

## EMC Invista

### Making virtual storage a reality for your enterprise

#### The Big Picture

- Simplify the non-disruptive movement of data across a multi-tiered heterogeneous environment
- Reduce unplanned or planned outages— increase availability while business applications remain online
- Unique split-path virtualization architecture: next-generation stateless architecture overcomes limitations of virtualization products that cache data
- Reduce the time and costs associated with moving data non-disruptively
- Utilize your storage assets more efficiently, effectively, and economically
- Leverage your entire multi-vendor storage environment to meet today's—and tomorrow's—business demands

#### Virtualized storage addresses today's IT and business challenges

Enterprise computing environments are larger and more complex than ever. As organizations grow, the demand on IT to deliver on the information requirements of the business grows accordingly. For most organizations, this means constructing complex IT infrastructures that can deliver the right information to the right place at the right time, twenty-four hours a day, seven days a week. Businesses require non-disruptive information availability and are unwilling to endure infrastructure downtime when delivering on the needs of the business.

In addition to unplanned events such as natural and man-made disasters, planned downtime is an IT reality today, accounting for 60 to 75 percent of all downtime. Some of the key reasons for planned downtime are scheduled maintenance, lease roll-overs, technology refreshes, data center migrations/additions, and moving data to the most appropriate tier of storage. The cost of downtime to the enterprise can be staggering.

Enterprise-class infrastructures typically include multi-vendor server environments, diverse connectivity technologies, and multi-vendor tiered storage environments. Organizations require the ability to allocate any storage to any application based on the needs of the business, and to do so non-disruptively. Networked storage virtualization enables organizations to deliver the right information at the right performance level and the right functionality to the business at the lowest total cost.

EMC® Invista® is a solution that enables the virtualization of storage in networked storage environments that dramatically reduces the amount of downtime associated with the movement of data across storage tiers in support of information lifecycle management (ILM) strategies.

Unlike other offerings, EMC Invista places the virtualization intelligence in the network—where that intelligence is applied—and where it does not impact server performance or data integrity. The results: non-disruptive application availability, reduced administrative overhead, more effective and efficient use of storage resources, and reduced cost—all leading to greater business value from the advantages of a tiered storage ILM strategy.

#### EMC Invista overview

The industry believes it is critical to implement virtualization within an intelligent switch environment in an open, non-proprietary fashion.

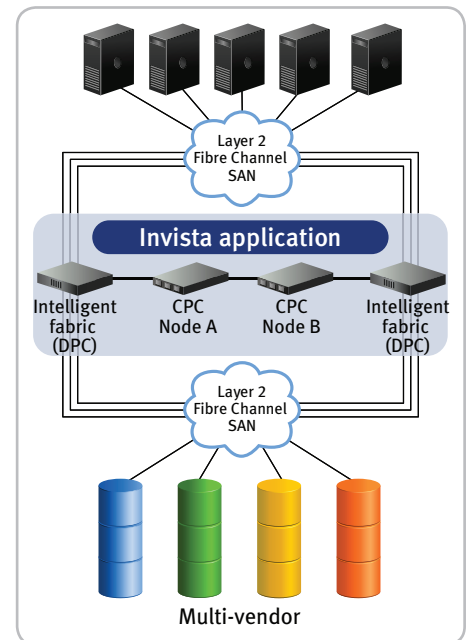
EMC Invista leverages intelligent SAN switches for deployment of network-based storage virtualization. Invista takes advantage of additional specialized processing power in the switch to perform the basic operation of virtualization (I/O redirection) at wire speed. The intelligent switch is a high-performance platform that can be incorporated into existing SAN infrastructures.

EMC is an active participant in an industry-wide effort around network-based storage virtualization and has made a key architectural decision to leverage an open, standards-based approach that writes to vendor APIs rather than develop custom code for each supported switch platform. EMC Connectrix® switches, using Cisco and Brocade technology, give our customers the widest choice of intelligent switches.

Deploying Invista involves both hardware and software. Invista software runs on an out-of-band Control Path Cluster (CPC)—a dual-node cluster, which configures and interacts with intelligent switch(es) of the customer's choosing. The intelligent switches may be new switches, or, depending on the switch and vendor, customers may be able to upgrade their existing switches (by adding an intelligent line card). To increase solution availability, the two nodes of the CPC can be separated in different racks within a single site (up to 500 meters or 1,640 feet maximum).

EMC Invista is managed either via a remote Web-based GUI, command-line interface, or through EMC ControlCenter® software. EMC ControlCenter is EMC's industry-leading family of storage resource and device management software that enables you to simplify and automate tasks such as reporting, planning, and provisioning through a single console, with a consistent information-centric approach.

