Rješenje za disaster/recovery – RecoverPoint

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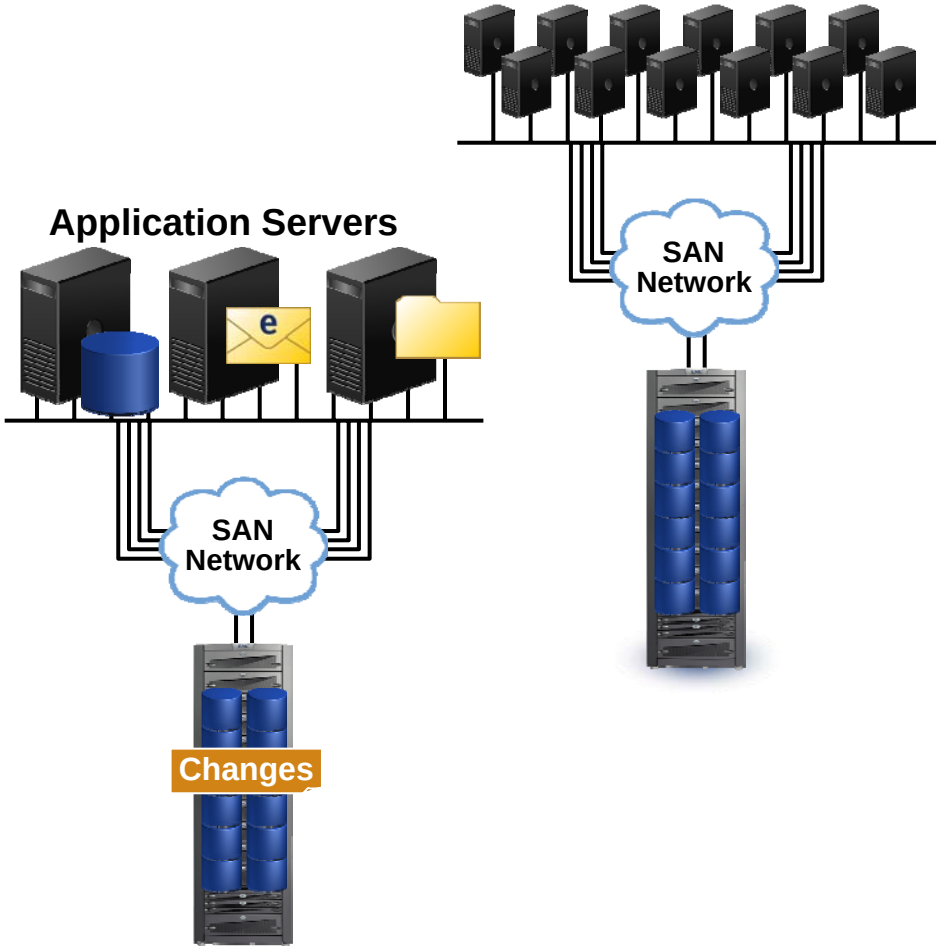
IT Challenges for Information Protection

- Improve protection and recovery
  - Match availability to a range of service level requirements
- Simplify the environment
  - Easily implement service requirements
- Drive down total cost of ownership
  - Utilization, consolidation, automated management
- Increase access and availability
  - Information growth more than 50 percent annually
- Provide investment protection
  - Utilize existing infrastructure and expertise

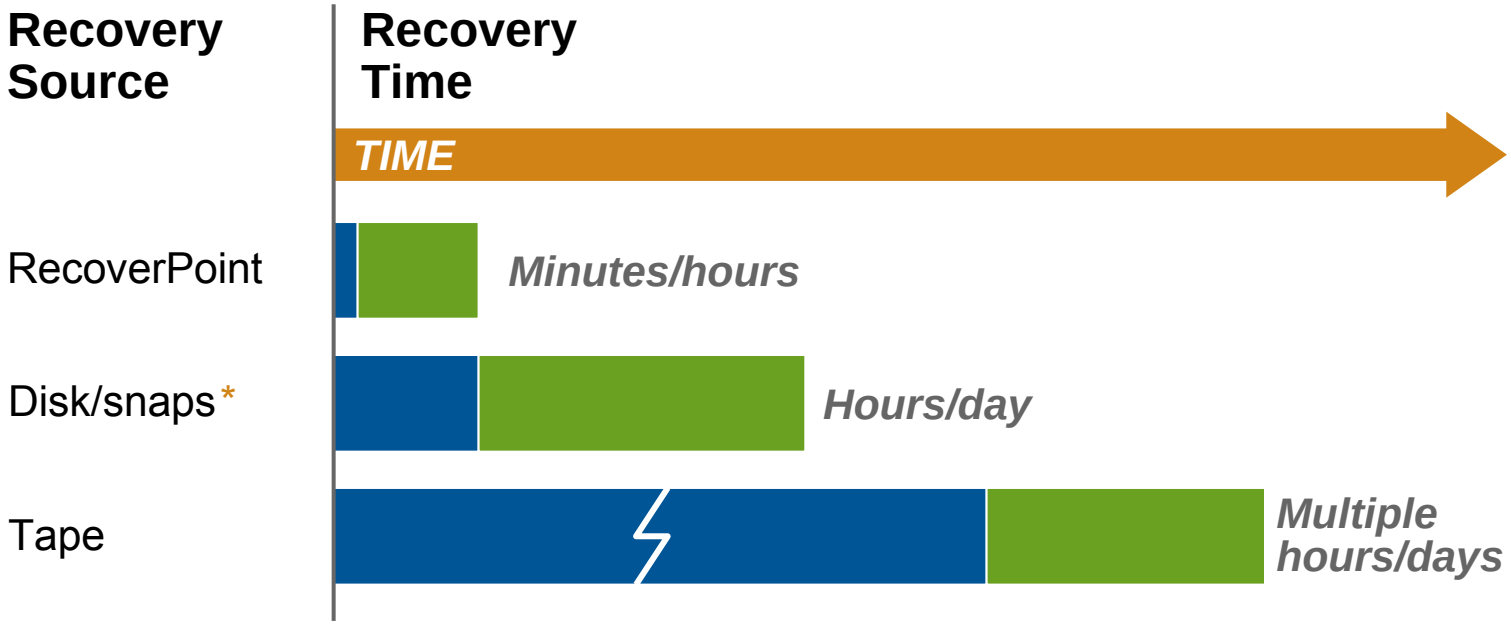
The right replication solution can overcome these challenges

Remote-Replication Benefits

- Protect against local and regional site disruptions
  - Continuous data availability
  - Local and/or remote-recovery sites
  - Meet regulatory requirements
  - Support multiple service levels with tiered storage
- Provide near-instant data recovery
  - Restore from offsite tapes can take weeks
- Leverage second site for:
  - Application testing, development, and training (productive protection)
  - Relocate your tape backups to a second site
- Enable non-stop operations
  - Business continuity—fast restore to full operation



