

# Deploying a Virtual Infrastructure for SAP with EMC and VMware Technologies

*Applied Technology*

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## ***Abstract***

This white paper describes technical and business considerations for deploying a virtual infrastructure for SAP landscapes with EMC and VMware technologies. The paper addresses a variety of key considerations for deploying such an infrastructure. Specifically, the paper provides example deployment options for the main layers of the infrastructure, including the host or compute layer, the connectivity layer, and the storage or information layer.

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## Executive summary

Today it is not uncommon for IT departments to support eight to 10 production environments, each with its own servers including those for production, disaster recovery, backup, quality assurance, test, training, development and sandbox. These SAP landscapes, sprawling with servers and storage, tend to be highly federated with stringent performance, business continuity, backup and recovery requirements. In addition, there is a growing need to streamline SAP upgrades, migrations and maintenance.

EMC® and VMware® are working together to help customers build robust infrastructures to support their SAP deployments.

## Introduction

This paper describes technical and business considerations for deploying a virtual landscape for SAP. The paper addresses a variety of key considerations for deploying virtual SAP infrastructures. Specifically, the paper provides example deployment options for main layers of the infrastructure, including the host or compute layer, the connectivity layer, and the storage or information layer.

The paper draws upon SAP use cases that leverage the following VMware and EMC virtualization technologies:

- VMware ESX™
- VMware vMotion
- VMware vCenter Site Recovery Manager (SRM)
- EMC® Invista®
- EMC RecoverPoint
- Smarts® Application Discovery Manager (ADM)
- Smarts IT Compliance Analyzer Application Edition (AE)

Readers of this paper will gain valuable insight into IT and business considerations for deploying virtual IT infrastructures within SAP landscapes.

## Audience

This white paper is intended for individuals interested in learning about virtual infrastructure alternatives for SAP landscapes and the applied technologies, design concepts, and planning considerations that support them. CIOs, application and datacenter managers, SAP Basis Administrators, DBAs, and system and storage architects can all derive benefit from reading this paper.

## Business and IT challenges for SAP

SAP project teams and IT executive managers face continuous changes within their SAP landscape, whether it be from expiring product support and increasing maintenance fees, or a requirement to implement new functionality offered with the SAP NetWeaver platform and SAP Business Suite.

They are looking for new ways to address performance and capacity issues, manage integration and business consistency, and ensure minimal to no downtime.

In short, organizations are looking for better ways to manage their SAP landscapes throughout the application lifecycle—implementation, migrations, consolidations, upgrades and ongoing maintenance.

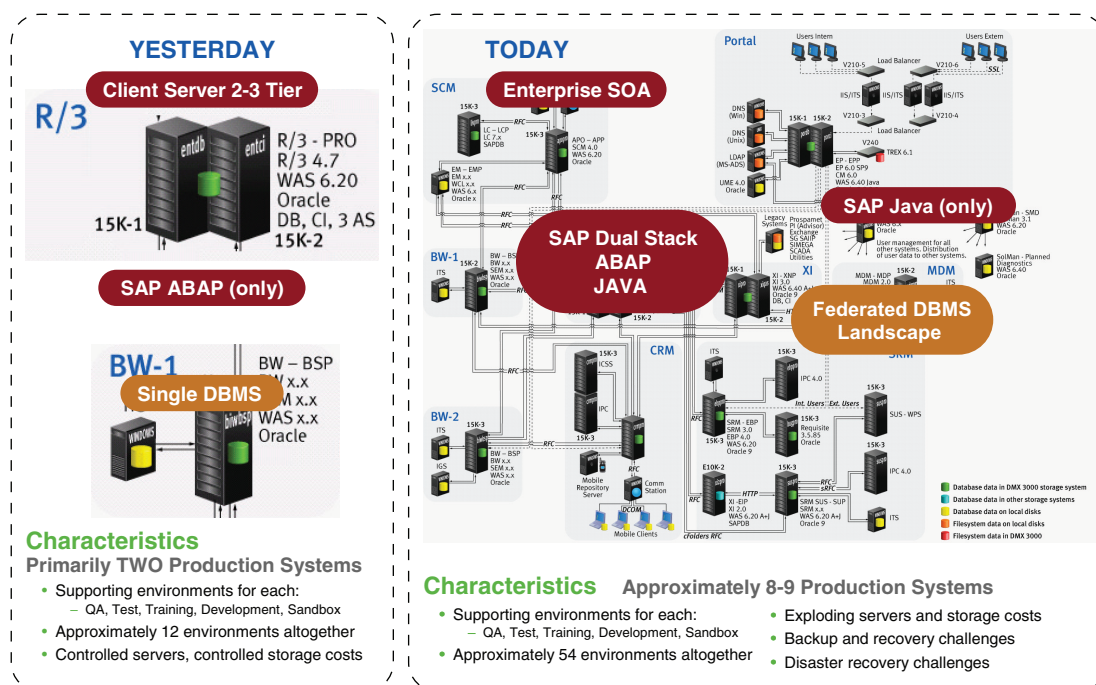
In addition to the requirement to find more efficient ways to manage SAP throughout the application lifecycle, growing SAP landscapes require ever-increasing capacity for power, cooling and floor space within datacenters.

The result is that many organizations are looking to change over to service-oriented infrastructures (SOIs) with virtual IT to reduce operating costs while improving service levels for the SAP landscape, including:

- Increased operational flexibility and efficiency: Rapid SAP software application and services deployment, and shortened time to productivity.
- Minimized risk and enhanced IT service levels: Zero-downtime maintenance capabilities and rapid recovery times for high availability, and streamlined disaster recovery scenarios across the datacenter.
- Optimized IT environments: Compliance monitoring and management of the complete enterprise IT server, network, and storage infrastructure.

Today, organizations typically fall into several categories of adoption:

- Organizations that are evaluating the possibilities of virtualization for SAP.
- Organizations that have a long-term plan for virtualization, but at this point are looking to virtualize non-production SAP environments only.
- Organizations interested in virtualizing the entire SAP landscape.



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Figure 1. The changing SAP landscape

## Why deploy a virtual datacenter for SAP?

### The SAP landscape

Virtualization makes it possible to pool common infrastructure resources and break the legacy “one application to one server” model. By virtualizing your SAP infrastructure, you can reduce hardware in the datacenter, which leads to reductions in real estate, power and cooling requirements and results in significantly lower IT costs. Virtualization also offers a new way of managing your SAP infrastructure and can help IT administrators spend

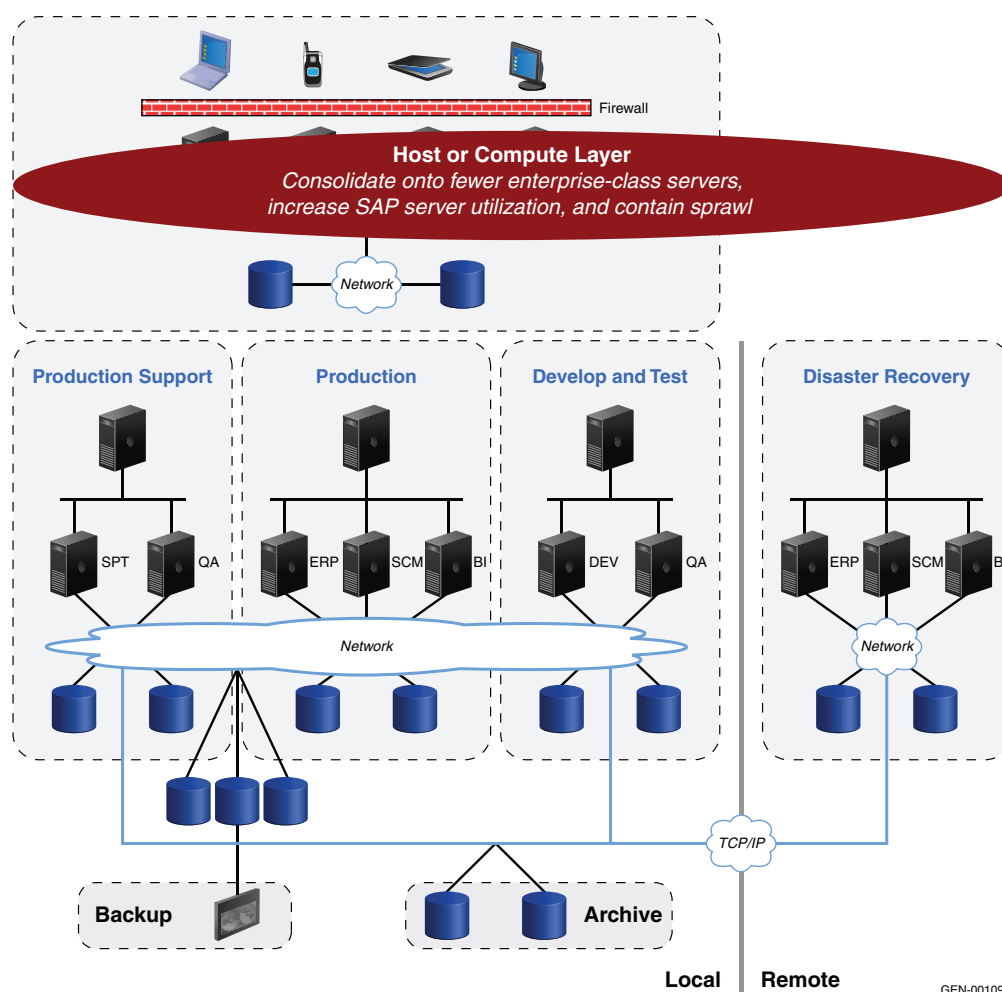
less time on repetitive tasks such as provisioning, configuration, monitoring and maintenance. It is now possible to securely back up and migrate entire virtual environments with no interruption in service, which leads to the ability to eliminate planned downtime and to recover quickly from unplanned outages.

