



SAP® Solutions on VMware® Infrastructure: Customer Use Cases



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Introduction

At the most basic level, virtualization allows you to run multiple workloads in “virtual machines” – each consisting of an operating system and one or more applications – on a single physical server. With virtualization, you can quickly move workloads from one physical server to another – without any application downtime - enabling flexible and dynamic alignment of business needs with compute resources.

Virtual machines are highly portable and can run unchanged on completely different physical servers since they consist only of a small number of files encapsulating applications, patches, data, and so forth. This structure allows separation of services from the underlying hardware.

Virtualization enjoys fast-growing adoption among SAP customers who are already reaping significant benefits. This document explores the ways real SAP customers have used VMware virtualization to:

1. Optimize datacenter resources
2. Ease SAP upgrades, new implementations, and platform migrations
3. Better meet SLAs
4. Support service delivery to the business

Optimizing Datacenter Resources

SAP deployments can generate significant server sprawl due to its tiered architecture and the need to provision separate systems for development, quality assurance/test and production environments. As a result, SAP implementations can span 50, 100 or more servers, and even smaller implementations can have a relatively large IT footprint.

In a typical deployment, every layer of the environment is hosted on dedicated physical systems that are not fully utilized much of the time. SAP implementations on Microsoft Windows have an average application server CPU utilization rate of 15-20 percent. VMware Infrastructure makes it possible to increase utilization with virtual machines containing different applications running on the same physical server. Figure 1 depicts a sample architecture for SAP enterprise applications on VMware Infrastructure.

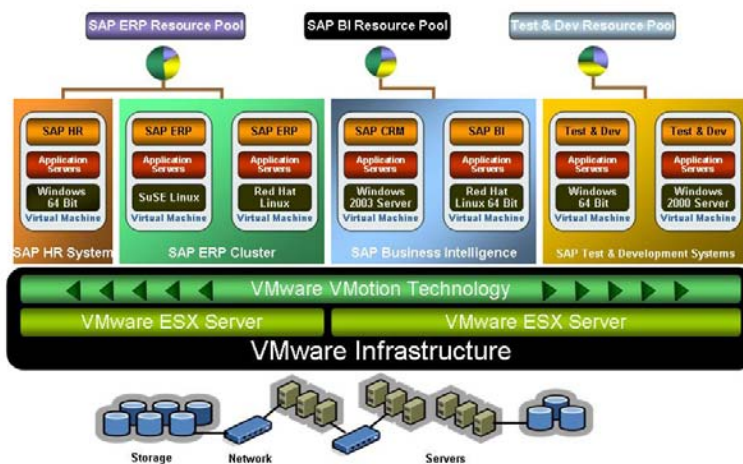


Figure 1: SAP Solutions-Based Landscape on VMware Infrastructure

Underutilized hardware resources take up space and eat energy. Computing equipment has become increasingly dense, energy costs are on the rise and many datacenters simply lack the power or space IT services require. Industry analysts estimate the annual cost of powering a server will soon exceed its acquisition cost.

SAP customers use VMware virtualization to reduce their hardware and energy costs and dramatically increase hardware utilization. For example:

- **ABB Grain** has achieved a consolidation ratio of 16:1 across all applications. The consolidation project has also allowed the company to reduce its data center carbon emissions. These have remained constant since 2006 while ABB Grain has doubled in size. The company has also reduced its power and cooling system consumption.
- **Peerless Clothing:** "Every virtual machine we deploy represents money that we didn't have to spend on buying a physical server. We currently have 40 virtual machines running on our ESX hosts, and there's room for more."
— *Joffrey Bienvenue, information systems infrastructure and operations manager*
- **Tasty Baking Company:** "Our CPU utilization used to run at 3 percent for most servers. Now, it runs at 35-40 percent – we really get to make good use of our hardware."
— *Greg Plover, infrastructure manager*
- **T-Systems North America:** "We now see consistent server utilization rates of 80 percent. One of the reasons we can confidently tell customers that they can save 30 percent on their hosting costs by moving to Dynamic Computing is that most customers are only running at 20-percent utilization right now. Virtualization lets us unlock that fallow capacity."
— *Uwe Wagner, Sales Director*