Online Backup/Rapid Restore—Benefits

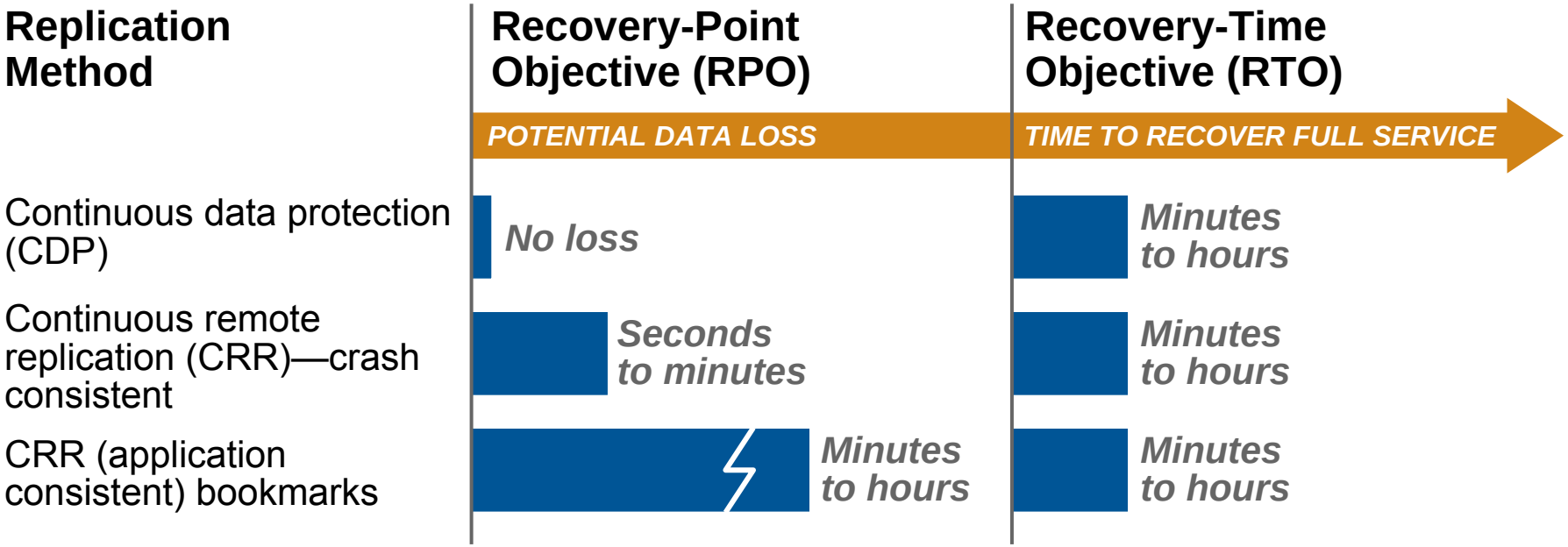


*Assumes full volume snapshots that are updated twice per day

Time required to restore database(s)
Log selection and playback time

Faster Recovery from Disaster—Benefits

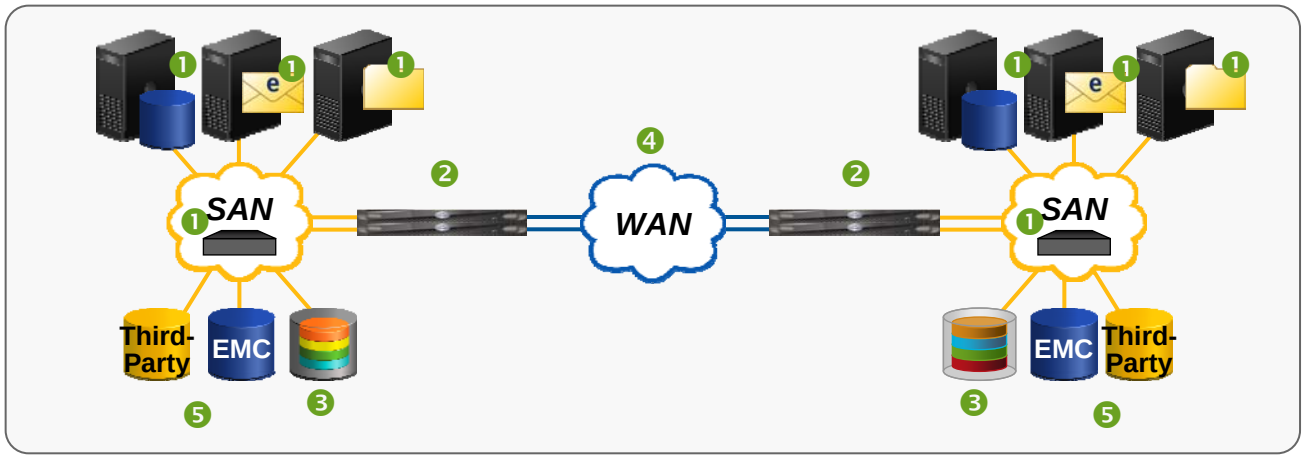
Tradeoffs for RPO and RTO by Replication Type



The RecoverPoint Family

- RecoverPoint (for the broader enterprise)
  - Continuous data protection (CDP) between LUNs on the same SAN
  - Continuous remote replication (CRR) between LUNs across two SANs
  - Concurrent local and remote (CLR) data protection between LUNs across two SANs
  - Heterogeneous operating system and storage array support
  - Integrated with intelligent fabric from Cisco
- RecoverPoint/SE (for EMC CLARiiON and Windows)
  - CDP between LUNs in the same CLARiiON array in the same SAN
  - CRR between LUNs in two CLARiiON arrays, one in each SAN
  - CLR data protection between LUNs in the same CLARiiON array or between two CLARiiON arrays in two SANs
  - Supports Microsoft Windows only; no fabric integration; supports CLARiiON array-based splitting for heterogeneous hosts
- Common functionality
  - Local CDP at a block level
  - Remote asynchronous replication (CRR) at a block level
  - Changes journaled to maximize the number of recovery points
  - Virtual and physical recovery modes optimize recovery time
  - Application-state integration for intelligent recovery using bookmarks
  - Dependent write-order consistency is maintained locally and remotely

RecoverPoint Continuous Remote Replication(CRR)



❶ RecoverPoint splitter drivers

- Intercepts server writes (block level)
- Resides on host, CLARiiON or in fabric
- Mirrors write to RecoverPoint appliance

❷ RecoverPoint appliance

- Manages and prioritizes resources
- Compresses data for WAN transfer
- Distributes changes to remote site
- Manages recovery processes
- Supports instant access to protected data
- Distributes replicated data to Journal

❸ Journal

- Tracks all data changes to every protected LUN
- Utilizes bookmarks for application-aware recovery
- Repository for live data updates
- Provisioned from existing SAN LUNs
- Dynamically compressed, which saves storage

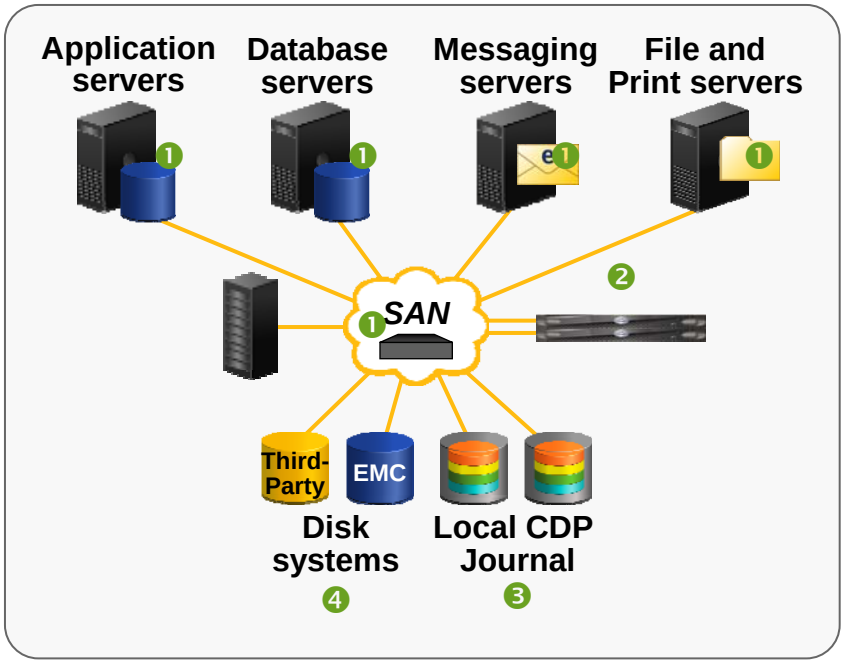
❹ Provides advanced functionality

- Policy-based bandwidth management
- 3–10x data compression
- Lowers cost of IP infrastructure

❺ Supports heterogeneous environments

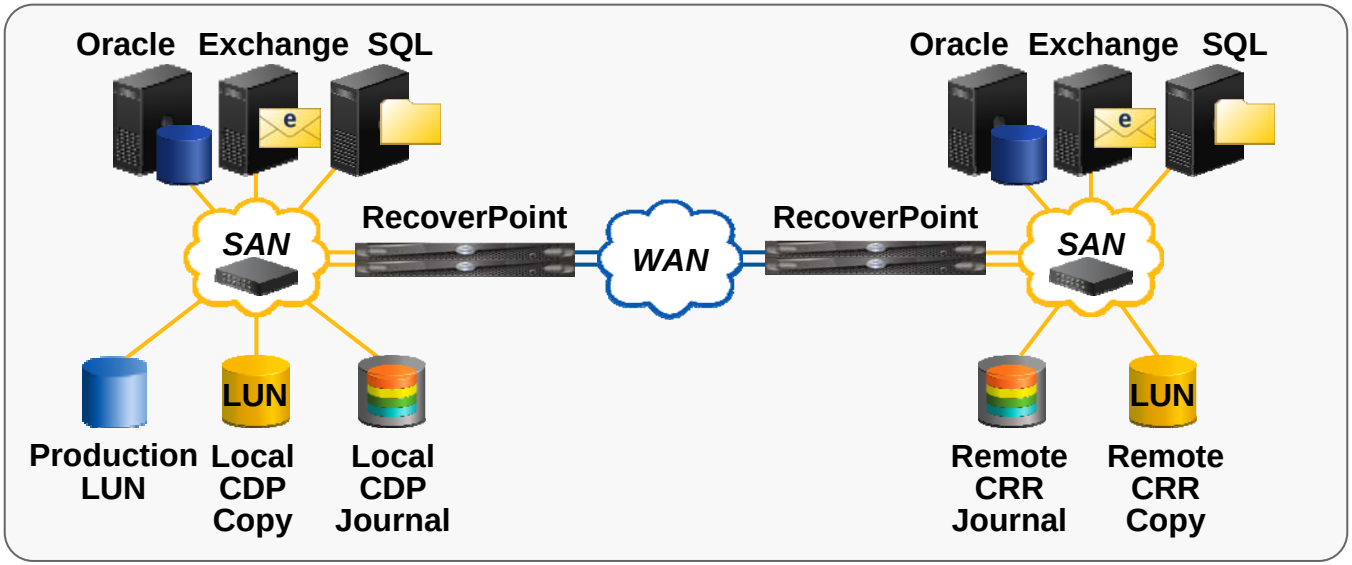
- Works with EMC and third-party storage
- True any-to-any volume replication

RecoverPoint Continuous Data Protection (CDP)