Hosts can connect directly to the intelligent switches or connect through a standard Layer 2 (non-intelligent) front-end fabric for fan-in. Storage arrays can be connected to the intelligent switches directly and/or via a back-end fabric. This implementation is designed to require minimal changes to most standard SAN configurations, making EMC Invista easy to deploy.



## The EMC advantage

EMC's vast experience in managing the data path and designing high-performance, highly reliable storage controllers makes us uniquely qualified to design, build, and deploy a network-based storage virtualization solution. With an approach that leverages port-level processing in intelligent switches and a highly scalable architecture, only EMC Invista has the performance and scalability that makes it suitable for deployment in enterprise data centers. Only EMC Invista runs on intelligent-switch platforms from all the major switch vendors.

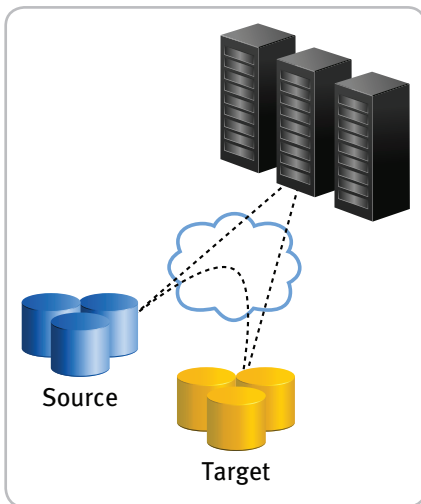
## Dynamic volume mobility

Once the foundation of a storage volume with a virtual address is in place, additional high-value services can be layered on top to take advantage of the flexibility offered. One such service is dynamic volume mobility. As shown in the figure, dynamic volume mobility allows storage administrators to move volumes from one location to another without application disruption.

### Example: Lease Rollover Process

- 1 – Select source array for removal
- 2 – Select target array to move the data to (Data is moved without host impact.)
- 3 – Source array can be safely disconnected (Application remains online.)

To move a storage volume, Invista performs a re-direction of I/O (copy is made in the background) from one physical location to another. Despite the fact that the I/O is physically redirected to a new location, the address of the virtual volume presented to the host never changes; this is accomplished through virtual LUN addressing that allows the process to be transparent and non-disruptive to the host. Additionally, since Invista does the copy, no host processing cycles are required.



The illustration presents a look at how EMC Invista might be deployed in a SAN. A new, intelligent core is created for the network with intelligent switches (which may be switches or directors with intelligent blades, depending on the vendor implementation), and the distributed Control Path Cluster (CPC). The CPC is connected to the intelligent switches.

## Dynamic volume mobility enables non-disruptive operations

A number of very valuable real-world uses for this dynamic volume mobility include:

- Lease rollovers or technology refreshes
- Data movement across multi-tiered heterogeneous environments to support the implementation of information lifecycle management strategies
- Data movement to respond to rapidly changing I/O performance needs

### Lease rollovers or technology refreshes

One significant challenge organizations have today is getting new arrays deployed in their environments. Migration solutions are complex, manual, and disruptive, making the process labor intensive, complex, and inefficient. Dynamic volume mobility can significantly improve the process.

An organization can bring a new array into the environment and then set a mobility job in motion to copy the data from the source to the new array. All the copying occurs in the background, without host impact or application downtime. Once the copy is complete and consistent, the cutover occurs and I/O is redirected to the new array and the old array can be removed.

### Enabling implementation of tiered storage

A key enabler for ILM, networked storage virtualization allows organizations to leverage the non-disruptive movement of data across different tiers of heterogeneous storage efficiently and quickly. For instance, a communications company has a business requirement to maintain their high-priority call records in the month generated on a tier-one storage platform. Once billing occurs, this rarely used data can now be moved non-disruptively to a tier-two platform.

This seamless, heterogeneous information mobility capability, based on dynamic business requirements, is key to supporting advanced information lifecycle management strategies.

### Performance moves

Networked storage virtualization can also facilitate performance moves. A SAN can have both medium- and high-performance storage pools and these pools can be from a mixed variety of vendors. When a storage administrator observes that a volume in the medium-performance pool is not meeting a specified SLA, a job can be set in motion to migrate this volume into the high-performance pool non-disruptively.