Easing SAP Solutions Upgrades and Platform Migrations

Many SAP solutions deployments will undergo a major upgrade over the next year or two as SAP ends support for SAP R/3® Enterprise and SAP R/3 4.6c 32-bit applications. Many of these companies are using the upgrade window as an opportunity to move their SAP solution-based landscape from older, proprietary platforms to cost-effective industry standard servers and Microsoft or open source operating systems.

Problems with the complex upgrade process can have a significant business impact. Upgrades must be thoroughly planned and tested to ensure the smoothest and least disruptive transition possible. You can accelerate and improve the planning and testing phase with VMware virtualization, achieving faster and more cost-efficient upgrades while reducing risk to the business.

Streamline provisioning of development, testing, and staging instances: An important task in the upgrade project is the setup of environments. The initial setup is one part of this task, but ad-hoc deployments of new environments for test or development purposes are commonly required as well. The ability to provide new environments as quickly as possible is especially important if the project includes a migration or an operating system upgrade. In a traditional native deployment, this process tends to be time consuming and can cause expensive project delays, particularly if available hardware is not sufficient. "Configuration drift" may also become a source of problems for the non-SAP aspects of the upgrade (OS, OS patches, database binaries, etc.).

VMware templates provide golden 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. It is easy to clone environments, which is extremely useful if you want to set up new environments for ad-hoc tests, or if you want to make copies of your production environment for test purposes.

Increase the number of tests you can perform: VMware software allows you to take snapshots that capture the state of the virtual machine memory, operating system, the SAP kernel, the SAP code, and the data. These snapshots capture the state of a virtual machine prior to applying and testing changes to SAP code or the operating system. In case of unsuccessful tests, you can roll back the SAP virtual machine to a known good state in minutes, allowing more tests cycles in a shorter time window.

The most critical step in the entire project is the upgrade of the production SAP applications. This process typically takes several hours and is extensively tested and tuned to minimize the risk of failure and shorten the time window. Using snapshots, users can capture the state of the application at multiple intermediate points during the upgrade process, making it easy to test only sub-phases of the upgrade under multiple scenarios.

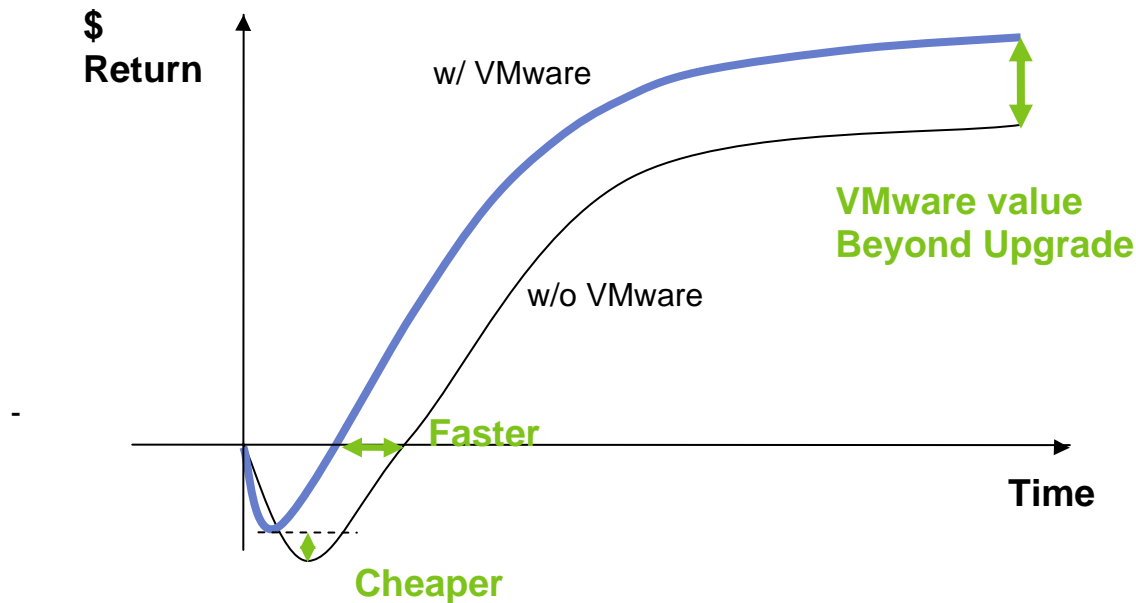
Enable faster rollbacks in case of problems in moving to production: In case of problems during the upgrade of production SAP applications, snapshots allow you to perform a fast rollback to the pre-upgrade state, providing worst-case insurance that your SAP solutions-based environment can be brought back quickly to a functional state, limiting any potential downside to the business.