1. RecoverPoint splitter drivers
   - Mirrors server writes to RecoverPoint appliance
   - Resides on host, CLARiiON, or in fabric
2. RecoverPoint appliance
   - Managed and prioritizes resources
   - Writes changes to local CDP Journal
   - Distributes changes to target
3. Journal
   - Tracks all data changes to every protected LUN
   - Utilizes bookmarks for application-aware recovery
   - Repository for live data updates
   - Provisioned from existing SAN LUNs
   - Dynamically compressed, which saves storage
4. Supports heterogeneous environments
   - Works with EMC and third-party storage
   - Fabric splitters support Cisco SANTap

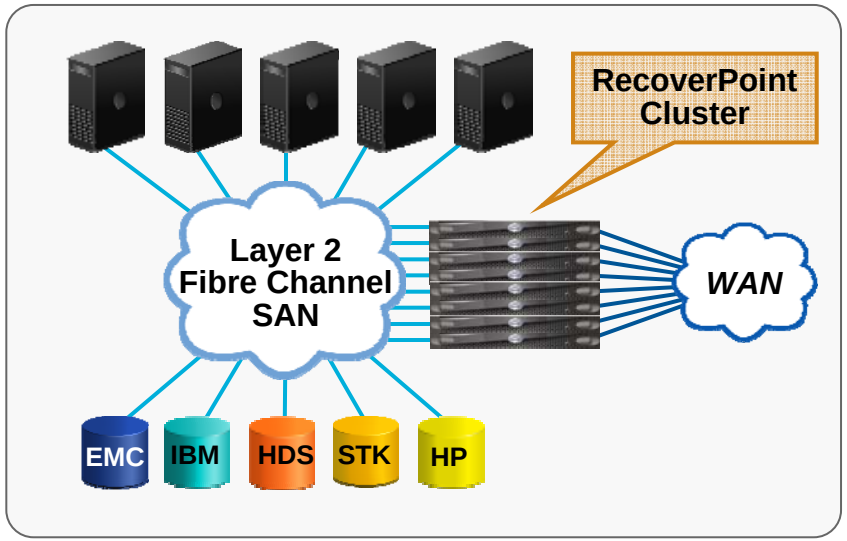
RecoverPoint Concurrent Local and Remote (CLR) Data Protection



- Create CDP and CRR copies of the same LUNs
  - Local copy is a CDP replica tracking all changes to the production LUN
  - Remote copy is a CRR replica tracking significant changes to the production LUN
- Can independently recover from local site (any point in time) and remote site (significant point in time)
  - Local copy for operational recovery with single write recovery point objective (RPO) to any point in time
    - Application recovery using local point-in-time image
  - Remote copy enables disaster recovery with customer-selected RPO to any significant point in time
    - Disaster-recovery failover using either local or remote point-in-time image

RecoverPoint Components and Topology

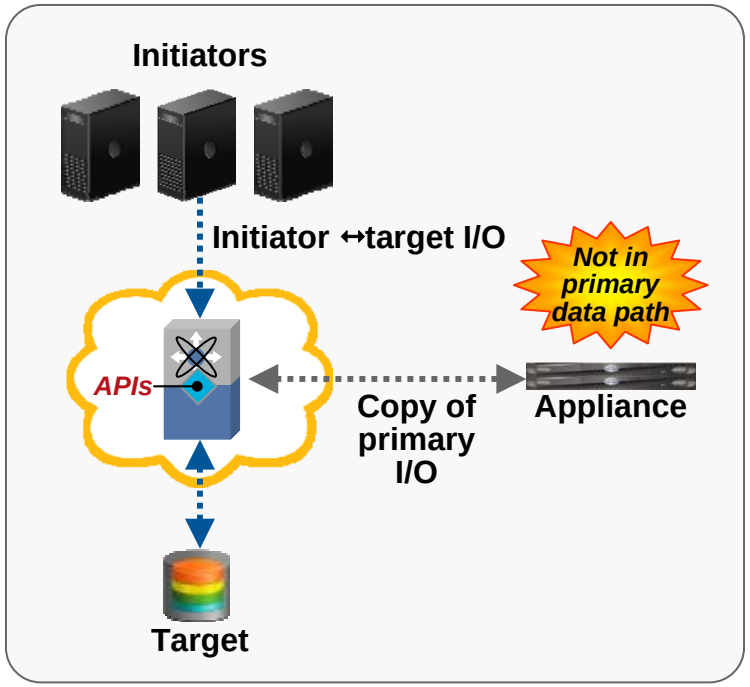
- Definitions
  - RecoverPoint appliance
    - Data-protection controller for RecoverPoint
  - RecoverPoint cluster
    - Collection of two or more RecoverPoint appliances
- RecoverPoint appliance is based on a standard Dell 1µ server
  - High-availability design with redundant power, cooling
  - Four 4 Gb/s Fibre Channel ports per RecoverPoint appliance
  - Two 1 Gigabit Ethernet ports per RecoverPoint appliance



- RecoverPoint appliances deployed in a cluster configuration
  - RecoverPoint supports failover between nodes
  - Failover does not impact performance; ongoing operations automatically transfer over to a remaining node
- RecoverPoint appliance communication
  - Nodes utilize private LAN and shared RecoverPoint appliance volumes
  - Data is replicated across WAN: standard TCP protocol used; no Fibre Channel-IP converters needed
- RecoverPoint cluster supports up to eight appliances per side/site

Intelligent Fabric-Based Write Splitting

- RecoverPoint leverages intelligent fabric services
  - Cisco SANTap API on the MDS Storage Services Module (SSM) in a Connectrix MDS-9000 series switch
- Out-of-band architecture
  - Intelligent fabric redirects I/O (write splitting)
  - Eliminates need for host splitter