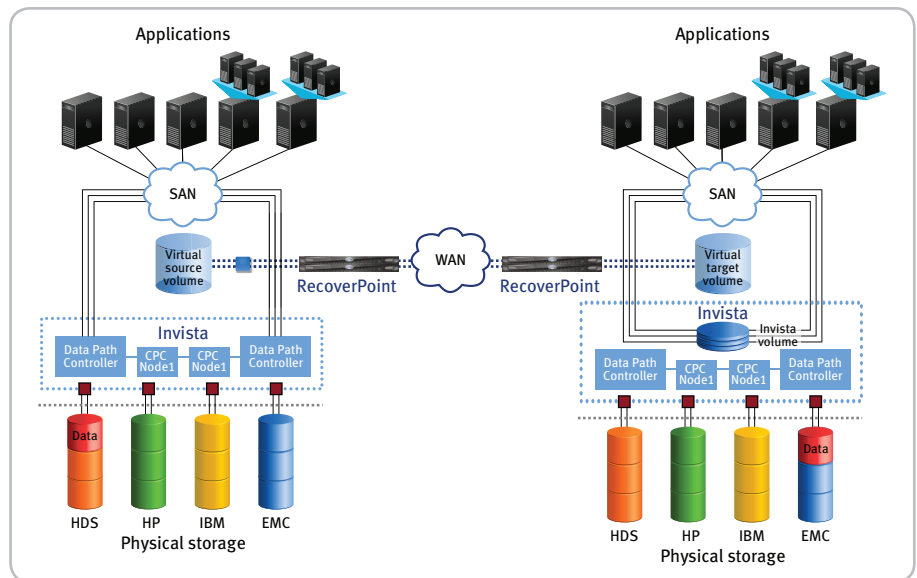
Just as in the lease rollover example, a copy is performed in the background with no host impact and no application interruption. Once the copy is complete and consistent, I/O is redirected to the new volume in the high-performance pool. Policy-based automation capabilities delivered by EMC will transparently and automatically optimize the performance of the storage infrastructure in accordance with business requirements.

## Network-based volume management offers storage management simplicity and efficiency

Network-based volume management is the ability to create and configure Invista storage volumes from a heterogeneous storage pool and present them back to hosts. Networked storage virtualization solutions can aggregate capacity from many different types of storage arrays. Users choose which volumes from a given array they wish to virtualize and then dedicate that capacity to a storage pool. Individual volumes which then get created and presented to hosts are subsets of the virtualized capacity from these pools. Volume size and structure are completely independent of structural restrictions imposed by the arrays.

Once created, hosts are presented the storage volume (or virtual LUN) from the network. This storage volume appears to a host just like a standard SCSI volume from an array. The core function of network-based volume management is the mapping of the virtual LUN to the corresponding physical storage.

Invista-based volume management reduces the need to deal with individual hosts or to load host-based software. Today, administrators can spend 20 to 30 percent of their time on volume management-related tasks. By centralizing volume management in the network, IT organizations can significantly reduce the amount of time spent on these types of tasks, freeing up resources to focus on other areas that are more critical to the business.



## Network-based local and remote replication increases flexibility across tiered storage infrastructures

Network-based local replication provides additional flexibility and choice. With EMC Invista, businesses can create heterogeneous local point-in-time copies of their production data.

For instance, a business could copy data from their tier-one to their tier-two storage to create an additional copy for backup, data warehousing, or other secondary uses. Since it is replicated via the network, data can be copied to and from any supported array platform (for example, Hitachi to EMC CLARiON®).

As the industry leader in the replication segment, EMC will continue to innovate and provide a wide range of replication options (array-, network-, or host-based) to meet our customers' business requirements.

EMC RecoverPoint continuous remote replication provides asynchronous, network-based remote replication. RecoverPoint performs remote replication at the network level, enabling virtual-volume-to-virtual-volume replication, allowing IT managers to employ virtualization technologies across multiple sites for disaster tolerance and enhanced availability. RecoverPoint can also enable virtual-volume-to-physical-volume replication. Additionally, businesses can opt to virtualize their storage while still continuing to leverage (no rip and replace) their array-based replication technology such as Symmetrix® Remote Data Facility (SRDF®).

As your business requirements grow, EMC Invista will grow with you. Invista's scalability, reliability, and performance are unparalleled and EMC's globally acclaimed service and support ensure you will get the maximum value from your information at the lowest total cost, at every point in its lifecycle.

## EMC Services for the IT lifecycle

EMC Services delivers results to our customers throughout the IT lifecycle: plan, build, and manage. Strategic storage consulting services from Information Solutions Consulting help companies achieve the maximum value from their information, at the lowest total cost, at every point in the information lifecycle. EMC delivers product-specific point solutions in addition to comprehensive custom planning, design, implementation, and integration services for EMC technology—everything from consolidation of your current resources to a transformation of your environment to achieve information lifecycle management. EMC Customer Service—six-time winner of the SSPA STAR Award for outstanding mission-critical support—helps you keep your information available 24/7 to deliver competitive advantage and drive revenue. And EMC Global Education drives the value of your investment with a comprehensive portfolio of customer courses.

Ask your EMC sales representative about the full spectrum of services from EMC that can benefit your organization.



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### Take the next step

For more information on EMC Invista, the most advanced storage virtualization and non-disruptive data mobility solution available today, contact your EMC sales representative. You can also visit our website at [www.EMC.com](http://www.EMC.com) or, in North America, call EMC directly at 1-866-464-7381.