## Host or compute layer

Today's servers are doubling in processing power every 18 to 24 months, and have been following that trend for decades. As a result, today's servers typically achieve 20%-40% processor utilization on a daily basis.

SAP deployments can generate significant server sprawl, primarily due to the need to provision separate systems for development (DEV), quality assurance and testing (QAS) and production (PRD) environments. Each SAP solution typically has its own system landscape, which contains, at minimum, a DEV, QAS and PRD environment. SAP enterprise environments can also contain multiple layers in the application architecture, including database, application server, and web server layers. In a typical deployment, every layer of the environment is hosted on dedicated physical systems that are not fully utilized at all times. Almost 66% of SAP implementations are built on the Microsoft® Windows® platform. These implementations have an average application server CPU utilization rate of 15%-20%.

Virtualization technology contains this server sprawl by running SAP application layers in virtual machines consolidated onto fewer enterprise-class servers, which results in increased server utilization.



**Figure 2. Host or compute layer**

## Connectivity layer

Network virtualization, provided by the switch hardware, guarantees quality of service (QoS) and eases administrative entanglement.

Today's networks provide virtualization to support isolation and secure transport over vendor-agnostic hardware. VLANs and VSANs are evolving for users who were reluctant to release administration and performance controls after moving to common networking hardware. Specifically, VLANs/VSANs provide an ideal alternative to combining diverse network traffic onto the same physical hardware while still providing administrative, diagnostic and performance isolation.

The connectivity layer not only carves up RAM and CPU utilization at the server level, it also carves up available bandwidth by virtualizing the channel, or pipe (a physical link can be divided into eight sublinks by resetting specific parameters). While this is not new for IP networks, it is relatively new for Fibre Channel networks.

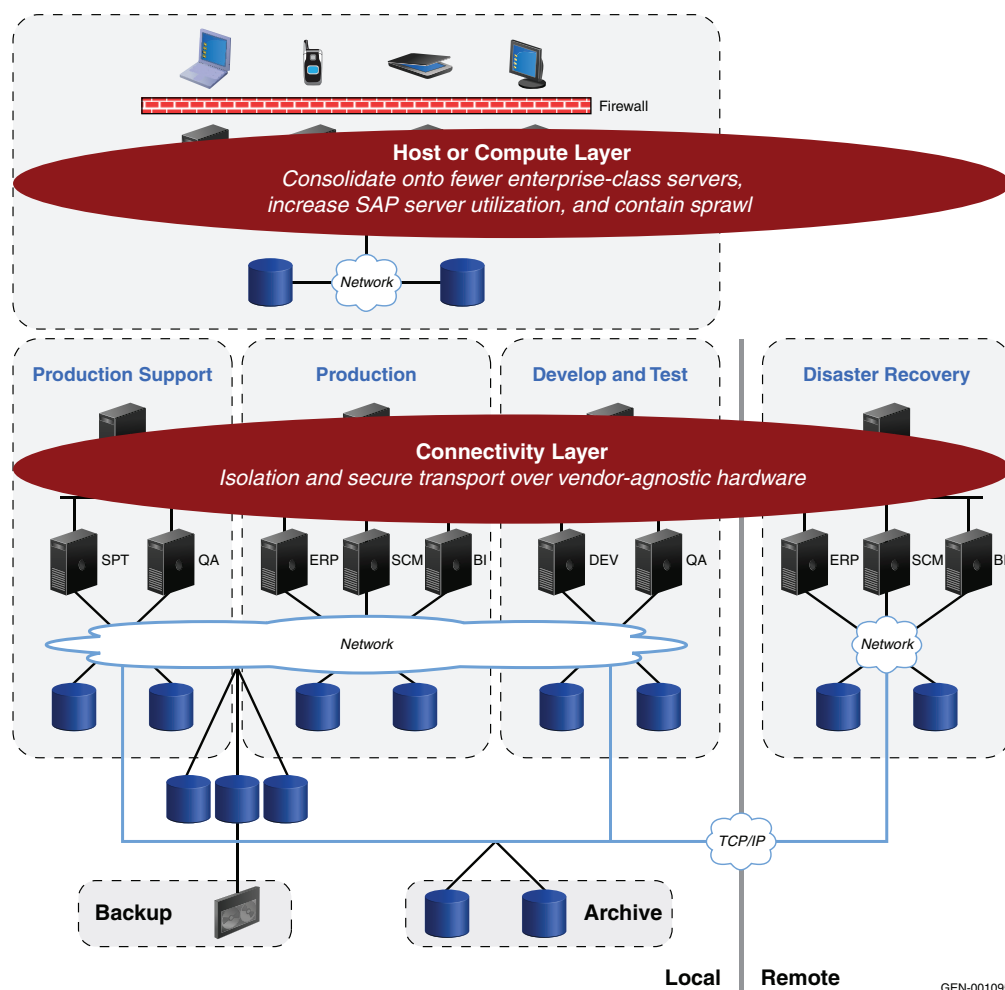


Figure 3. Connectivity layer

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## ***Storage or information layer***