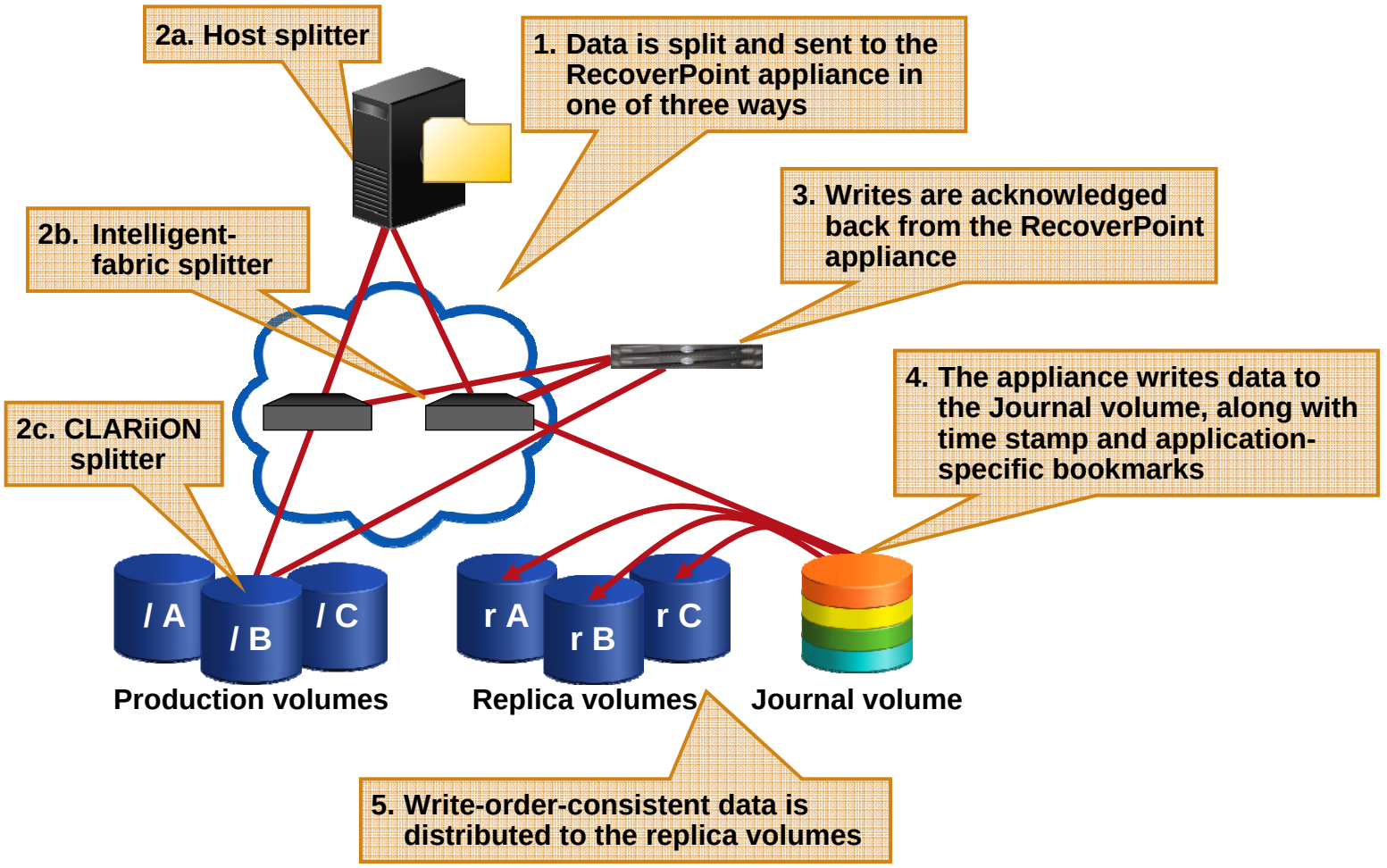


RecoverPoint—Supported Fabric Splitter Platforms

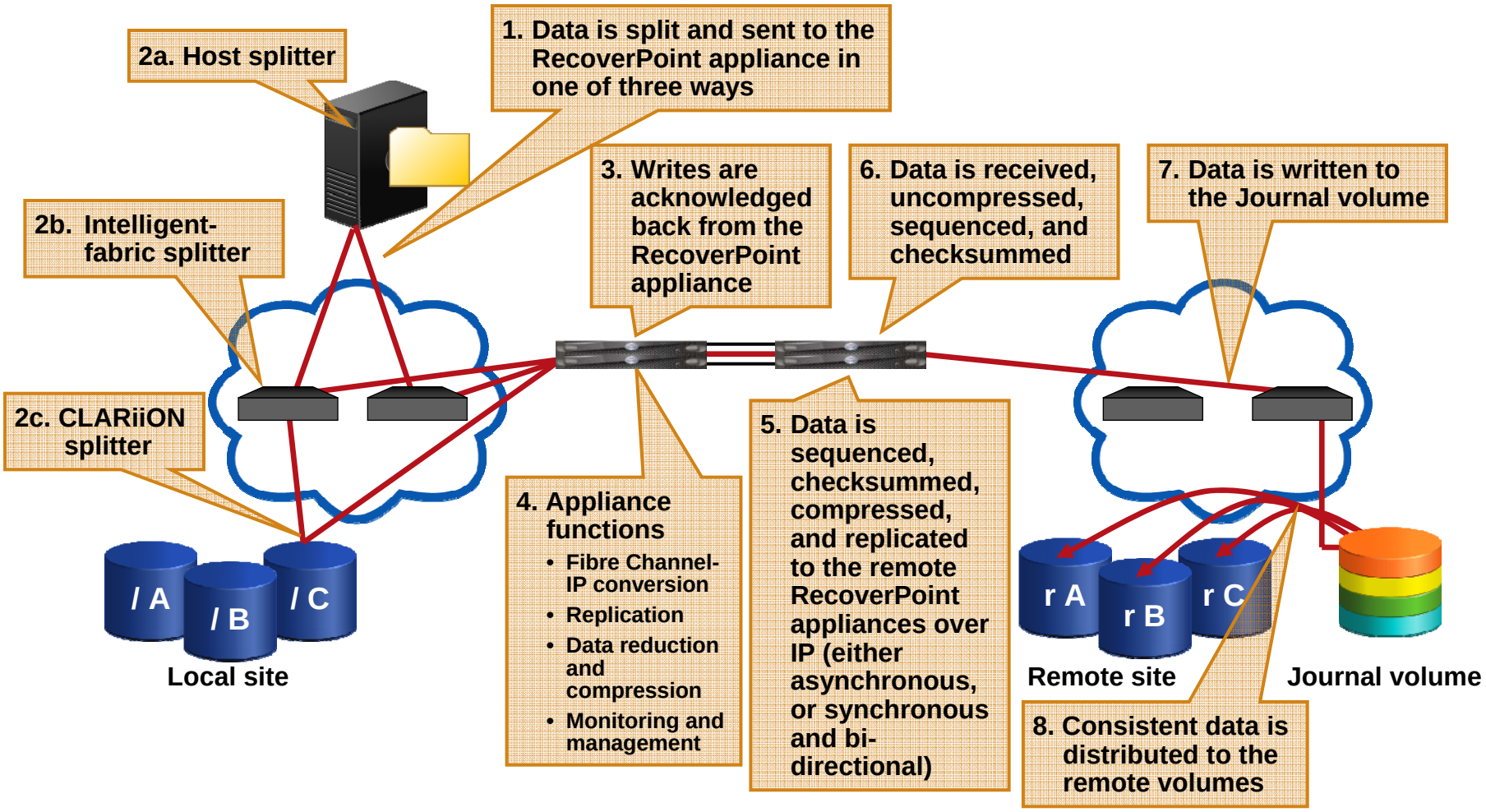
Connectrix MDS-9000 Series with MDS Storage Services Module (SSM)

- 32 2 Gb/s Fibre Channel ports per SSM
- 8,192 initiator, target, LUN (ITL) triplets
- Fits in any open slot in Connectrix MDS-9000 series modular chassis
  - Mix and match intelligent and normal ports in same switch
  - SSM Service does not require use of front panel ports on SSM module—preserves initial cabling configurations
- SANTap uses Storage Services Enabler license

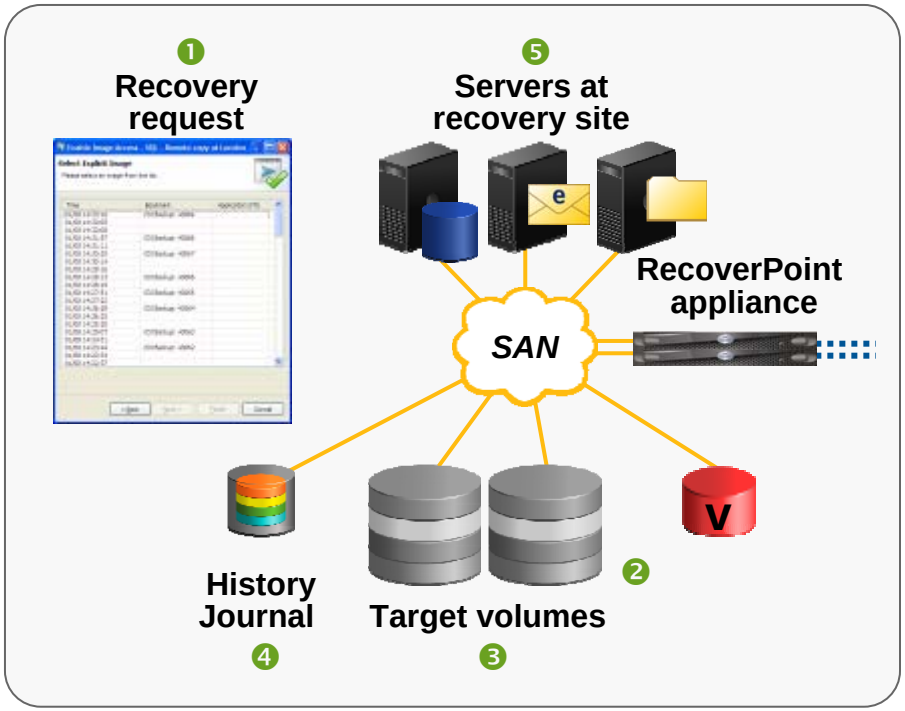
RecoverPoint Local Protection Process—CDP



RecoverPoint Remote Protection Process—CRR



RecoverPoint Recovery Process

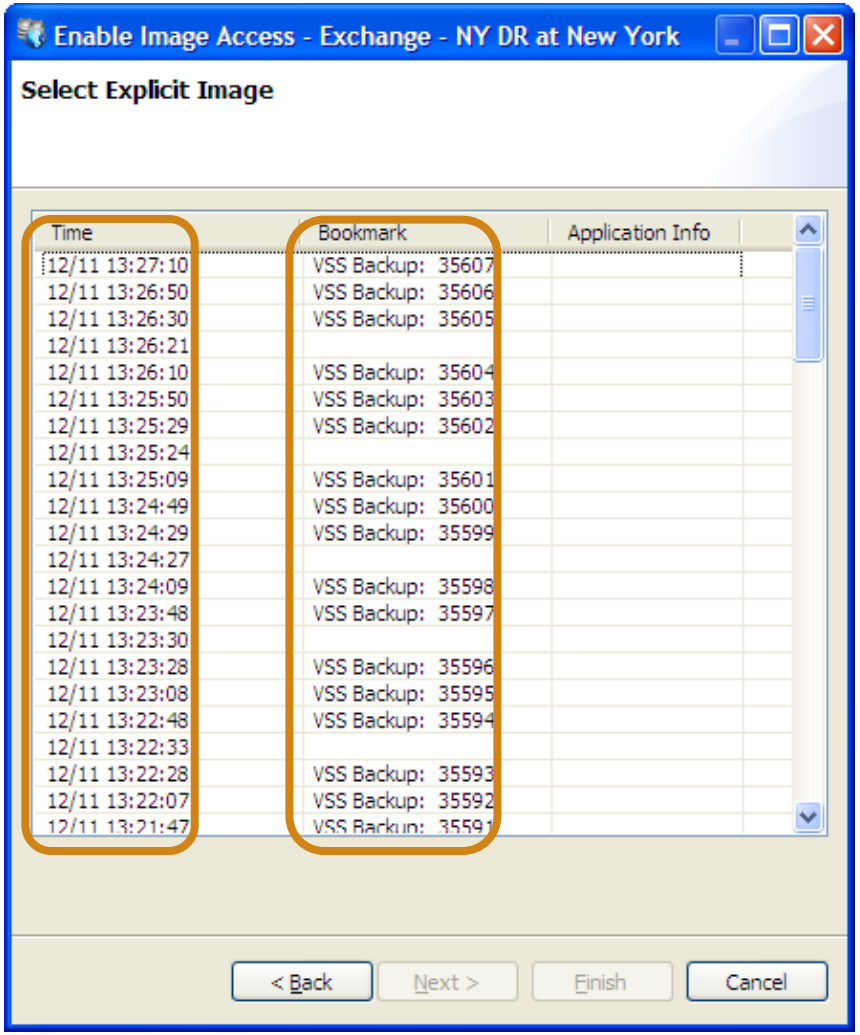


- Request “image” via management interface 1
  - User selects by bookmark or point in time
- RecoverPoint recovers image as read/write
  - User chooses virtual 2 or physical target 3
  - Existing Journal data 4 used to play back changes to appropriate bookmark or point in time
  - Target-mounted read/write to recovery server 5
- All new writes saved in Journal 4
  - Existing disaster-recovery protection not impacted
  - Image changes committed on request
- Recovery-image use cases
  - Failover production to image
  - Start new application from image
  - Surgically repair data from image
  - Fast production resynchronization
    - Rollback production from changed blocks
  - Source for backup
  - Data analysis
  - Disaster-recovery development and testing (“fire drill”)

