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VBLOCK™ POWERED SOLUTION FOR SAP: HIGH AVAILABILITY FOR THE PRIVATE CLOUD


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Introduction

Operational recovery of SAP mission-critical applications from infrastructure component failure can be greatly simplified by leveraging the technology of Vblock™ Infrastructure Packages (hereafter referred to in this document as Vblock). The Vblock solution enables SAP administrators to manage their environment and take advantage of the benefits of virtualization technology provided by three world-class corporations – Cisco®, EMC®, and VMware®.

Deploying SAP on a Vblock is simplified because Vblocks are pre-engineered, production-ready (fully tested) IT infrastructure units. This allows administrators to focus on application performance and management, rather than on infrastructure deployment. Jointly developed technologies and solutions for Vblocks enable SAP administrators and architects to manage and operate SAP in a private cloud while still allowing flexibility in application deployment.

This document provides:

- An introduction to Vblock technology
- An overview of the high availability and disaster recovery capabilities of the Vblock
- Detailed descriptions of a number of high availability use cases for SAP applications on Vblock. This includes specific information about how to use Cisco, EMC, and VMware technologies to maintain high availability of SAP applications while simplifying operational recovery.

Purpose

High availability enables administrators to ensure real-time system performance in the event of a system failure or catastrophe. Using the solutions developed by the Virtual Computing Environment coalition (VCE) that are described in this paper, administrators can manage their SAP landscapes in a virtualized environment and perform recovery and restore operations in case of a failure.

Audience

This paper is intended for SAP architects and Basis administrators or other individuals tasked with evaluating, acquiring, managing, operating, or deploying SAP in a virtualized data center environment.

Vblock Introduction

IT's transition to a private cloud infrastructure will allow IT organizations to provide a more service-based consumption model and more easily meet their service level agreements. Previous models hindered IT's capability to respond to the business, and created a perception of IT as a cost center rather than as a valuable services provider.

Many IT environments that have outdated technologies are planning incremental approaches towards virtualization and private cloud computing, exposing themselves to risk at each incremental change. Vblock Infrastructure Packages are now available to accelerate data center virtualization and private cloud adoption by implementing the coalition's state of the art technologies together, at one time.

Deploying your SAP applications on Vblock technology creates minimum risk because the Vblock Infrastructure Packages are:

- Production-ready, pre-engineered, integrated and tested units of virtualized infrastructure
- Best-of-breed virtualization, network, compute, storage, security, and management products
- SLA-driven, providing predictable performance capabilities and operational characteristics

What is a Vblock?

Vblocks provide pre-engineered, production-ready (fully tested) virtualized infrastructure components, including the best-of-breed private cloud offerings from Cisco, EMC, and VMware. At a high level, Figure 1 shows how the Vblock virtualization, network, compute, storage, and management components fit together with the operating system and SAP applications to provide all the elements needed in your IT environment.

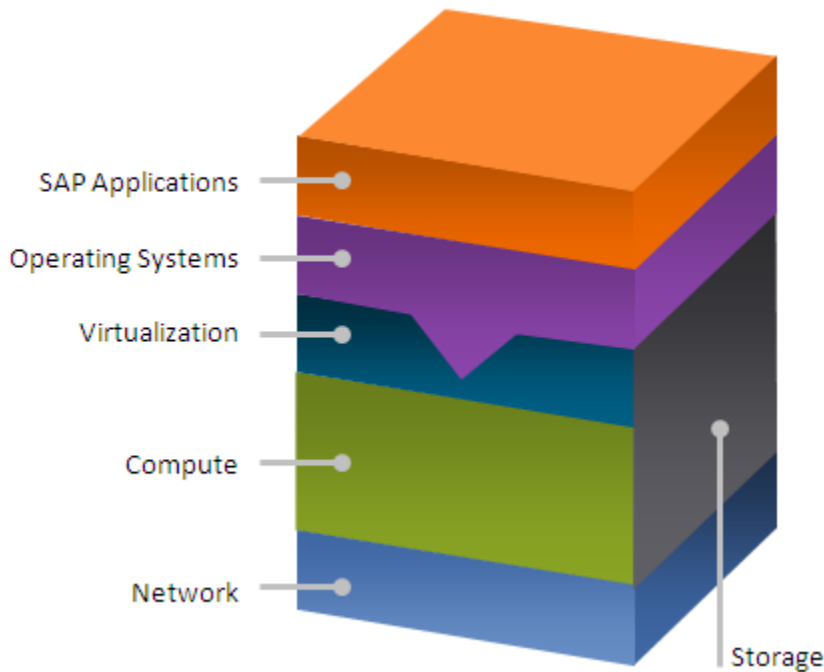


Figure 1. Vblock Infrastructure Packages

Vblock components

As shown in Figure 1, the operating system and application layers sit on top of the Vblock hardware and software component layers. These scalable, pre-tested components include:

- Virtualization with VMware vSphere 4
- Compute with Cisco UCS Blade Servers
- Network with the Cisco networking stack
- Storage with the EMC® Celerra® NS-960, EMC CLARiiON® CX4, or EMC Symmetrix® VMAX™
- Management with one or more of the following management tools:
 - EMC Ionix™ Unified Infrastructure Manager (UIM)
 - VMware vCenter
 - EMC Navisphere® or Symmetrix Management Console (SMC)
 - Cisco UCS Manager
 - VMware Site Recovery Manager

Figure 2 provides additional information about the components that make up the Vblock architecture.