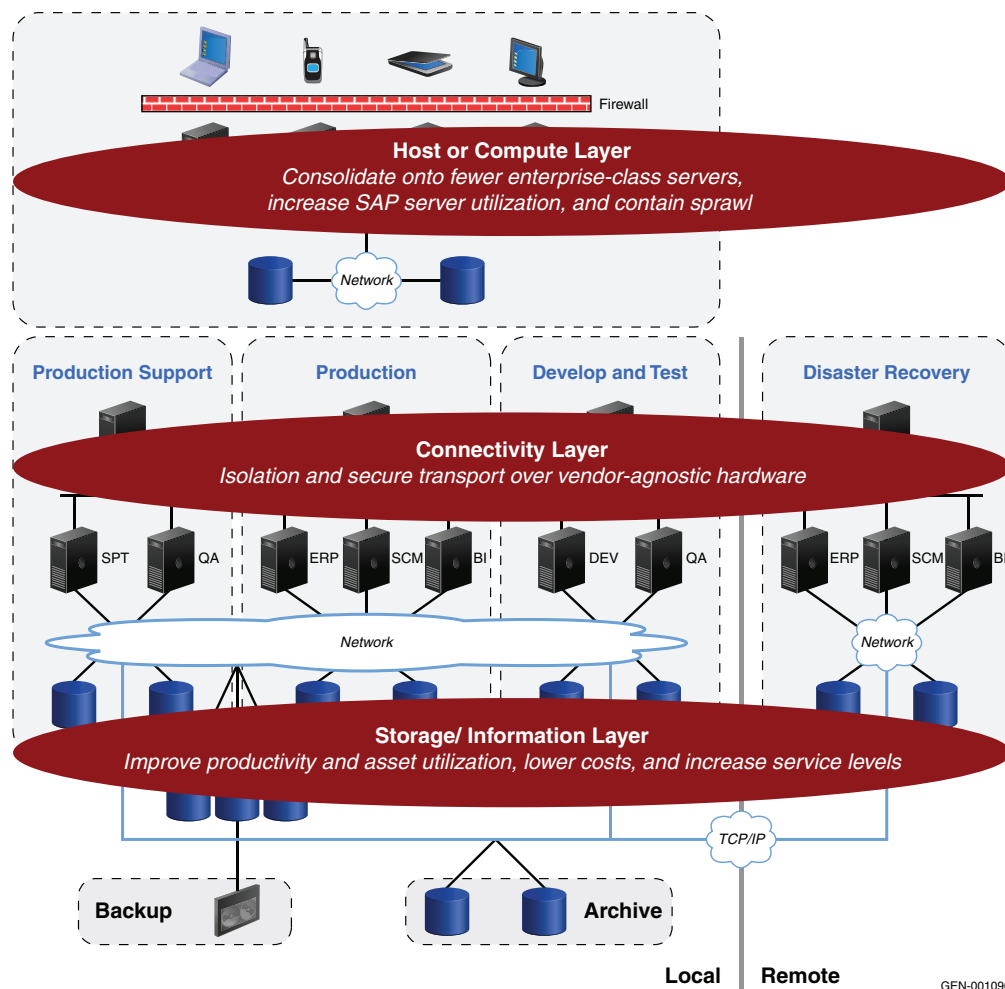
With storage growing at an annual rate of 50%-60%, IT organizations are seeking ways to improve productivity and asset utilization, lower costs, and increase service levels. Many IT organizations leverage a tiered storage strategy to provide the appropriate levels of performance, availability, recoverability and cost for a range of applications. While the tiering of storage infrastructure helps to optimize resources, the ability to move data without affecting application availability, and the ability to provide QoS at the array level become challenges. For example, the requirement to migrate data as part of a technology refresh can consume significant time and resources for both planning and execution. Also, when required to process peak month-end or quarter-end workloads, it is important to be able to move from lower performance disks to higher performance “flash” drives.

The relative ease of deploying virtualized servers has also created a new set of challenges with regard to performance prioritization. Not all virtual machines are created equal; virtual machines have different service levels associated with their end users. In complex, virtualized server environments it becomes paramount for the storage to provide complementary QoS functionality with the ability to prioritize the provision of storage resources to individual virtual machines when system contention exists.

Moreover, this solution must be able to guarantee that performance thresholds will be met during the specified interval. Depending on the SAP application performance profile, metrics such as throughput, bandwidth and response time can be used to determine the service level of a specified virtual machine. When the desired service level metric is identified, users can choose one of several control methods or goals and limits. The power of virtualization lies in the ability to provide solid SLA management.

Storage array-based virtualization addresses these challenges. It enables technology refreshes to occur efficiently while applications remain online. From a QoS perspective, it also provides a way to tune performance or reduce costs by non-disruptively moving data to the appropriate tier of storage at the appropriate time through the use of dynamic cache allocation and LUN migration. Finally, storage virtualization also provides a common mechanism for managing storage across heterogeneous storage platforms. This simplifies management and provides replication services that enable data protection and disaster recovery across heterogeneous assets. Research performed by the Enterprise Strategy Group found that early adopters of storage virtualization have seen a 19% average reduction in storage administration costs.





**Figure 4. Storage or information layer**

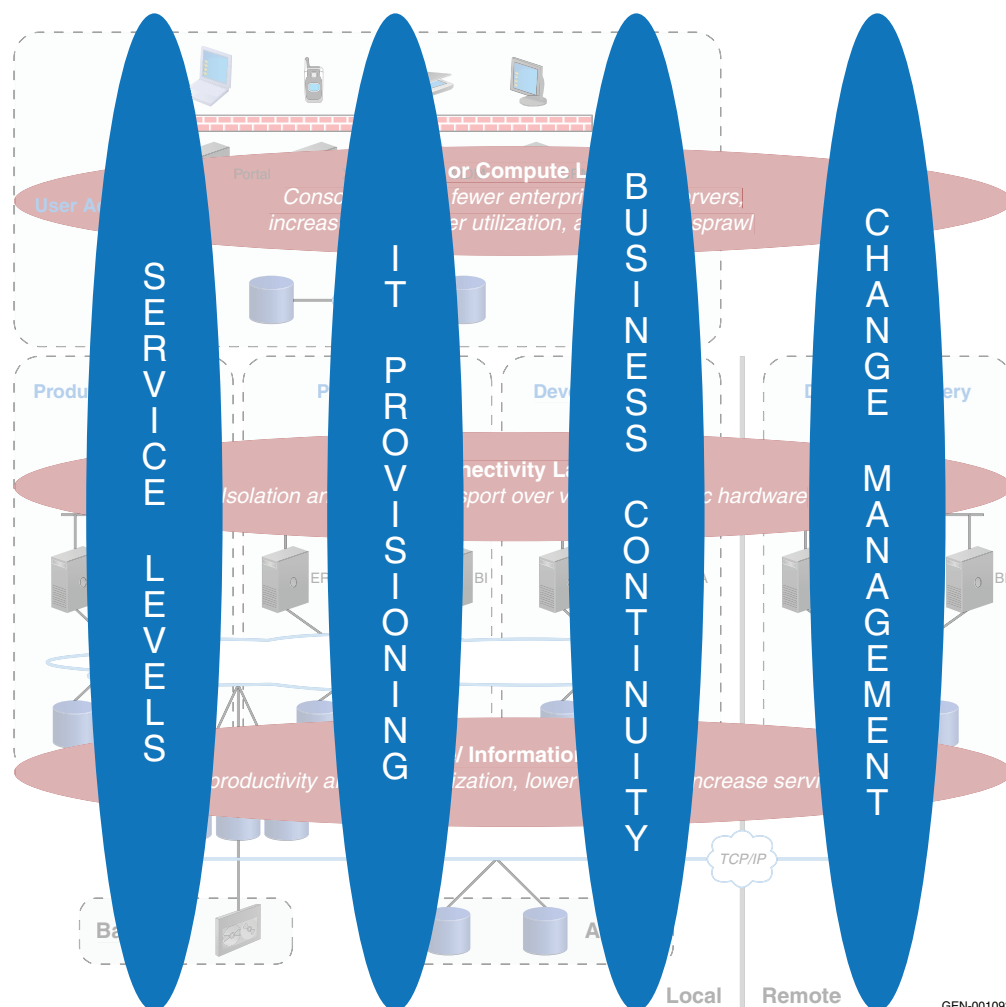
## ***Delivering value with virtual infrastructure***

As organizations deploy virtual datacenters for SAP, IT will be looking to deliver value to SAP project teams, administrators and end users to accelerate and lower the risk of deploying and managing SAP. Additionally, virtual infrastructure delivered as a service will need to support optimal production uptime and performance for 24/7 SAP shops.

IT organizations will align service offerings that dynamically provision infrastructure in areas such as:

- Service level management: Delivering on QoS with flexible and reusable infrastructure components that cross the host, connectivity, and storage layers.
- IT provisioning: Move to SOI to provision IT as a service instead of dedicated of physical equipment.
- Business continuity: As customers adopt virtual datacenter deployments, new options will be available for managing planned and unplanned downtime for higher-tier mission- and business-critical application environments such as SAP.

- Change management: Companies are looking to implement processes and best practices based on ITIL standards. With expanding governance and risk mitigation requirements for businesses, solutions that support expanded controls focused on SAP landscapes and supporting infrastructures will receive much attention in this area.