Journaling for Application-Aware Recovery

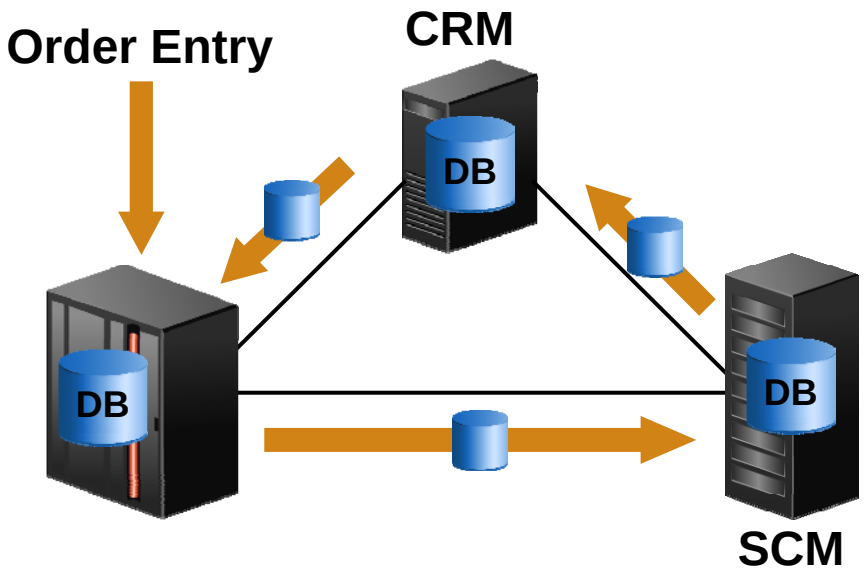
Journal Includes Data Plus Metadata

- Time/date
  - Identifies the time image was saved
- Bookmarks:
  - System-generated group bookmarks
    - *e.g.,* Volume Shadowcopy Service (VSS) Backup
  - User-generated bookmarks
  - System-event-generated bookmarks
  - Microsoft SQL Server
    - Microsoft Virtual Device Interface (VDI) operations
  - Microsoft Exchange
    - Microsoft VSS



Understanding Data Consistency

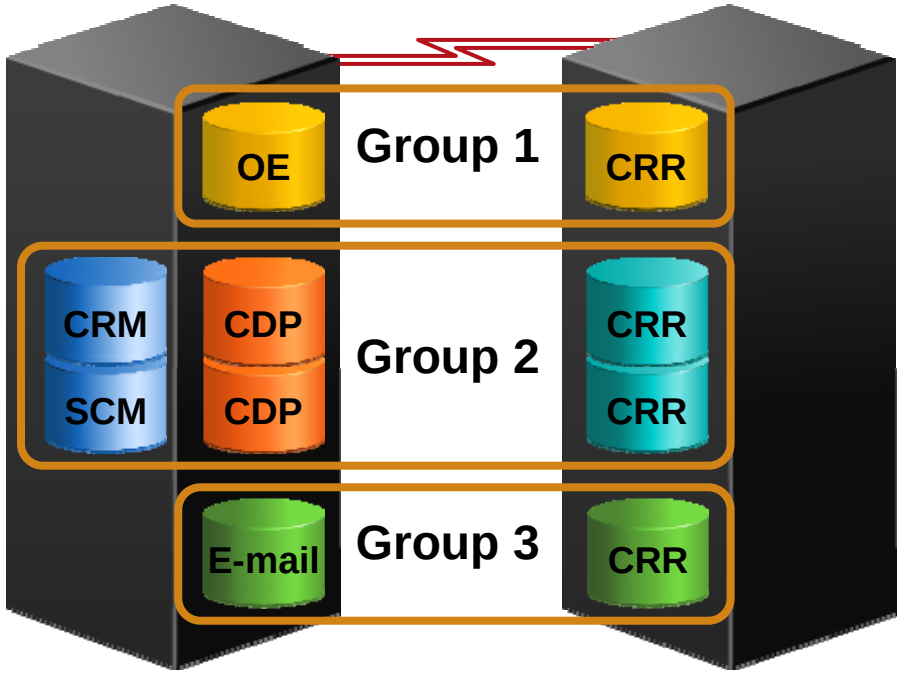
- Applications and data are interrelated (Federated)
- All data movement must be stopped/started at the same point in time
- To restart applications you must have *all* the data—not parts of it
- Recovery requires dependent-write consistency across *all* volumes and systems



Systems share information…how do you get a consistent view?