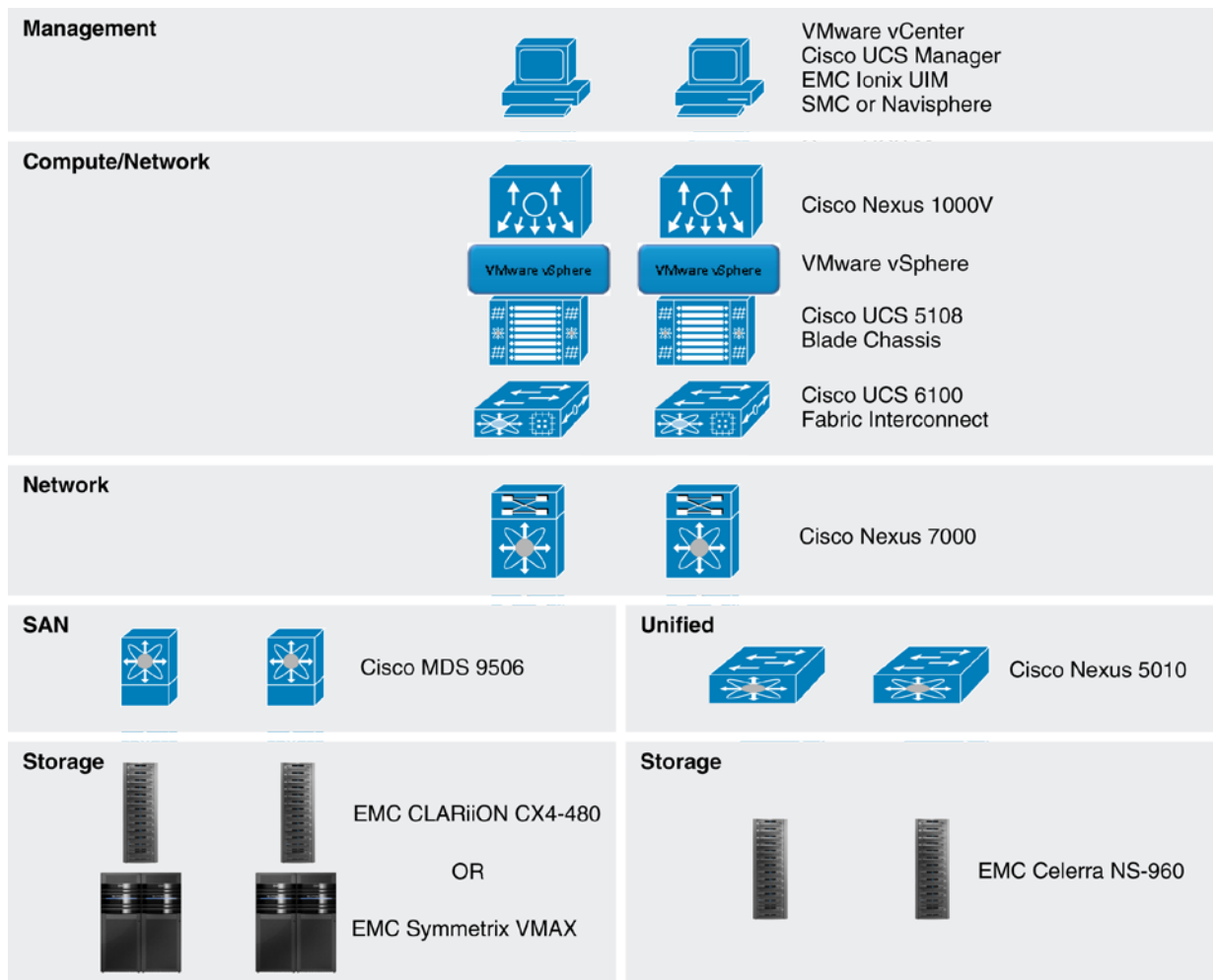


Figure 2. Vblock architecture components

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Vblock benefits

Enabled by the best players in IT product delivery, each with industry-leading enterprise-level credibility, Vblock provides SAP customers with several benefits from its integrated hardware stack including:

- Fewer unplanned downtimes and reduced planned downtimes for maintenance activities
- Reduced complexity due to preconfigured and centralized IT resources leading to standardized IT services
- Predictable performance and operational characteristics
- Tested and validated solutions with unified support and end-to-end vendor accountability
- Graceful scaling of a Vblock environment by adding:
 - capacity to an existing Vblock
 - more Vblocks
- Virtualized efficiency with predictable scaling for a given footprint

Learn more about Vblock

For more details on Vblock Infrastructure Packages, refer to the *Vblock Infrastructure Packages Reference Architecture* and for more information on the Virtual Computing Environment (VCE) coalition, visit www.emc.com/powerof3.