**Figure 5. No disruption to SAP landscape**

## Technology for SAP virtual datacenters

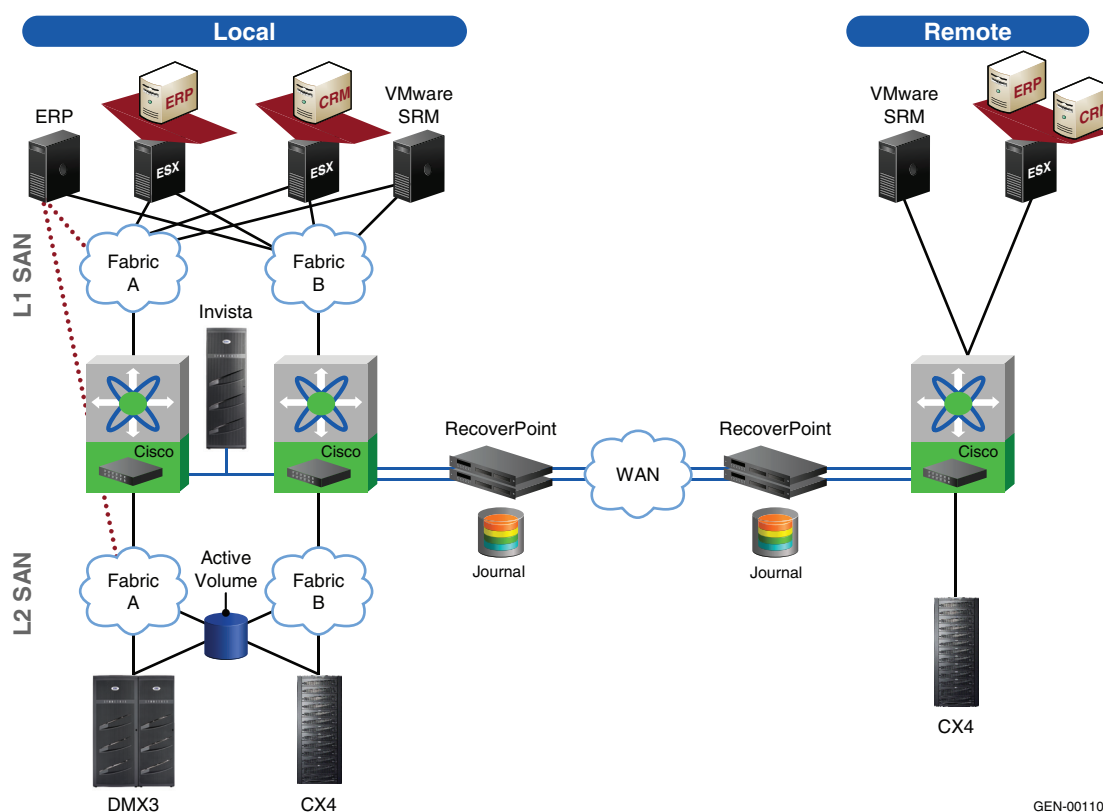
### *Reference architecture*

EMC developed a proof-of-concept (PoC) with the support of VMware and Cisco to demonstrate how EMC technologies work seamlessly to create an optimized virtual infrastructure.

- EMC Invista creates the underlying virtual storage and EMC RecoverPoint moves both virtual storage and virtual machines from the production site to the target site.
- Cisco SANTap functions are activated through the Cisco Storage Services Module (SSM), which provides the ability to split write activities at the VMware ESX host level to the Invista virtual storage and to the journal repositories.

- Two SAP system virtual machines (ECC IDES and CRM) are built on VMware ESX hosts on multiple Dell servers according to SAP recommendations.
- A two-way VMware ESX cluster shares the data stores where the SAP virtual machines reside. VMware VMotion technology moves whole VMs between ESX platforms.
- The logical devices created for the ESX data store where the SAP VMs reside are Invista virtual LUNs. An EMC Invista instance is built on the Cisco SSM, which is combined with Invista Element Manager to virtualize the storage target, host initiator relationships, and service the data flow.

Another key part of this PoC is the integration of EMC RecoverPoint and VMware vCenter SRM for automated DR testing and site failover. VMware SRM makes disaster recovery a property of virtual machines. It provides central management of recovery plans from VMware vCenter and turns manual recovery processes into automated recovery plans. VMware vCenter SRM simplifies and automates disaster recovery workflows into setup, testing and failover. EMC RecoverPoint consistency groups are mapped to VMware data store groups through a VMware vCenter SRM API plug-in. The RecoverPoint consistency groups contain snaps of entire SAP virtual machines and the attached disks, which enables straight-forward deployment and startup of the SAP virtual machines from the snaps.



**Figure 6. EMC proof of concept for SAP virtualization**

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## Hardware and software resources

The following tables list the hardware and software resources used to validate the PoC.

**Table 1. Hardware resources**

Equipment	Quantity	Configuration
EMC Symmetrix® DMX-3 1500	One	146 GB 15k drives
EMC CLARiON® CX4-480	Two	300 GB 15k drives
EMC Invista 2.1	One	Standard Invista configuration with a 2x CPC cluster and Allied Telesyn AT9848 L3 switches
EMC RecoverPoint 3.0	Four	Two local and two remote
EMC Smarts ADM	One	Version 6.0 local for SAP discovery, resource management, and interdependency mapping
EMC ITCA	One	Version 1.1 local for compliance management
Cisco 9509	Two	Dual SSM blades on each switch at the local site with SANOS 3.3; one blade for EMC RecoverPoint and one blade for EMC Invista
Cisco 9513	One	Dual SSM blades at the remote site with SANOS 3.3; both for EMC RecoverPoint
Dell PowerEdge 6850	Two	8 CPUs, 8 GB at the local site for ESX servers; separate SAP CRM and ECC instances on each server, capable of VMotion between servers for Dynamic Resource Scheduling
Dell PowerEdge 6850	One	8 CPUs, 8 GB at the local site for physical SAP ECC instance
Dell PowerEdge 6850	One	8 CPUs, 8 GB at the remote site for failover
Dell PowerEdge 2950	One	4 GB at the local site for VirtualCenter 3.5 with SRM
Dell PowerEdge 2950	One	4 GB at the remote site for VirtualCenter 3.5 with SRM

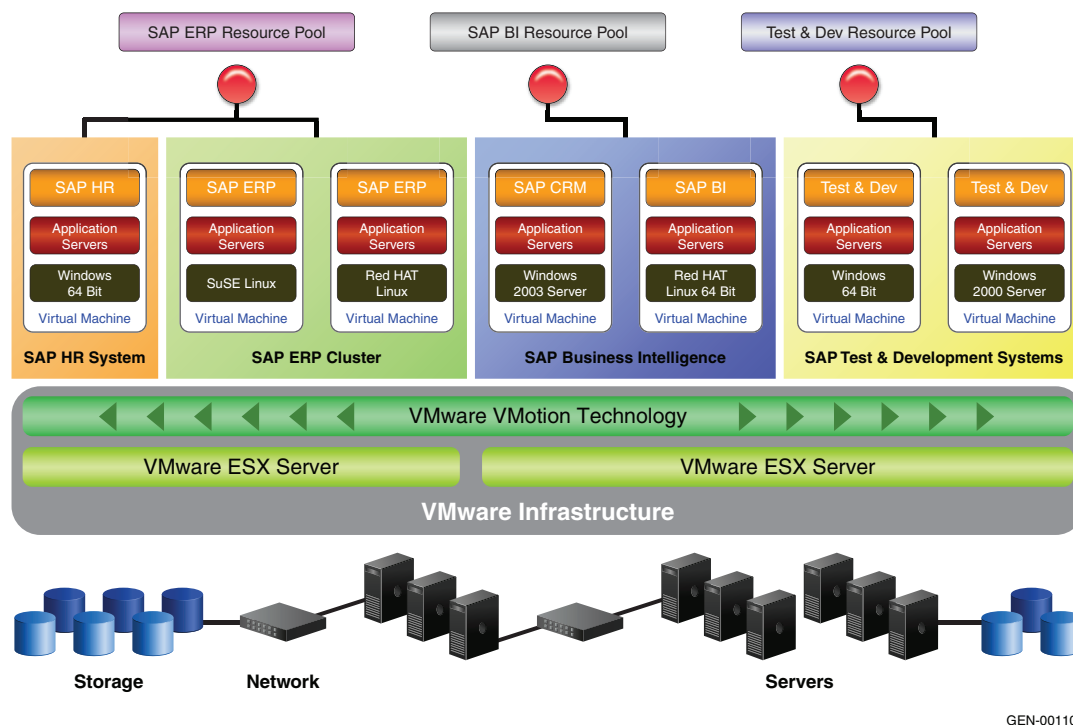
**Table 2. Software resources**

Title	Version	Installed on...
Microsoft Windows Server 2003	Release 2	All SAP servers
Microsoft SQL Server 2005		SAP ECC physical servers
Oracle Database 10g	Release 2 10.2.0.1 64-bit	SAP VMware servers
SAP ERP 2005 IDES (ECC 6) ABAP stack		All SAP servers
VMware ESX Server	v3.5	VMware ESX Server servers
VMware vCenter	v3.5	VMware vCenter servers
VMware vCenter SRM	v1.0	VMware vCenter servers

## Key technologies for virtual SAP

### VMware

Using VMware makes it possible to deploy virtual machines running different operating systems on the same physical server that contains the SAP application components and the operating system of choice. It is critical to evaluate the usage of the SAP solutions at their collective peak loads to determine which solutions can be deployed on the same physical server. Sizing should be established before deployment to understand the CPU, memory, and I/O requirements, as well as the characterization of the specific solution, in order to determine which components can be run together.