Customers using VMware Infrastructure during their SAP upgrade and platform migration projects have experienced these benefits and more:

- **EFI (Electronics for Imaging):** EFI planned to upgrade its SAP modules and at the same time move from a proprietary hardware and software environment to industry-standard x86-based hardware and Red Hat Linux operating system. EFI used VMware Infrastructure 3 to minimize the complexity and reduce the cost of developing, testing, and deploying its upgrade to this multi-tiered environment, with excellent results. The company was able to double the number of test cycles it could run during the process, while keeping the project on budget. The overall upgrade/migration project was completed in four instead of six months (and with more features than initially planned for).

"In any large multi-tier application deployment, you have to use resources such as consultants whose costs can add up if they have to wait for test and development systems to be set up. With VMware Infrastructure, we can add another compute block to the cluster or whip up new virtual machines quickly. As a result our developers have the resources they need, when they need them, and we've really mitigated 'budget creep.' That flexibility has to do with the functionality and responsiveness of VMware products, which enables us to serve our customer better and ultimately to save my company money."

— Dave Swan, Senior Manager, IS & T Server Operations



- **NuVasive:** San Diego-based medical equipment manufacturer NuVasive deployed a brand new SAP ERP implementation on VMware Infrastructure.

“We had an eight-month timetable, which is very difficult to do with an SAP implementation. I don’t think we would have been able to keep the pace if we were doing a conventional implementation on hardware. We’d have to order the servers..., wait for them to be delivered, rack them, hook them into the SAN, provision the ATA, and install an operating system. All that could take days, or even weeks. But with VMware, we could right-click a template and deploy a server in 15 minutes.”

— Bill Moore, IT Infrastructure Manager

Meeting SLAs for Availability, Application Performance, and Disaster Recovery

SAP application owners, basis administrators and the IT staff are on the hook to meet Service Level Agreements that guarantee availability and performance targets for solution users. VMware virtualization works alongside SAP-provided functionality to deliver infrastructure and application performance and high availability for critical business functions.

Availability: VMware® High Availability (HA) provides cost-effective high availability for SAP applications running in virtual machines. In the event of physical server failure, VMware HA automatically restarts SAP virtual machines on servers that have spare capacity. Thus, VMware HA minimizes downtime and IT service disruption while eliminating the need for dedicated stand-by hardware. It provides high availability across the entire virtualized SAP environment without the cost and complexity of failover solutions that are tied to either operating systems or specific applications. Also, with VMware High Availability, you have availability benefits for all of your SAP environments, without having to set up complex and expensive cluster configurations.

Application Performance: SAP distributed transaction processing, automated load balancing and replicated service framework offer high levels of scalability and resource optimization for the application environment. VMware Infrastructure solutions support these capabilities by addressing resource management across the entire datacenter infrastructure and across multiple distributed SAP application servers.

