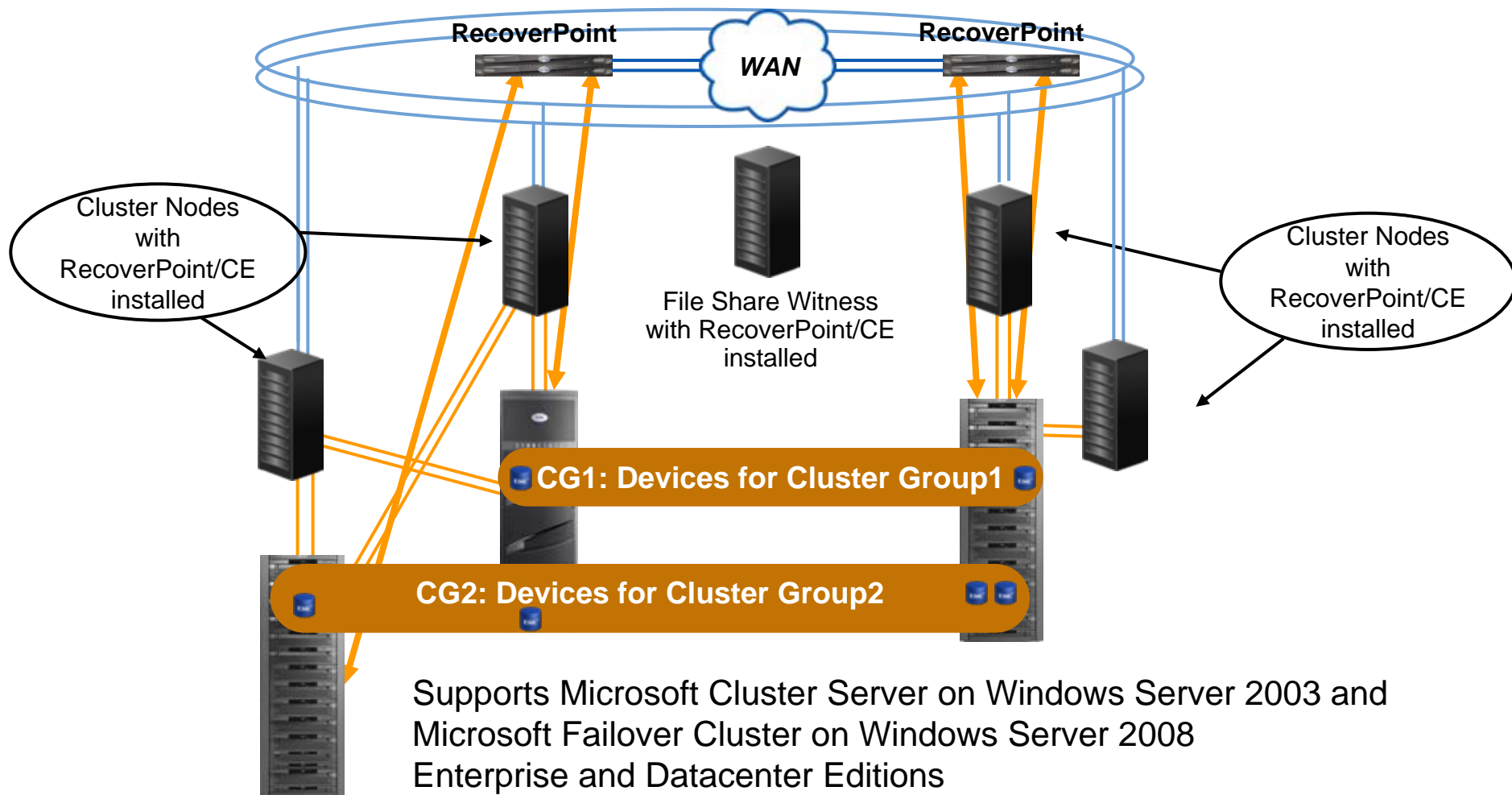


RecoverPoint/Cluster Enabler

New in
V3.1

EMC²
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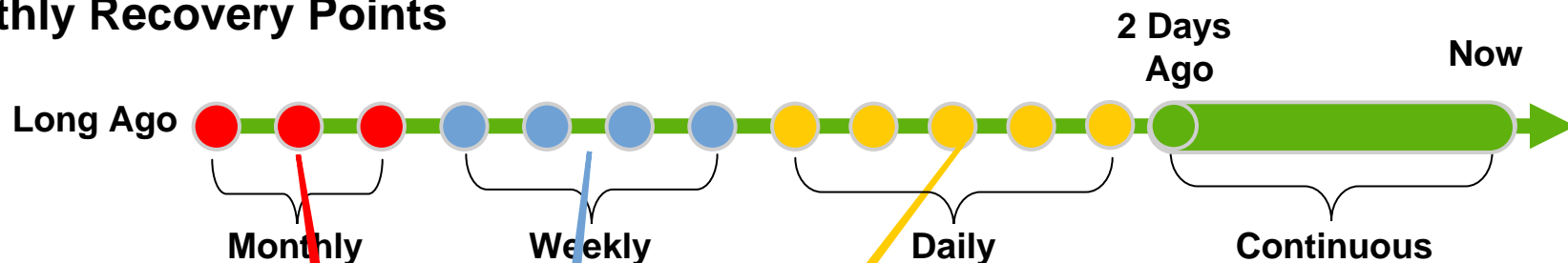
Each named cluster group's associated devices reside in a single RecoverPoint consistency group of the same name



RecoverPoint Snapshot Consolidation



- Continuous Recovery Points
- Daily Recovery Points
- Weekly Recovery Points
- Monthly Recovery Points