**Figure 7. The role of VMware in the SAP landscape**

What follows are descriptions of some of the key technologies from VMware for consolidating and managing SAP server environments.

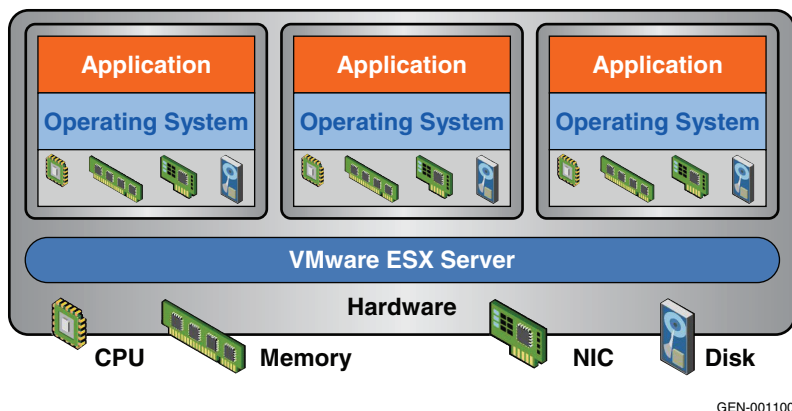
### VMware ESX

VMware ESX is the foundation of a dynamic, self-optimizing IT infrastructure. VMware ESX is a robust, production-proven virtualization layer that abstracts processor, memory, storage and networking resources into multiple virtual machines. VMware ESX delivers the highest levels of performance, scalability and robustness required for enterprise IT environments.

VMware ESX allows enterprises to dramatically reduce hardware and operating costs by sharing resources across a virtual environment. With VMware ESX, IT administrators can:

- Increase hardware utilization and dramatically decrease capital and operating costs by sharing hardware resources across a large number of virtual machines that run side-by-side on the same server.

- Improve service levels, even for the most resource-intensive applications, with advanced resource management, high availability and security features.



**Figure 8. VMware ESX**

### VMware vMotion

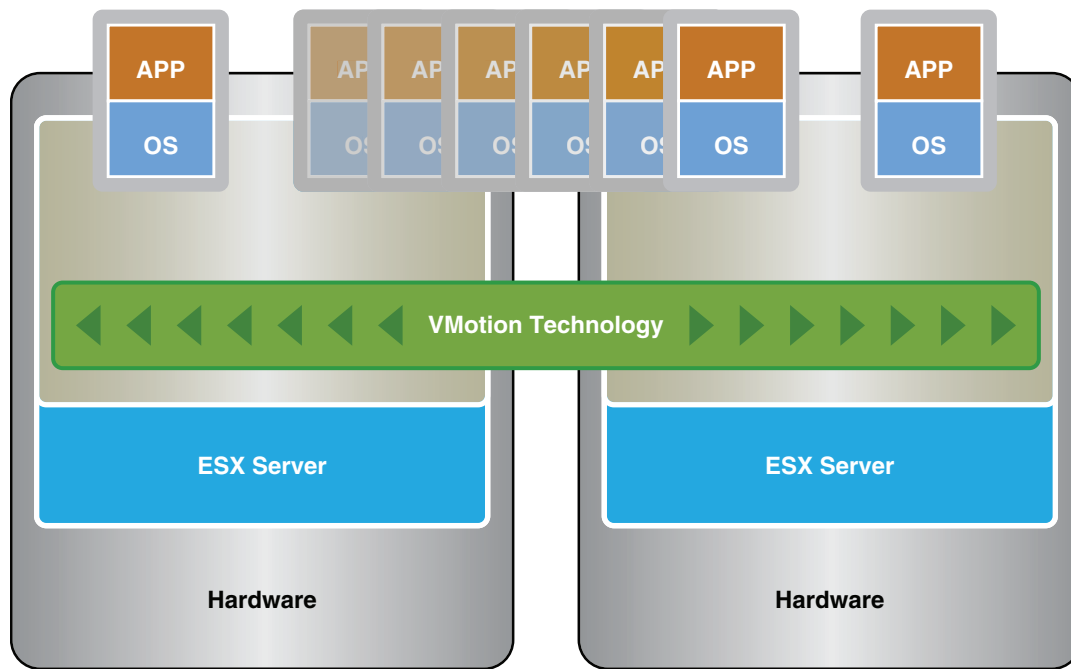
VMware vMotion™ enables the live migration of running virtual machines from one physical server to another with zero downtime, continuous service availability, and complete transaction integrity. vMotion is a key enabling technology for creating a dynamic, automated, and self-optimizing datacenter.

vMotion allows users to:

- Automatically optimize and allocate entire pools of resources for maximum hardware utilization, flexibility and availability.
- Perform hardware maintenance without scheduled downtime.
- Proactively migrate virtual machines away from failing or underperforming servers.

Live migration of a virtual machine from one physical server to another with vMotion is enabled by three underlying technologies:

- First, the entire state of a virtual machine is encapsulated by a set of files stored on shared storage, such as Fibre Channel or iSCSI Storage Area Network (SAN) or Network Attached Storage (NAS).
- Second, the active memory and precise execution state of the virtual machine are rapidly transferred over a high speed network, allowing the virtual machine to instantaneously switch from running on the source ESX Server to the destination ESX Server.
- Third, the networks being used by the virtual machine are also virtualized by the underlying ESX Server, ensuring that even after the migration, the virtual machine network identity and network connections are preserved.



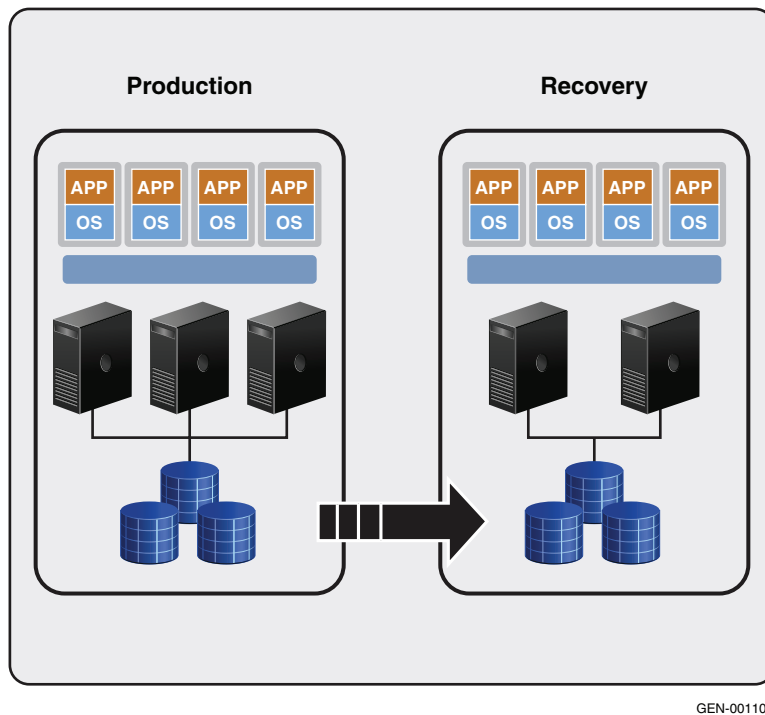
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**Figure 9. vMotion**

### **VMware vCenter SRM**

VMware vCenter SRM is a pioneering disaster recovery management and automation solution for your VMware virtual infrastructure. VMware vCenter SRM accelerates recovery by automating the recovery process and simplifies management of disaster recovery plans by making disaster recovery an integrated element of managing your VMware virtual infrastructure. The solution ensures reliable recovery by eliminating complex manual recovery steps and enabling non-disruptive testing of recovery plans.

vCenter SRM integrates tightly with VMware, VMware vCenter, and storage replication software to make failover and recovery rapid, reliable, affordable and manageable. It enables organizations to take the risk and worry out of disaster recovery, as well as to expand protection to all of their important systems and applications.