High Availability and Disaster Recovery Scenarios for SAP in a Vblock Environment

Overview

High availability is vital to any SAP organization. Even a few moments of downtime can move a company from a positive to a negative fiscal position. IT groups have spent a lot of time and effort to create a highly available environment for SAP, but these efforts are often expensive and unreliable.

The Vblock solution for an SAP landscape enables administrators, in a virtualized data center environment, to maintain application high availability within a private cloud using Cisco, EMC, and VMware technologies. For example, leveraging UCS service profiles to restore a failed UCS blade, EMC RecoverPoint CDP technology to perform an SAP recovery, and VMware VMotion to move SAP instances between UCS blades, administrators can manage their SAP environment efficiently and securely.

Companies that deploy SAP in a Vblock environment inherit all of the features designed for high availability from each of its components. These products leverage the latest technologies from three world-class vendors working together to ensure that the infrastructure changes you are making to your mission-critical SAP application environment are not being done using guesswork—they are accomplished in a highly controlled manner. You can be confident that the Cisco, EMC, and VMware pre-tested high availability products and features will deliver the next era of high-availability virtual data centers.

While many more products and features are available to address high availability and disaster recovery in an SAP Vblock environment, this paper describes just a few use cases, including:

- Recovery from a blade failure using service profiles
- SAP recovery using EMC RecoverPoint continuous remote replication (CRR)
- Moving SAP instances from one UCS blade to another using VMware VMotion
- Achieving high levels of availability for the database and central services using out-of-the box features such as VMware High Availability and Fault Tolerance

The data protection products detailed in these use cases are described below.

Data protection using Cisco technologies


The Cisco Unified Computing System (UCS) is a next-generation data center platform that unites compute, network, storage access, and virtualization into a cohesive system designed to reduce total cost of ownership (TCO) and increase business agility. The system integrates a low latency, lossless 10 Gigabit Ethernet unified network fabric with enterprise-class, x86-architecture servers. The system is an integrated, scalable, multi-chassis platform in which all resources participate in a unified management domain.

Cisco Unified Computing System

The Cisco Unified Computing System (UCS) is composed of fabric interconnects, fabric extenders, blade server chassis, blade servers, network adapters, and Cisco Extended Memory Technology as shown in Figure 3.



Figure 3. The Cisco Unified Computing System



UCS fabric interconnects can be clustered for redundancy and increased bandwidth. You can configure a UCS instance to use a single fabric interconnect in a standalone configuration or use a redundant pair of fabric interconnects in a cluster configuration. A cluster configuration provides high availability. If one fabric interconnect becomes unavailable, the other fabric interconnect automatically takes over. Only one management port connection is required to support a cluster configuration.

Cisco UCS Manager

Cisco UCS Manager provides centralized management capabilities, creates a unified management domain, and serves as the central nervous system of the Cisco Unified Computing System. UCS Manager provides an intuitive GUI, a command-line interface (CLI), and a robust API to manage all system configuration and operations. Cisco UCS Manager helps to increase IT staff productivity, enabling IT storage, networking, compute, and application managers to collaborate on defining service profiles for applications. Service profiles help to automate provisioning and increase business agility, allowing data center managers to provision applications in minutes instead of days, shifting IT's focus from maintenance to strategic initiatives.

Cisco UCS Manager resides on a pair of Cisco UCS 6100 Series Fabric Interconnects using a clustered, active standby configuration for high availability. The manager participates not only in server provisioning, but also in device discovery, inventory, configuration, diagnostics, monitoring, fault detection, auditing, and statistics collection.

Data protection using EMC technologies

EMC provides many high availability products. This document describes use cases for solutions involving EMC RecoverPoint, EMC Ionix Unified Infrastructure Manager, and RSA enVision (See <http://www.rsa.com/node.aspx?id=3170>).

EMC RecoverPoint

EMC RecoverPoint uses continuous data protection (CDP) and continuous remote replication (CRR) to provide a concurrent local and remote replication solution with point-in-time recovery of heterogeneous storage for Vblock environments. You can monitor the protection status of virtual machines using the RecoverPoint Management Application GUI. You can also bring virtual machines back online rapidly with no data loss when using RecoverPoint with VMware vCenter™ Site Recovery Manager. RecoverPoint is the most flexible approach to protecting virtualized data for Site Recovery Manager—replicating VMware VMFS to protect and recover a single virtual machine or the entire VMware ESX Server®.