VMware® Distributed Resource Scheduler (DRS) dynamically allocates and balances computing capacity across a collection of hardware resources aggregated into logical resource pools. It continuously monitors utilization across these pools and intelligently allocates available resources among the virtual machines based on pre-defined rules that reflect business needs and changing priorities. When an SAP virtual machine experiences an increased load, VMware DRS automatically redistributes virtual machines across physical servers to ensure resource availability so your application will continue to perform at expected levels.

Business Continuity and Disaster Recovery: While the SAP system provides automated load balancing, distributed transaction processing and application failover to ensure continuous service availability and transaction integrity, VMware VMotion 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 VMware Infrastructure, you can implement a unified disaster recovery (DR) without investing in an exact replica of the hardware. VMware® Site Recovery Manager is a DR management and automation solution for VMware Infrastructure. It integrates with VMware Infrastructure, VMware® VirtualCenter and storage replication software from leading storage vendors. The solution eliminates complex manual recovery steps and enables non-disruptive testing of recovery plans, making failover and recovery rapid, reliable, affordable and manageable. You can find more information from NetApp, SAP, and VMware about this solution at this URL: <http://www.vmware.com/files/pdf/partners/sap-whitepaper-disaster-recovery-en.pdf>.

Customers have discovered the benefits of VMware Infrastructure for meeting SLAs on performance, availability and disaster recovery:

- **ABB Grain** is Australia's largest malt producer and among the top 12 internationally. In 2006, ABB Grain selected VMware virtualization to support a disaster recovery infrastructure incorporating a co-located production data center managed by an external service provider and a secondary data center located at the organization's head office in South Australia.

"In a disaster recovery context, we have an agreement with ABB Grain's business managers that we can have our live production environment up and running in two days. However, thanks to our virtual infrastructure, we can achieve 100 percent recovery in eight hours while recovery of our core business systems can be completed in just two hours."

— Tony Garland, Infrastructure Projects Supervisor

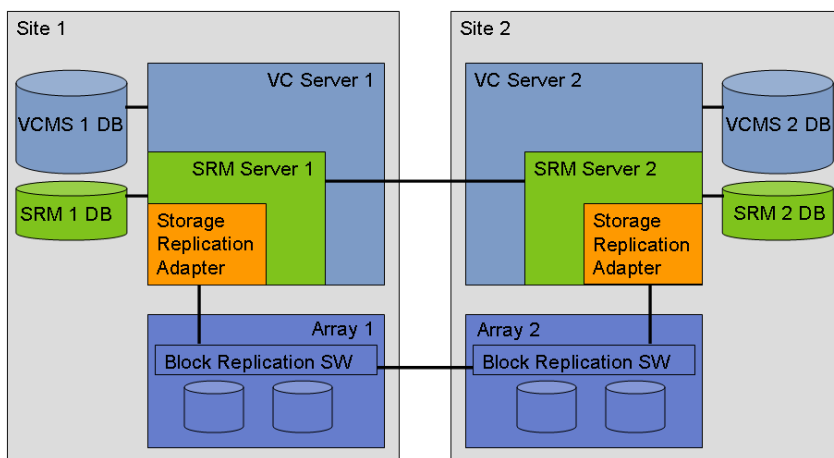


Figure 2: Site Recovery Manager Technical Architecture

- FutureFuel Chemical Company** has been in business since 1976 manufacturing specialty chemicals and biodiesel. The company's virtualized infrastructure supports almost every area of the business from domain controllers to the critical SAP solutions production environment. FutureFuel Chemical Company implemented a new SAP environment on VMware ESX from ground zero.