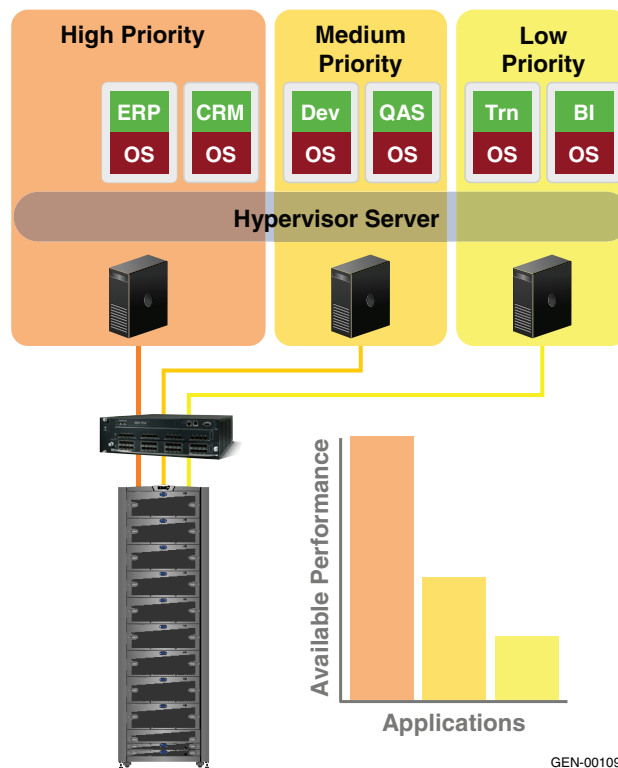
**Figure 10. VMware vCenter SRM**

## EMC

Delivering on QoS to provide different priorities to different applications, users, or data flow, or to guarantee a certain level of performance to a data flow is critical at every level of the infrastructure for SAP:

- Server: Guarantee sufficient server-side resources (CPU, memory) for specific virtual machines and establish priority control and time-sharing of resources.
- Network: Guarantee sufficient network resources (queuing, scheduling, traffic shaping).
- Storage: Guarantee sufficient storage-side resources (response time, bandwidth, throughput) for specific LUNs, and establish priority control and performance (minimum/maximum) on a LUN-by-LUN basis.





**Figure 11. Delivering on QoS agreements**

Working the total “stack,” customers want to guarantee performance throughout the data or transaction path and immediately diagnose and respond to potential problems with a self-adjusting, self-optimizing datacenter.

Also, as customers adopt virtual datacenter deployments that support higher tier mission- and business-critical application environments such as SAP, providing business continuity, high availability and data protection will continue as top priorities.

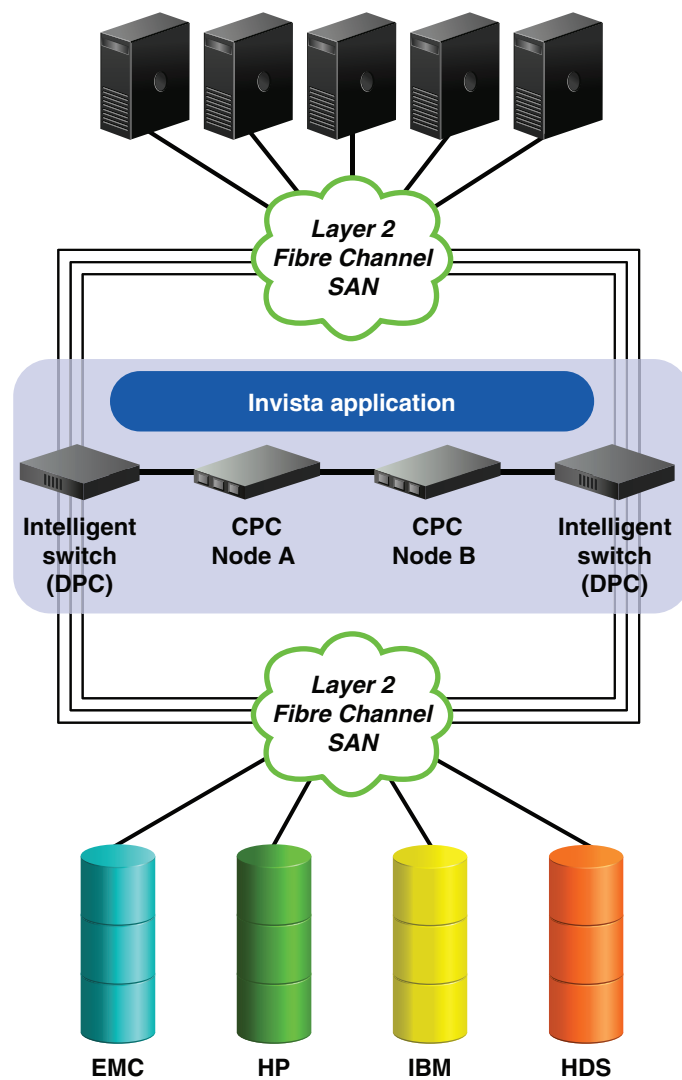
### Invista

EMC Invista provides SAN-based storage virtualization. Its unique, stateless architecture leverages intelligent switch technologies to deliver superior performance, scalability, and data protection capabilities. Invista enables the SAN to:

- Achieve performance I/O operations at “wire speed.”
- Eliminate the latency and bandwidth issues associated with virtualization architectures that cache data by fully leveraging the processing power and cache of the attached arrays.
- Enable non-disruptive upgrades to the next generation virtualization technology and non-disruptive data movement between all virtual volumes.
- Leverage a redundant fabric design that protects against local disasters, and a stateless architecture that ensures data integrity.
- Protect your investment through the continued use of your array functionality and its data protection capabilities.

Invista helps optimize a tiered storage infrastructure to:

- Move data non-disruptively: Move and change primary volumes while applications remain online.
- Provide network-based volume management: Pool storage and manage volumes at the network level.
- Enable heterogeneous point-in-time copies: Create local copies of data for testing and repurposing across multiple types of storage.
- Leverage heterogeneous remote replication of virtual volumes: Create remote copies of data for disaster recovery and business continuity.
- Support continuous data protection of virtual volumes: Enable point-in-time recovery and application checkpoints.



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**Figure 12. EMC Invista**

## RecoverPoint

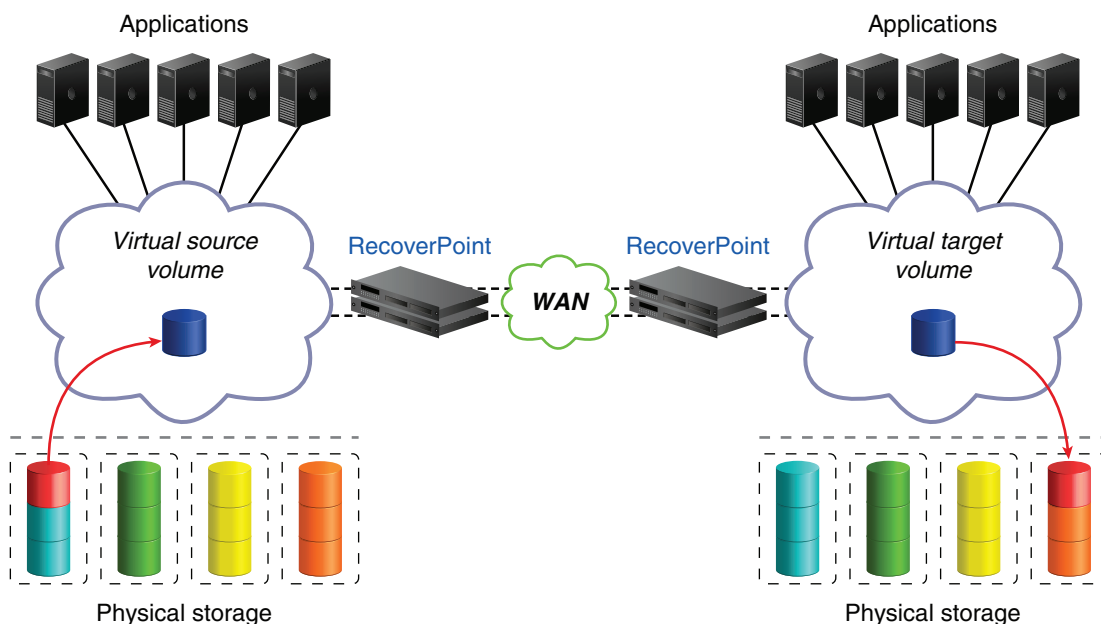
Users seeking to move, grow, or change virtualized volumes without taking applications or replication services offline can extend their capabilities by moving virtual volumes with EMC RecoverPoint's network-based replication services. EMC RecoverPoint complements Invista by providing asynchronous remote replication and continuous data protection (CDP) at the virtual volume level.