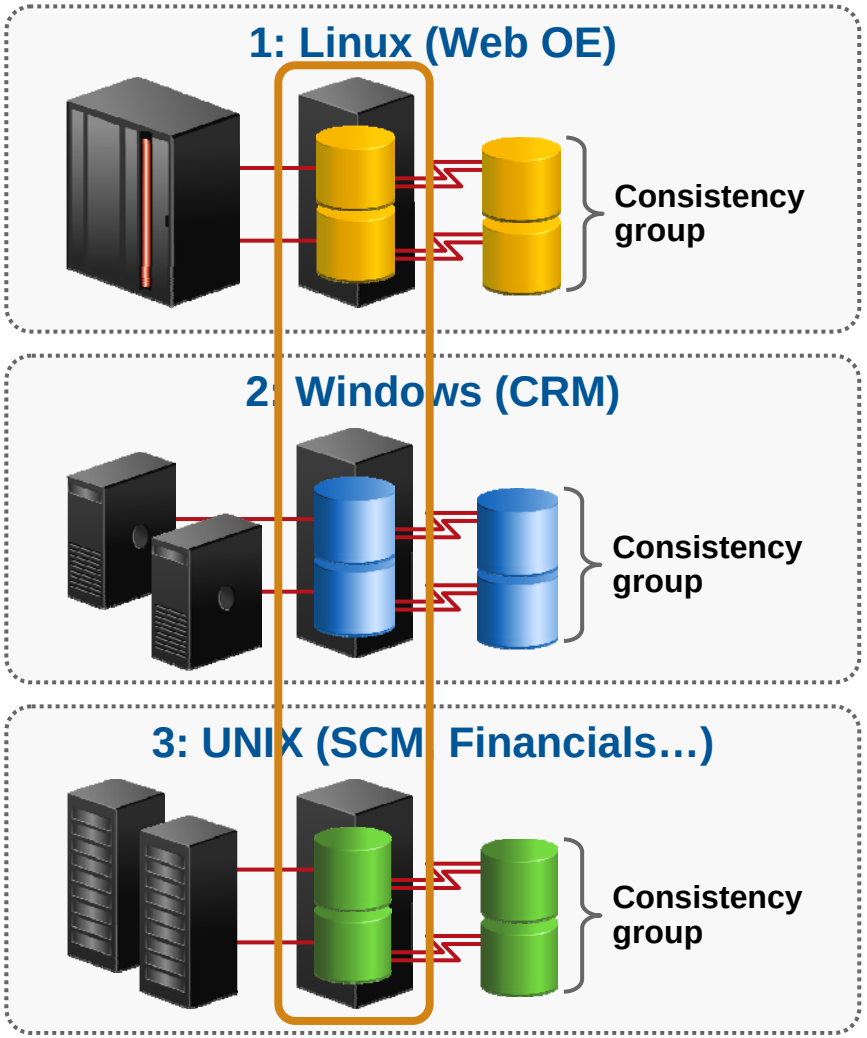
Grouping for a Consistent View

- 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



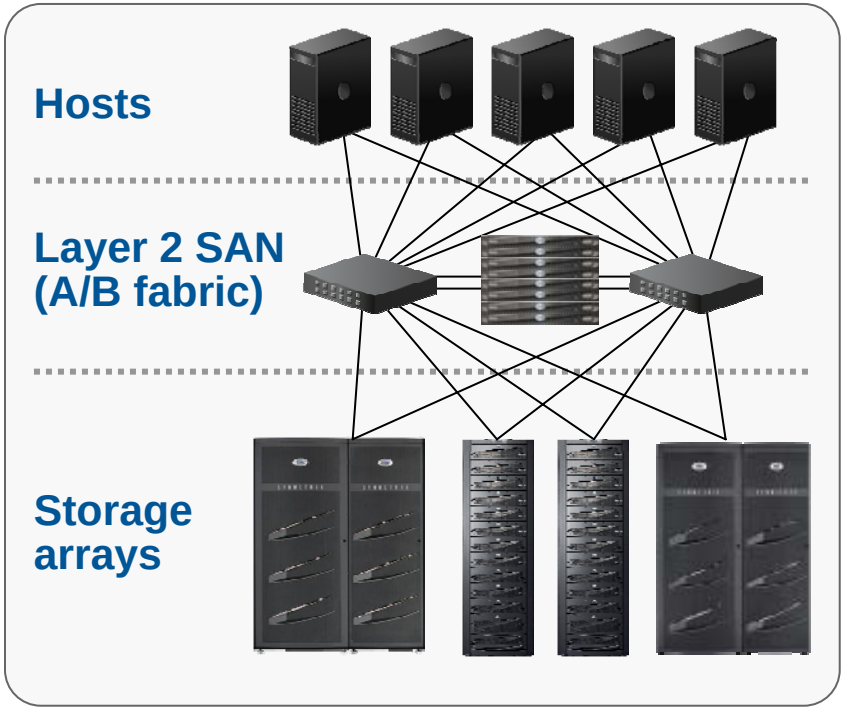
Grouping for Federated Environments

- 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



High-Availability Configuration

- Mirrored SAN
  - Two separate SANs
  - Supports nondisruptive firmware upgrades
  - Provides high availability for switch configurations through fault isolation
  - LUNs can be protected across both fabrics
- RecoverPoint is a multi-node cluster
  - Active-active configuration
  - Load distribution
- Multiple appliances
  - Appliance failure does not interrupt protection or recovery operations
  - Support for switch upgrades (hardware and firmware)
  - Performance scales with additional appliances



EMC is Building a Heterogeneous, Multi-Vendor, Standards-Based Solution

Industry Leaders as Partners

CISCO

Robust Heterogeneous System Qualification

EMC	**HP**	**HDS**	**IBM**
Sun Solaris	**Microsoft Windows**		**Red Hat/SUSE Linux**
IBM AIX	**HP-UX**		**VMware**

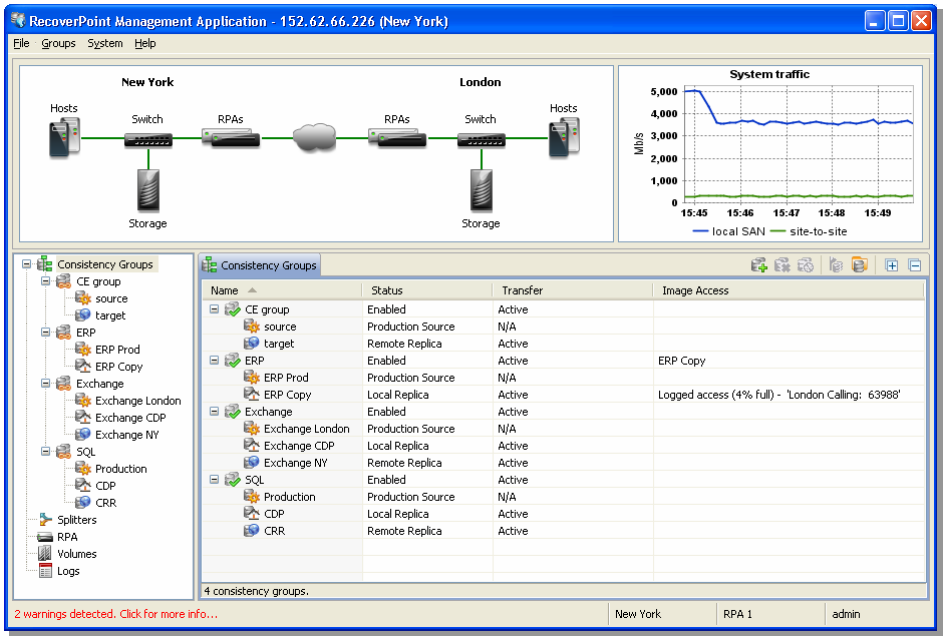
Consult the "EMC Support Matrix" on EMC.com for qualification and support details.

RecoverPoint Enhancements

New with RecoverPoint V3.1

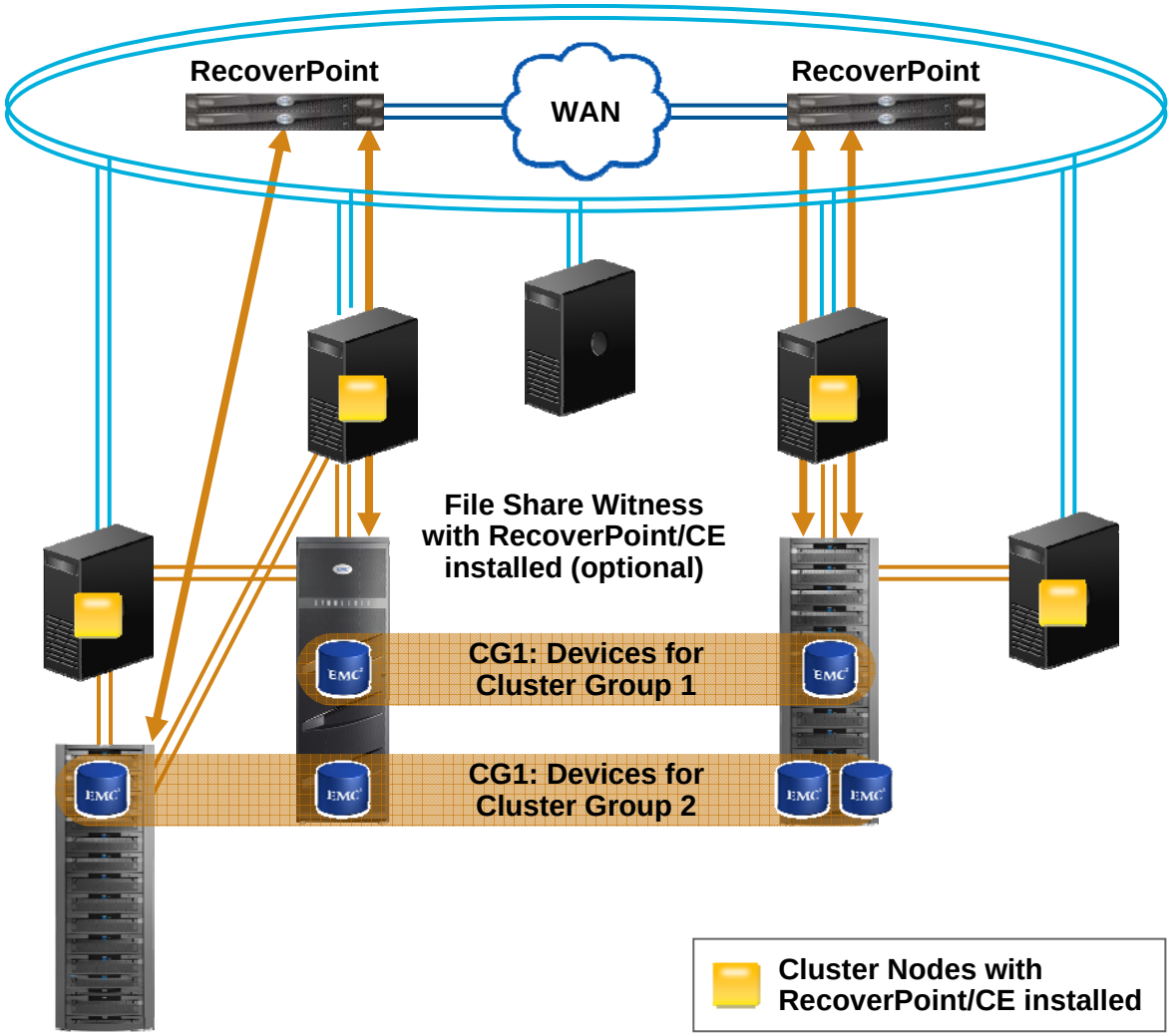
New

- RecoverPoint/Cluster Enabler
  - Integrates with Microsoft clusters to enhance application availability
- Snapshot consolidation
  - Enables longer-term recovery with same storage consumption
- Stretched CDP
  - Provides synchronous replication up to 30 kilometers
  - Enables cascaded RecoverPoint for three-site multi-hop disaster recovery configurations
- Virtual Provisioning support
  - Supports CLARiiON CX4 and Symmetrix DMX
  - Replication of thin LUNs preserves storage allocation policies
- Replication over Fibre Channel
  - Preserves existing financial investments
- Performance and scalability improvements
  - Protects more applications with existing investments
  - Protects more applications quicker