Policy Configuration

General Settings

Name : Production Copy
 Production Copy
 Journal Compression Level : None

Protection Settings

Required protection window: 1 hours

Enable RecoverPoint snapshot consolidation

Consolidate snapshots between bookmarks

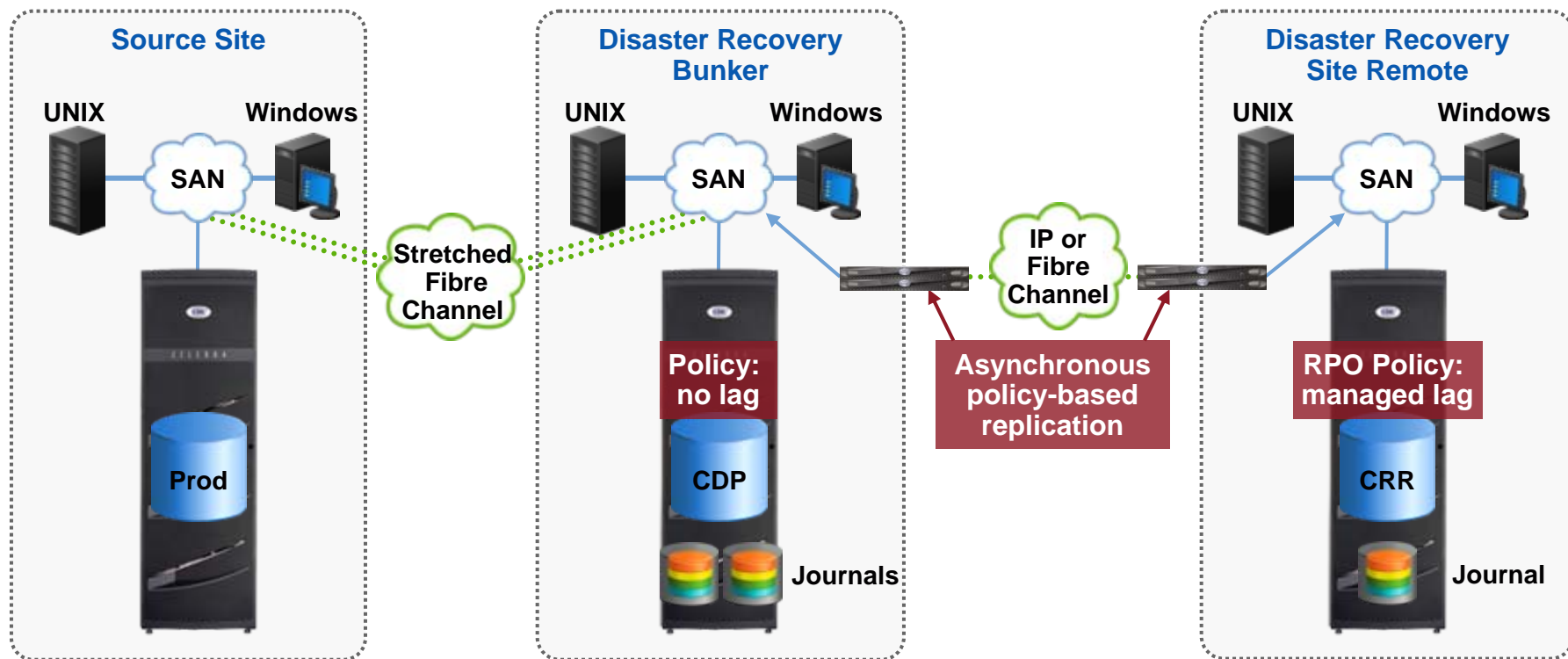
Maintain all snapshots for 2 days

Consolidate snapshots that are older than 2 days to one snapshot per day for 5 days indefinitely

Consolidate snapshots that are older than 1 week to one snapshot per week for 4 weeks indefinitely