RecoverPoint provides integrated continuous data protection (CDP) and continuous remote replication (CRR) as well as concurrent local and remote (CLR) data protection. The RecoverPoint family protects data at a local site and/or at a remote site without impacting production application processing.

RecoverPoint CDP provides synchronous local replication, enabling customers to roll back to any point in time for effective operational recovery from events such as database corruption. RecoverPoint CRR provides asynchronous remote replication (with unique bandwidth reduction) for EMC and heterogeneous storage environments, which lowers multi-year total cost of ownership. RecoverPoint CLR combines CDP and CRR features, providing both operational recovery and disaster recovery for the same data. RecoverPoint:

- Consolidates replication and CDP for all storage arrays across a single data-protection platform.
- Provides significant operational cost savings, allowing organizations to utilize IP-based, low-speed links rather than costly optical connections.
- Enables cost-effective compliance in a changing regulatory climate, with protection in the local SAN for application data and remotely for mission-critical data such as SAP.

All applications are managed from a single platform, allowing administrators to map data protection policies to the value of data and prioritize resource allocation to critical applications.



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**Figure 13. EMC RecoverPoint: Heterogeneous replication of virtual volumes**

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## EMC PowerPath

PowerPath combines multiple-path I/O capabilities, automatic load balancing and path-failover functions into one integrated offer that works across your heterogeneous server and storage environment. PowerPath maximizes application availability, optimizes performance and automates path management while reducing complexity and cost — all in one powerful data-path management offering.

### Path management

- Proactive failure management: PowerPath uses sophisticated algorithms to boost application-I/O rates for Symmetrix, CLARiiON, and non-EMC arrays with automatic data-path load balancing, allowing for the greatest efficiency and throughput.
- In-depth tuning capability: PowerPath provides in-depth tuning capability to maximize path performance, efficiency and utilization.
- Non-disruptive: PowerPath ensures continuous data access while optimizing server and path usage by protecting the I/O path in the event of a path failure.
- End-to-end SAN awareness: To allow, as an example, SAP applications to take precedence over others during critical month-end processing.
- Optimized for heterogeneous environments: By leveraging your server, SAN, and storage assets, PowerPath maximizes your investment by increasing storage usage.

### Data migrations

When it comes to your IT environment, there is no worse enemy to productivity than downtime. Companies require maximum data availability (i.e., systems and applications are up and available with minimal disruption). Without it, productivity suffers and in the case of SAP, revenue is lost. IT professionals must plan for downtime accordingly, allowing for data migrations to take place at the least disruptive times in the business cycle. This is not always possible, as migration technologies today typically impact server/host resources.

This is where PowerPath Migration Enabler, EMC's solution for non-disruptive data migrations during planned-downtime situations, comes in.

PowerPath Migration Enabler combines the best of both worlds:

- Host-based software for data consistency during the data migration, and array-based migration technology to reduce impact to the host during the bulk-data move
- Host-based software for data consistency when encapsulating (capturing) volumes into a virtualized environment to eliminate downtime

With PowerPath Migration Enabler, you can eliminate application downtime during data migration. This functionality gives IT professionals more flexibility in the time it takes to perform migrations.

Finally, PowerPath provides data-at-rest encryption at the storage-device level to protect data from unauthorized access or the removal of a disk drive or array from a secured environment. It enables a consistent encryption technology that can be leveraged across EMC storage platforms and leverages RSA Key Manager to centrally manage and automate encryption keys.

### Smarts ADM

SAP is an enterprise-class, heavily distributed and interfaced “landscape.” The landscape requires a top-to-bottom view of a host to know its SAP components, installed/dependent software and underlying hardware infrastructure. In addition, an end-to-end view across the SAP landscape is also needed to see modules, services and external interfaces.

These views, coupled with proper policy definition and change management, enable customers to minimize risk to availability and performance for SAP landscapes due to planned and unplanned change.

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EMC Smarts Application Discovery Manager provides continuous discovery and mapping of applications, their dependencies and configurations with respect to their underlying infrastructure in datacenter environments. With Application Discovery Manager, you get accurate, real-time visibility into the datacenter from an application standpoint, including SAP and non-SAP.

Passively discover virtual and physical infrastructure without agents:

- Discover hosts, application services, and dependencies.
- Relate virtual machine (VM) infrastructure to various application components.

Actively collect configuration details for:

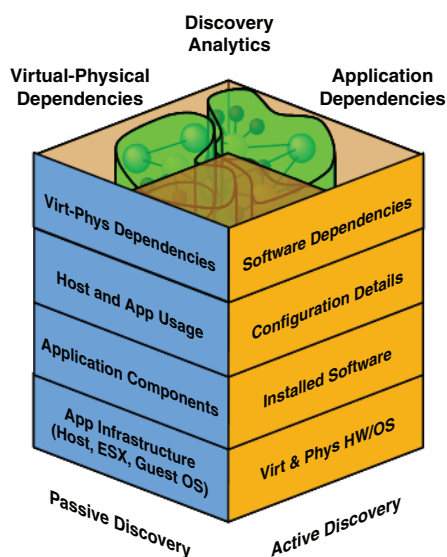
- Hardware and operating systems
- Installed software
- VMware vCenter

Customize discovery scope and methods to suit requirements:

- Analyze discovered configuration items and dependencies.
- Determine virtual and physical dependencies.
- Identify application patterns, groups and reports.

Track changes to the IT infrastructure:

- Hosts, application components, and dependencies



**Figure 14. Smarts ADM**

### Smarts IT Compliance Analyzer AE

EMC Smarts IT Compliance Analyzer AE eliminates the risks associated with manual audits and processes by automating the validation of application-related configurations, changes, and dependencies to help ensure IT compliance with internal governance, external regulatory requirements, industry best practices or a combination of these.

Continuous analysis of user-defined policies against comprehensive configuration and dependency mapping data that spans physical and VMware environments ensures that you are immediately alerted when policy violations occur.

With Smarts ADM driving SAP discovery, IT Compliance Analyzer can drive automation, policy, and rule management for SAP application datacenter components with enhanced processes related to SAP change, configuration, incident and problem management including:

- Identify and manage change impact to SAP landscape
- Control configuration drift
- Collect and analyze detailed configuration and dependency data in real time without the need for server-side agents
- Ensure that SAP application environments are configured for maximum performance
- Detect unauthorized communication between unrelated applications
- Validate that SAP is configured for high availability at all times

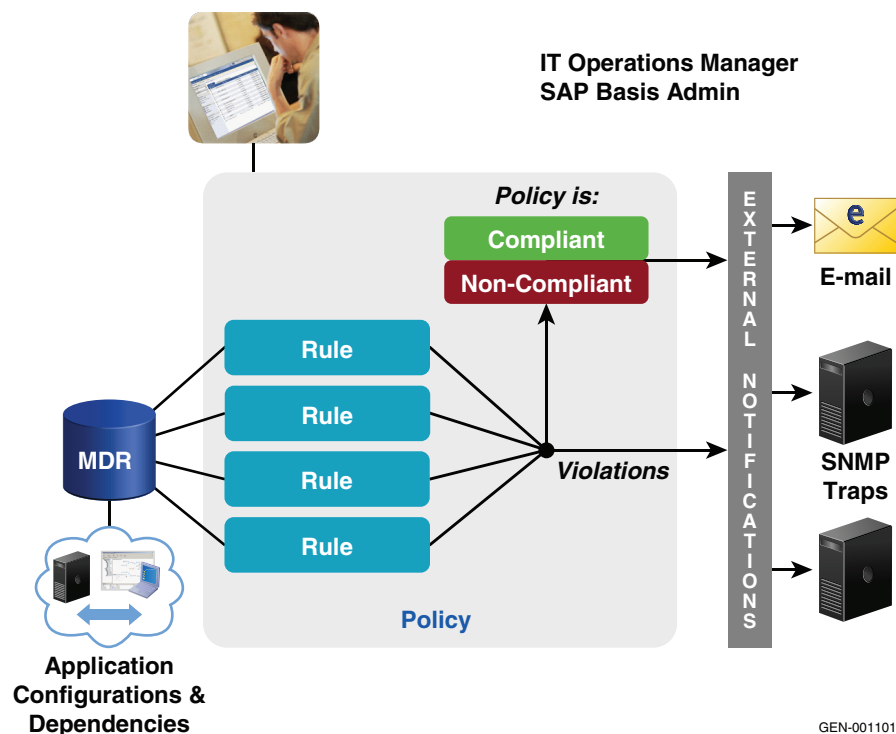


Figure 15. Smarts Compliance Analyzer AE

## Use cases for SAP landscapes

### *SAP upgrades and migrations*

Many SAP customers will undergo a major upgrade over the next year or two as support ends for SAP R/3 Enterprise and SAP R/3 4.6c 32-bit applications. In preparing for upgrades, customers are going through the application lifecycle, which includes development, testing and training for existing and new functionality. In addition, proper planning and documentation are required for the actual upgrade to reduce the risks and downtime associated with the cutover.