RecoverPoint/Cluster Enabler

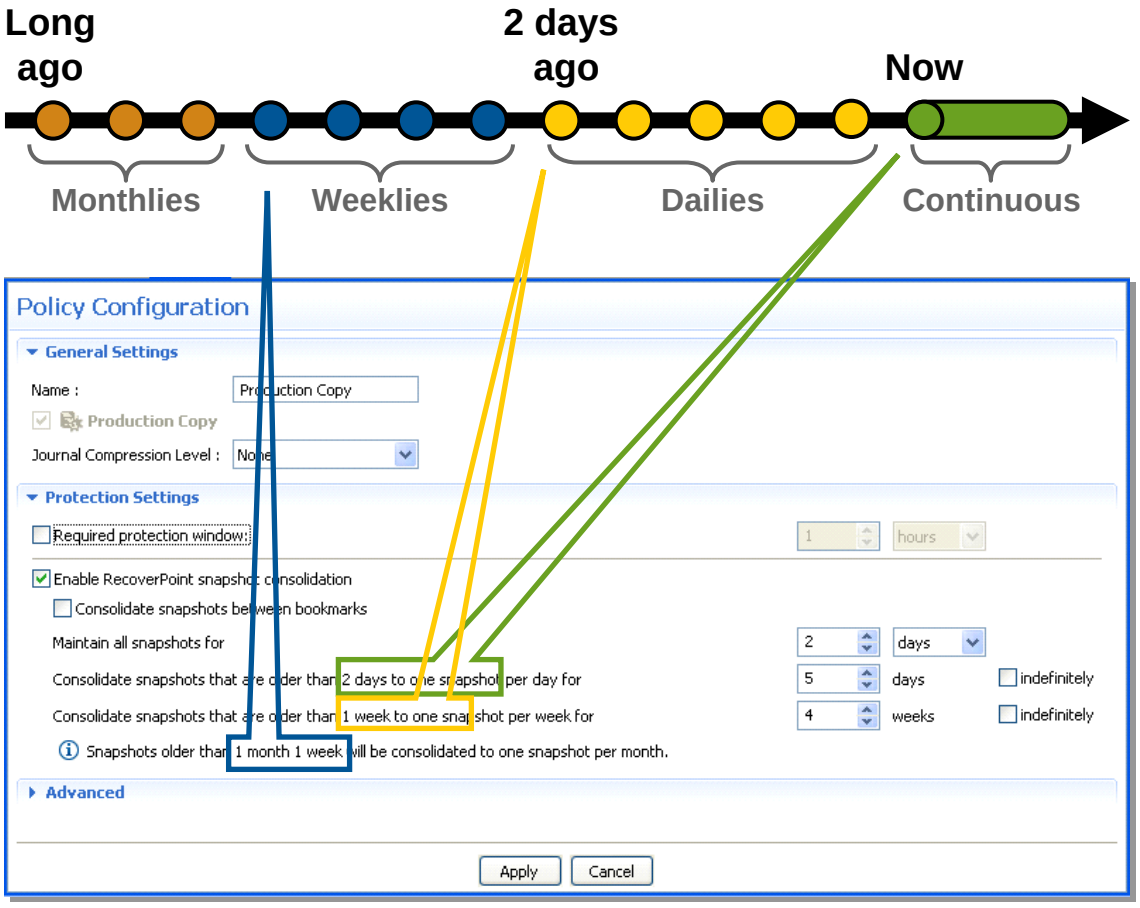
New in V3.1



- Each named cluster group's associated devices reside in a single RecoverPoint consistency group of the same name
- Supports Microsoft Cluster Server on Windows Server 2003 and Microsoft Failover Cluster on Windows Server 2008 Enterprise and Datacenter Editions

RecoverPoint Snapshot Consolidation

New in V3.1



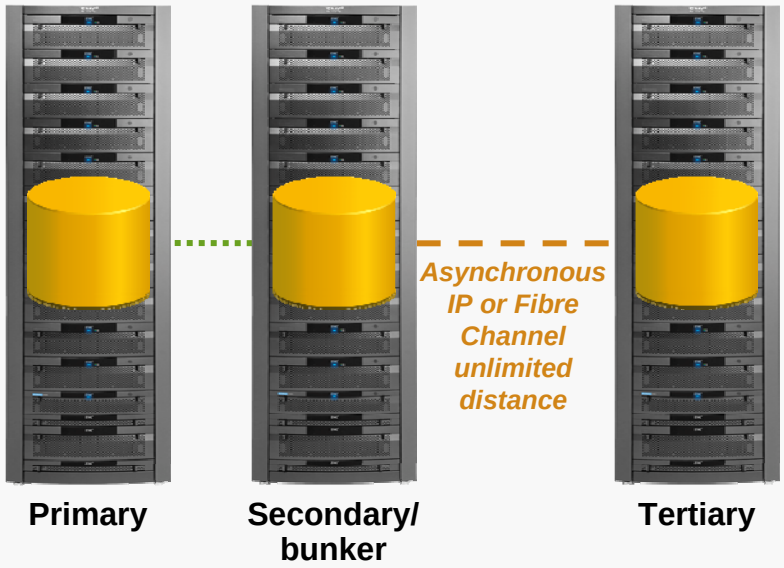
- Continuous recovery points
- Daily recovery points
- Weekly recovery points
- Monthly recovery points

RecoverPoint Stretched CDP

EMC² where information lives

New in V3.1

RecoverPoint Data Protection



Stretched CDP

- Enables CDP deployment over extended, dual-fabric SAN between two sites
- RecoverPoint only; not available for RecoverPoint/SE

Cascaded RecoverPoint

- Synchronously replicate to secondary or bunker site with stretched CDP
  - Secondary site can take over production in the event of primary site failure
- Asynchronously replicate to remote tertiary site with CLR
  - Remote site can take over production in the event of a primary or bunker failure

RecoverPoint Virtual Provisioning Support

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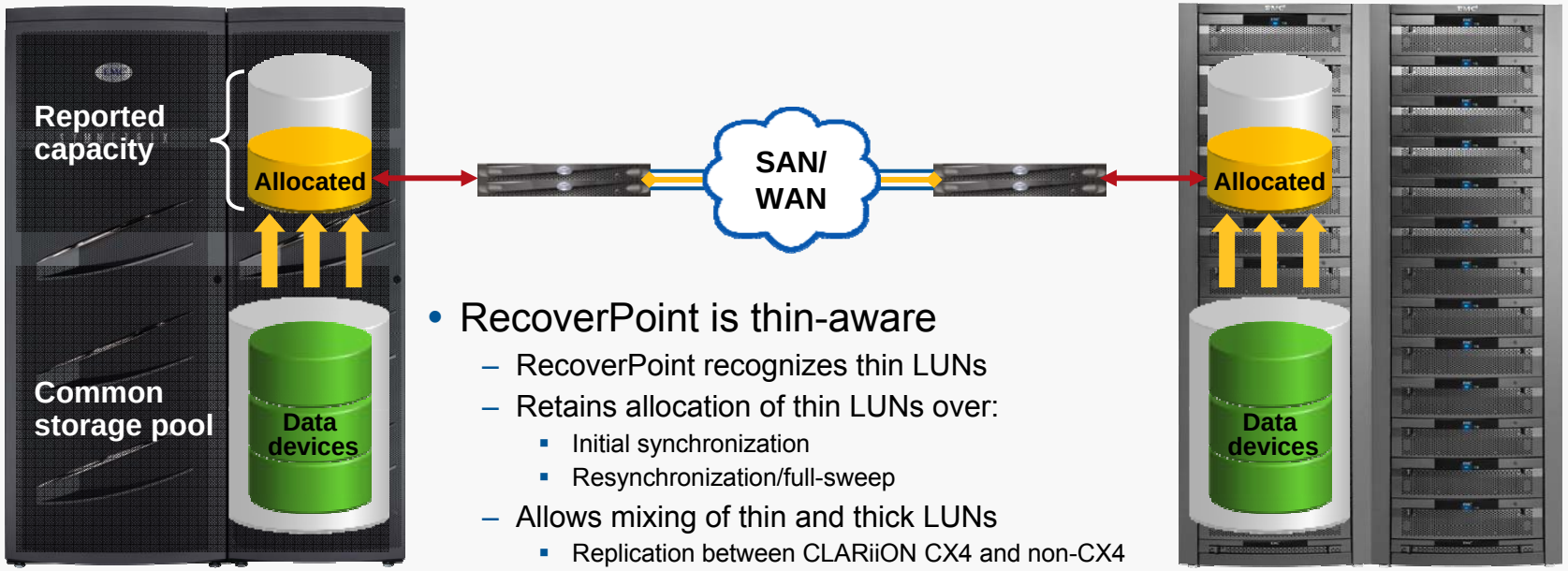
New in V3.1

RecoverPoint Understands Allocated Capacity



Symmetrix DMX-3/DMX-4

- RecoverPoint is thin-aware
  - RecoverPoint recognizes thin LUNs
  - Retains allocation of thin LUNs over:
    - Initial synchronization
    - Resynchronization/full-sweep
  - Allows mixing of thin and thick LUNs
    - Replication between CLARiiON CX4 and non-CX4
  - Virtual-to-virtual (thin-to-thin) replication
    - Between Symmetrix DMX to DMX, CLARiiON CX4 to CX4, and DMX to CX4