① Snapshots older than 1 month 1 week will be consolidated to one snapshot per month.

Cascading Replication for Disaster Recovery

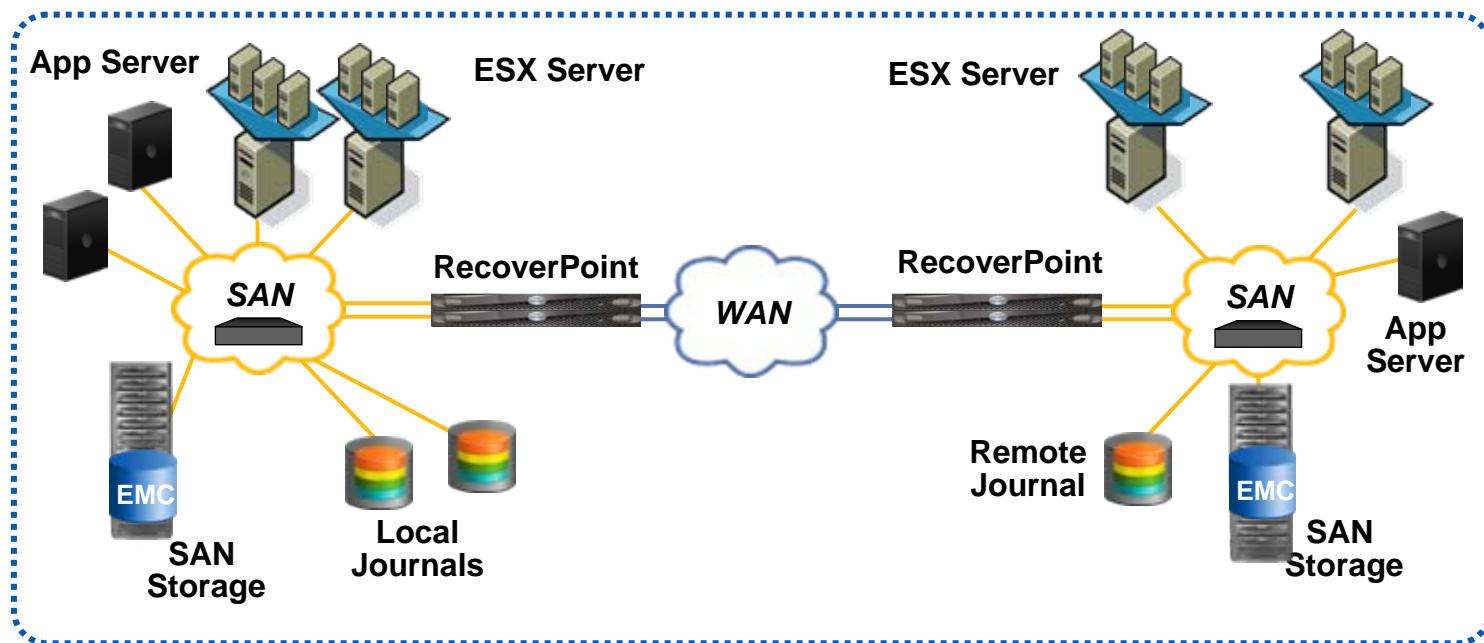


- CDP replication from production to bunker
- CRR replication over IP or Fibre Channel from production, with a managed lag, to remote site
- If source site is lost, production can continue from bunker or remote site
- If remote site is lost, replication continues from source to bunker
- If bunker is lost, replication stops

RecoverPoint Integration with Replication Manager

Replication Manager Support for RecoverPoint Family:

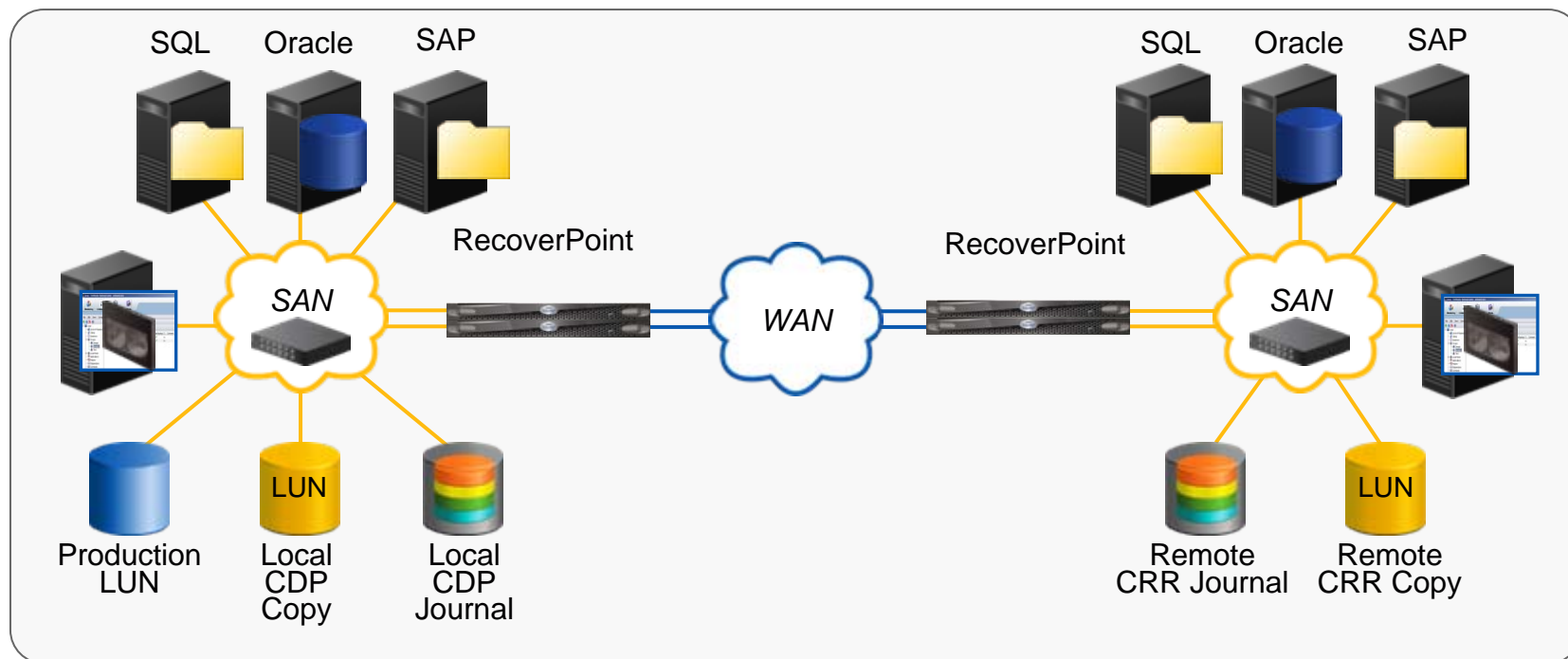
- RecoverPoint CDP, CRR and CLR
- Application Consistent Point-in-Time Copies locally, remotely or both
- Crash Consistent Point-in-Time copies
- CLARiiON FC & iSCSI arrays; Symmetrix FC arrays
- Physical and VMware ESX Server Windows guest OS environments with RDM/VMFS



RecoverPoint Integration with NetWorker

NetWorker PowerSnap 2.4 SP2 integrates with RecoverPoint

- Expanded support for RecoverPoint Interoperability
 - Leverage NetWorker for Bookmark creation in RecoverPoint journal
 - Continuous Data Protection (CDP) support for SQL, Oracle and SAP
 - Continuous Remote Replication (CRR) support for SQL, Oracle and SAP



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Local and Remote Exchange Replication with VSS and Recovery

Use Case

- Overview

- Microsoft Exchange 2007, Windows Server 2003
- 4 TB of replicated capacity, CLARiiON CX3 Arrays
- Replicating 200 miles across 10MB WAN link