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Some companies are also using the upgrade window as an opportunity to move their SAP solution-based landscapes from older, proprietary platforms to cost-effective, industry-standard servers and Microsoft or open-source operating systems.

Using VMware virtual machines and EMC RecoverPoint continuous data protection, customers can decrease the time risk and the cost of the infrastructure required for an SAP upgrade by:

- Streamlining the provisioning of development, testing, and staging instances
- Increasing the number of tests that can be performed
- Enabling faster rollbacks in case of problems when moving to production

## ***Managing SAP infrastructure lifecycles***

As the SAP enterprise solution evolves to address more complex business problems, newer versions of SAP software and newer capabilities are introduced. Often these new versions require more resources, resulting in upgrades to existing infrastructure or additional hardware purchases. Also, technology refreshes—storage, for example—may be required for infrastructure supporting SAP.

VMware and EMC Invista deliver the ability to provide capacity on demand and perform technology refreshes for SAP with minimal service interruption.

## ***Server and storage containment***

In traditional SAP deployments, there can be significant server sprawl primarily because of the need to provision separate systems for development (DEV), quality assurance and testing (QAS) and production (PRD) environments. Each SAP solution typically has its own system landscape, with each landscape containing at minimum a DEV, QAS, and PRD environment. Enterprise environments can also contain multiple layers in the application architecture, including database, application server and Web server layers. In a typical deployment, each layer of the environment is hosted on dedicated physical systems that are not fully utilized at all times.

The same can be said of storage. The demand for storage is growing 50%-60% per year. Growing SAP production databases and related copies to support backup, development, testing, training and disaster recovery make SAP a main consumer of storage.

VMware virtualization technology contains this server sprawl by running SAP application layers in virtual machines consolidated onto fewer, highly scalable, and highly reliable enterprise-class servers, increasing server utilization. With EMC Invista, customers can consolidate storage use and move SAP data between tiers of storage without disrupting the SAP landscape.

## ***Provisioning IT services***

VMware virtualization solutions reduce the time to provision new SAP (development, test or production) application environments. A new deployment typically requires procurement of new hardware, after which the operating system and applications are installed. This process takes up valuable time and IT resources in addition to requiring dedicated hardware with its attendant costs. By using VMware Infrastructure, SAP customers can take advantage of virtual machine libraries and virtual machine templates to provision new pre-configured SAP application environments in minutes on virtualized infrastructure hardware.

VMware templates provide gold images of virtual machines that you can use to enforce consistency among many instances of an application. You can build an archive of development and test environments deployable on a moment's notice, eliminating time-consuming manual tasks associated with setting up and recreating system configurations.

With EMC Invista and RecoverPoint, customers can make VMware templates available anywhere on the network—locally, across campus or to any location around the globe. This gives customers the ability to provide development, testing and training environments worldwide.

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## ***High availability: Business continuity and disaster recovery***

While SAP provides automated load balancing, distributed transaction processing, and application failover to ensure continuous service availability and transaction integrity, VMware VvMotion enables the live migration of running SAP virtual machines from one physical server to another with minimal downtime. With vMotion, you can perform hardware maintenance without scheduling system downtime that disrupts business operations. As a result, maintenance work can be done during regular business hours rather than during late night or weekend shifts. With EMC Invista, you can enable live migration of SAP data across any SAN storage device without disruption to SAP.

With VMware, you can implement a unified disaster recovery plan without investing in an exact replica of the hardware. VMware vCenter SRM is a disaster recovery management and automation solution that integrates with VMware deployments, VMware vCenter, and EMC RecoverPoint continuous remote recovery (CRR).

VMware vCenter SRM integrated with EMC RecoverPoint helps users with the key elements of building, managing and executing disaster recovery plans. Specifically, vCenter SRM simplifies and automates key elements of setting up, testing and executing recovery plans:

- Set up a site recovery infrastructure
- Create recovery plans
- Test recovery plans
- Automate failover

## ***Datacenter optimization***

A VMware virtual environment provides additional management capabilities that help optimize the infrastructure resources used by SAP and non-SAP applications. SAP provides distributed transaction processing, automated load balancing and a replicated service framework that offer high levels of scalability and resource optimization for the application environment.

VMware solutions support these capabilities by addressing resource management across the entire datacenter infrastructure and across multiple distributed SAP application servers. VMware vCenter Distributed Resource Scheduler (DRS) dynamically allocates and balances computing capacity across a collection of hardware resources aggregated into logical resource pools.

When an SAP virtual machine experiences an increased load, vCenter DRS automatically allocates additional resources by redistributing virtual machines across the physical servers. vCenter DRS optimizes IT environments to align resources with business goals while ensuring flexibility and efficient utilization of hardware resources.

EMC storage delivers on QoS, providing appropriate prioritization and I/O data throughput for SAP virtual machines to meet established priority control and performance parameters.

## ***Monitoring and change management***

SAP teams and IT departments face key challenges in SAP change management, including patch testing and testing upgrades for compatibility with standard corporate hardware, operating system, and application configurations. IT organizations traditionally need to procure identical hardware and create test beds that mirror the operating system and application configurations of the production environment.

With VMware, IT staff can clone production or create a set of virtual machine libraries that mirror production, which can then be used to provision the test environment. The latest patches and upgrades can be tested against these virtual machines running SAP applications, eliminating the need for dedicated hardware.

From an infrastructure standpoint, SAP is a heavily distributed and interfaced “application landscape.” To monitor configuration drift and manage change, IT staff require a top-to-bottom view of a host (including virtual machines) to know SAP components, installed or dependent software, and the underlying hardware



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infrastructure. Views of the systems, coupled with appropriate policy definition and change management, enable customers to minimize risks to availability and performance for SAP landscapes due to planned and unplanned changes in the SAP infrastructure.

EMC Smarts Application Discovery Manager (ADM) provides continuous discovery and mapping of SAP applications, their dependencies and configurations with respect to the underlying infrastructure in datacenter environments. EMC IT Compliance Analyzer (ITCA) provides continuous analysis of user-defined policies for SAP server configurations and dependency mapping data that spans physical and VMware environments to ensure that you are immediately alerted when policy violations occur.

## Conclusion

In summary, SAP project teams are always looking for better ways to manage their SAP landscapes throughout the application lifecycle: Implementation, migrations, consolidations, upgrades and ongoing maintenance. In addition, teams need to continually ensure optimal performance and high availability for SAP.

For IT, with growing SAP landscapes, infrastructure challenges are compounded by constraints for power, cooling and floor space within datacenters, and continual corporate acquisitions that introduce heterogeneous platforms into the corporate architecture.

As a result, many organizations want to realize transformational cost savings with lower TCO based on virtual datacenters. EMC and VMware are investing together to help customers achieve next-generation virtual datacenters for SAP.

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EMC Innovation Lab: Santa Clara, CA

EMC Global Solutions Center for SAP

## Contributors

EMC — Haji Aref, Senior Solutions Architect for SAP

EMC — Michael LaFauci, Technical Business Consultant, Integrated Virtualization Solutions

EMC — Michael Tan, Senior Manager, EMC Innovation Lab

VMware — Vas Mitre, SAP Solutions Architect