CLARiiON CX4

Available for CLARiiON CX4 and Symmetrix DMX-3 and DMX-4

RecoverPoint Replication over Fibre Channel

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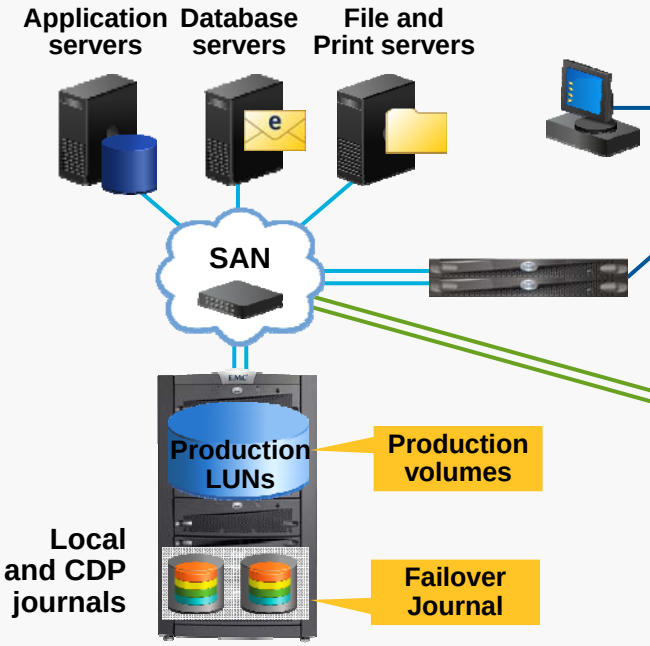
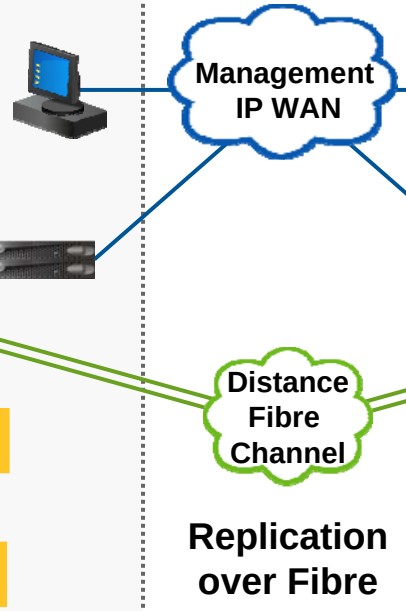
New in V3.1

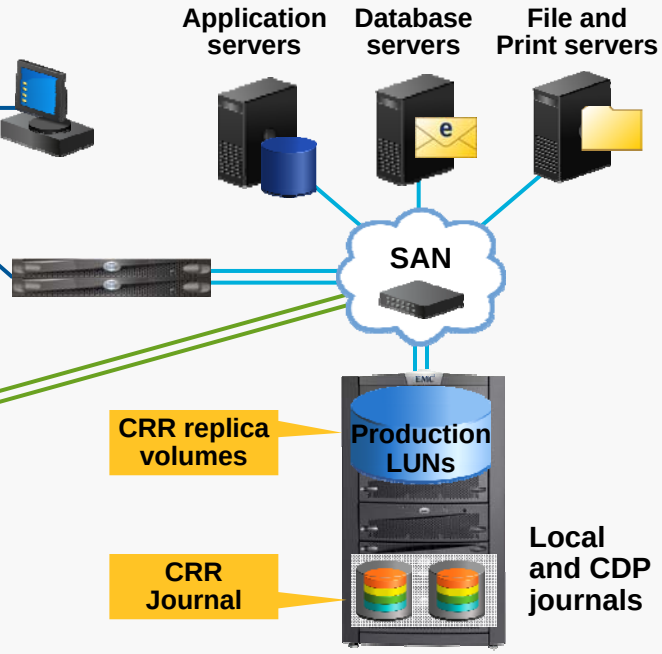
Primary Site



- Supports asynchronous remote replication over Fibre Channel
  - Distance subject to specific configurations*
- Enables use of existing Fibre Channel infrastructure
- May support more throughput than existing IP



Remote Disaster Recovery Site



- Specific requirements for replication over Fibre Channel
  - All Fibre Channel ports on all RecoverPoint appliances must be in same zone
  - Replication mode fixed at install, IP, or Fibre Channel only
- Dual fabric—must be extended to remote site
  - SAN infrastructure must be on EMC Support Matrix
- Servers and splitters must be at both sites

* *Refer to the EMC Support Matrix (starting in December 2008) for guidance*

RecoverPoint Performance and Scalability

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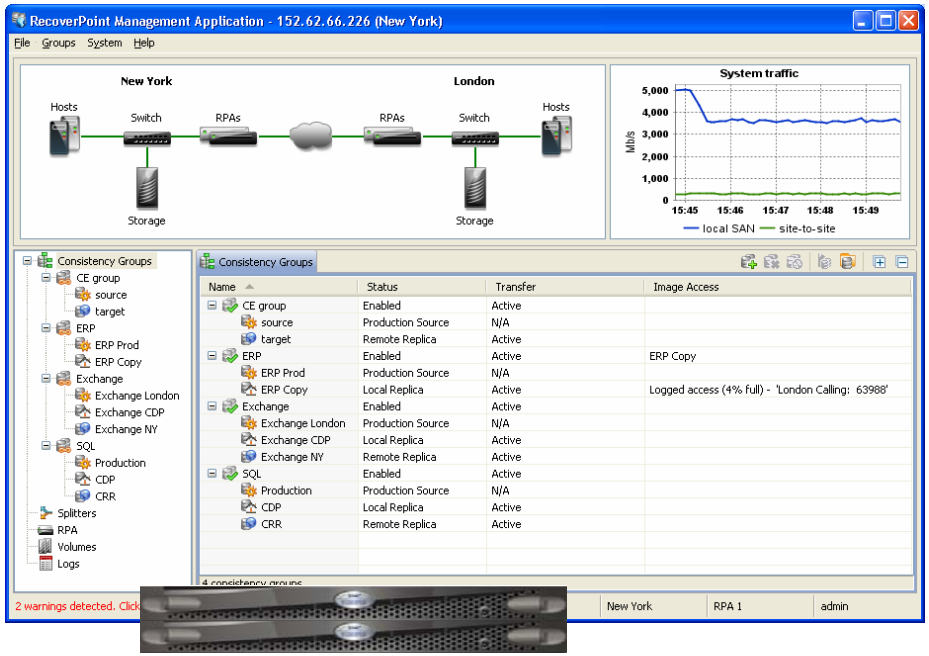
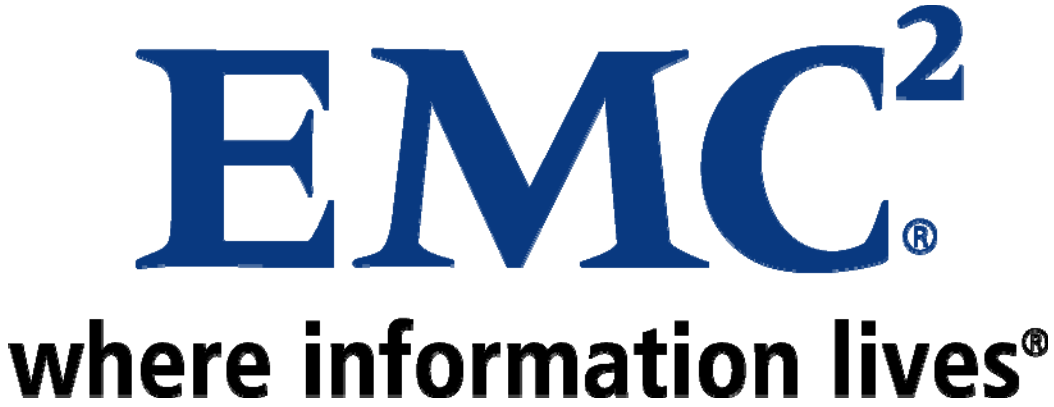
New in V3.1

- Each RecoverPoint appliance can support up to 64 consistency groups
  - Up to 64 consistency groups can be active at any time
  - Up to 128 consistency groups can be active during failure
- A RecoverPoint configuration supports up to 128 consistency groups
- Initial synchronization and replication performance
  - Each RecoverPoint appliance can initialize the remote LUNs at speeds exceeding 100 MB/s
  - Each RecoverPoint appliance will operate at almost 60 MB/s sustained for local and remote replication
- Compression performance
  - Performance for compression has been increased, reducing elapsed time
- RecoverPoint supports 2,048 replication sets
  - A replication set has the production volume and a local and/or remote copy
  - Up to 6,144 LUNs can be supported by RecoverPoint

Summary

- Lowest total cost of ownership
  - Consolidation of server, storage footprint (capital expenditure)
  - WAN bandwidth reduction (operational expenditure)
- Integrated EMC array support
  - CLARiiON based splitter on CX3 and CX4
  - Virtual Provisioning support for Symmetrix DMX and CLARiiON CX4 series
- Intelligent SAN-switch integration
  - RecoverPoint supports EMC Connectrix using Cisco technology
- Any-point-in-time recovery
  - Data rollback at the local and/or remote site
- Highest availability, highest performance
  - Network-based architecture optimized for application availability and performance
- Heterogeneous support
  - RecoverPoint supports spectrum of host, storage, and SAN elements

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