Customer:
State Government
Department of Health

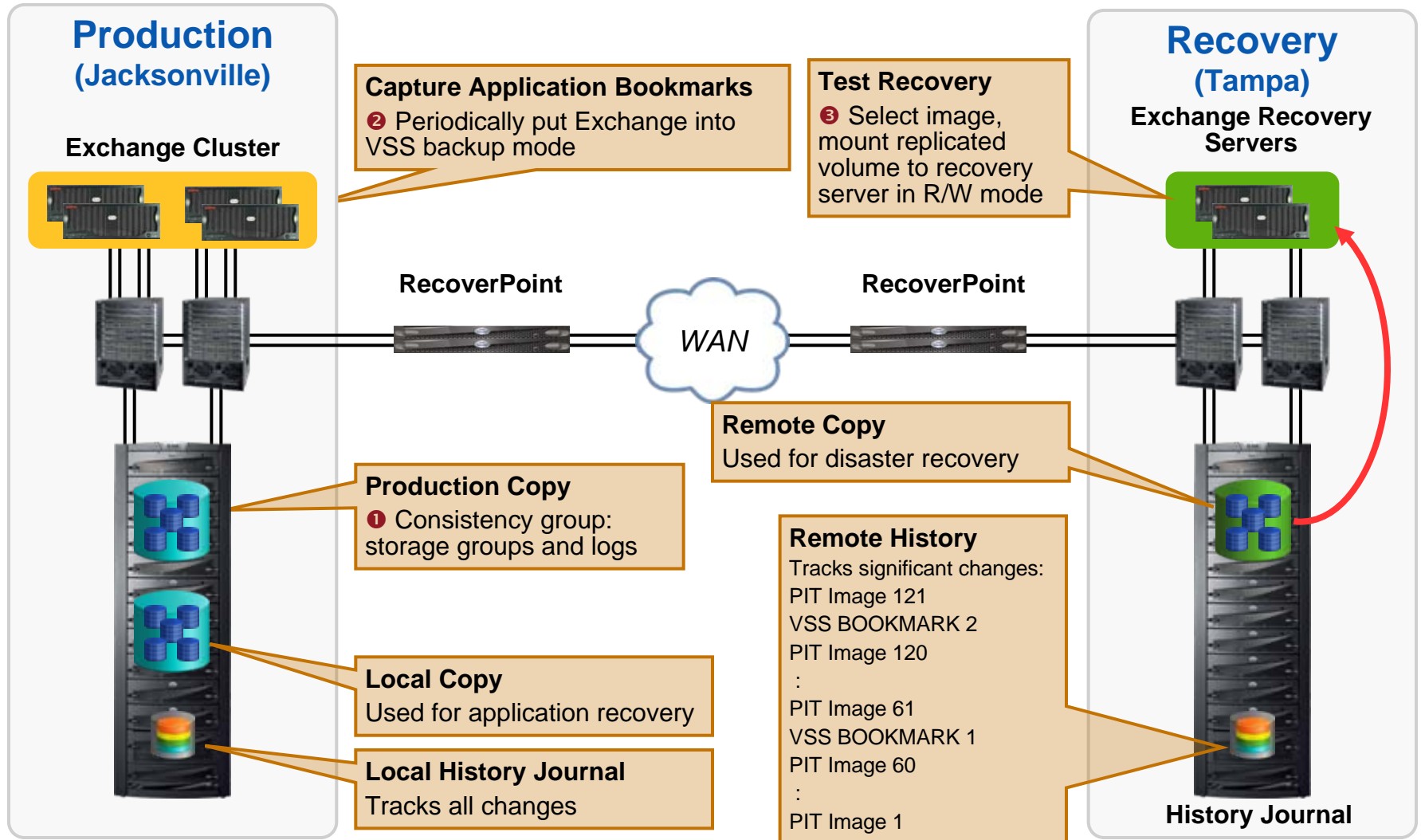
- Pain points

- 15-minute recovery point objective, quarterly disaster- recovery tests
- Must maintain cross-host consistency
- Previously used host-based replication, performance issues

- Implementation

- Continuous replication, 1-minute lag, hourly application consistency
- Placed storage groups and logs into single consistency group
- Used Microsoft VSS to bookmark images ensuring Exchange consistency
- Leveraged logged image access to test recovery

Local and Remote Exchange Replication with VSS and Recovery (continued)



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Questions?

Thank you

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