"With VMotion, DRS, and HA, we never have to worry about applications being unavailable due to a hardware issue. If a VMware host server is lost due to a hardware failure. The virtualized server stays online as it moves to another VMware host server in the HA cluster. With VMware in place, software upgrades are the only reasons our users are unable to get to the applications they need."
 — Lance Wehrung, Senior Engineer, Systems

- AstraZeneca:** "VMware Infrastructure is proving to have a lot of benefits for us. For example, we are already using VMotion to achieve high availability and 24/7 uptime."
 — Askin Karatepe, server and database administrator

Supporting Service Delivery

VMware Infrastructure enables rapid service-oriented architecture (SOA) deployment at reduced cost. According to Roland Wartenberg, Chief Virtualization Strategist at SAP Labs, "Enterprise SOA with SAP NetWeaver and virtualization from VMware deliver most flexible, reliable and cost effective business agility solutions for the customers' business needs today." Consider a system that operates within certain business parameters, such as the required number of SAP transactions per second. The system can use VMware Infrastructure capabilities to move resources dynamically into the application resource pool as load increases, or shift resources away from the pool as the load diminishes.

Mergers and acquisitions present a host of challenges to IT organizations, including maintaining integrity of data and transactions in financial, customer, and other operational systems, building communication among application systems, transitioning data and users from one application to another, and so forth. VMware virtualization reduces the cost and complexity of merging disparate IT environments by converting legacy applications and database environments to virtual machines. These virtualized workloads can run on the latest industry-standard servers and are easily incorporated into the existing landscape. Further, as you integrate data and processes of the acquired company into the existing SAP systems, the

virtualized architecture provides the flexibility required to effectively address the increased load on the systems.

Customers are using VMware Infrastructure for improved service delivery and to ease the challenge of integrating during mergers or acquisitions:

- **Checkpoint Systems International** is a leading manufacturer and marketer of identification, tracking, security and merchandising solutions for the retail industry and its supply chain. Checkpoint relies heavily on its SAP ERP deployment to produce, sell, ship and invoice its products in a controlled manner.

“Moving our SAP deployment on to VMware Infrastructure has made it easier to deliver a higher level of service to the business than was previously possible. We have moved our entire SAP environment onto VMware and our lives are now significantly easier. We spend far less time performing upgrades and maintenance tasks, and our service delivery processes are incredibly streamlined.” — *Michael Nogger, IT Operations Manager Europe*

- **ABB Grain** banked on the capabilities of VMware Infrastructure to seamlessly transition the information of acquired businesses into its infrastructure. Using virtualization has enabled the company to constrain what would otherwise be a massive hardware administration task spanning multiple server brands, configurations and ages across geographically distributed locations.

“VMware’s physical-to-virtual (P2V) conversion tools enable us to take a snapshot of an existing physical server run by an acquired business and convert it to a virtual machine incorporating an exact clone of the operating system and application,” Garland said. “This usually takes between 30 minutes and four hours, depending on the information residing on the server.” — *Tony Garland, Infrastructure Projects Supervisor*

Summary

SAP solutions are the heartbeat of your business and provide rich business functionality; VMware virtualization is the heartbeat of an infrastructure that drives tangible benefits for both the business and the IT organization. With VMware as the platform underlying the SAP landscape, infrastructure and application teams are empowered to do their work more efficiently and with fewer administrative headaches throughout the hardware and software lifecycle, from development through production and maintenance.

More and more customers are taking advantage of the benefits of VMware Infrastructure to build a dynamic, responsive infrastructure to support their SAP solutions-based landscapes. VMware virtualization enables efficient datacenter resource pooling and maximized utilization of system resources. VMware virtualization technologies help customers achieve faster and more cost-efficient upgrades while reducing risk to the business. By expediting and simplifying the application development and testing processes, customers experience faster time to production while maintaining high quality throughout. Implementing business continuity solutions for SAP applications on VMware Infrastructure delivers enhanced high availability while minimizing the need for duplicate hardware. Rapid provisioning and efficient change management in production environments increase IT flexibility, allowing timely response to sudden and changing business needs.



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6,711,672, 6,725,289, 6,735,601, 6,785,886, 6,789,156, 6,795,966, 6,880,022, 6,961,941, 6,961,806, 6,944,699, 7,069,413,
7,082,598 and 7,089,377; patents pending.