RecoverPoint's advanced capabilities include policy-based management, application integration, and bandwidth reduction. With RecoverPoint, customers can implement a single unified solution to protect and/or replicate data across heterogeneous storage. It simplifies management and reduces the cost of recovering data at a local or remote site to any point in time, and verifies continuous replication to a remote site without impacting performance.

EMC's RecoverPoint data protection technology allows you to perform the following actions in an SAP environment:

- Local data protection (CDP)
- Remote replication (CRR)
- Data protection for any point in time
- Presentation of any point in time to another host in the SAP environment

This document describes a use case involving RecoverPoint with continuous remote replication in the section entitled SAP Recovery Using RecoverPoint CRR on page 14.

EMC Ionix Unified Infrastructure Manager

EMC Ionix Unified Infrastructure Manager (UIM) provides a single point of management for Vblock infrastructures. With UIM, you can manage multiple Vblocks across compute, network, and storage resources. UIM

provides simplified Vblock management for provisioning, configuration management, and compliance management and eliminates the need for multiple server, network and storage configuration tools.

Customers can download UIM from EMC Powerlink® (<http://powerlink.emc.com/km/appmanager/km/secureDesktop>) and follow the on-screen instructions to add credentials and discover UCS, Cisco Nexus® switches, and Cisco MDS switches. UIM creates the foundation to provide unified management to larger segments of the data center infrastructure, providing a “single pane of glass” for systems configuration and integration and provides Vblock service catalogs and Vblock self-service portal capabilities.

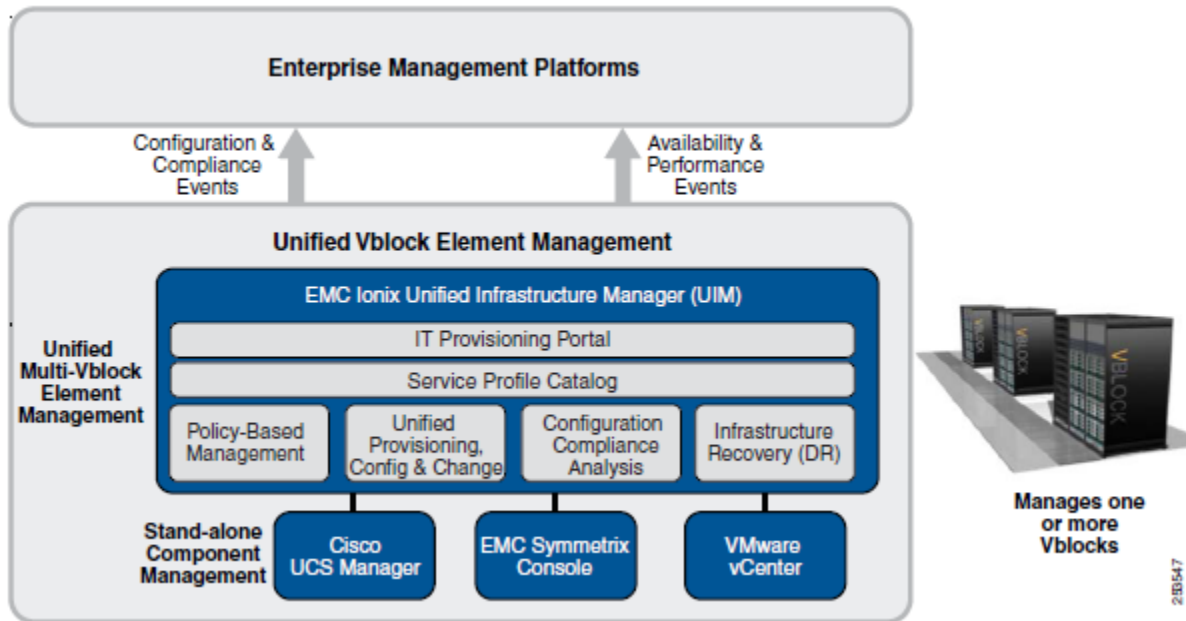


Figure 4. EMC Ionix Unified Infrastructure Manager in the Vblock infrastructure

Using UIM as a single point of integration simplifies Vblock deployment by abstracting the overall provisioning aspects of Vblock, while offering granular access to individual components for troubleshooting and fault management.

UIM includes the concept of service profiles that combine network, compute, and storage elements. This approach is very helpful for IT groups to leverage Vblocks in either an internal or external cloud (also known as service-based) deployment, paving the way for rapid deployment and utilization of Vblock resources in a consistent, structured manner.

Note: Vblock has an open management framework that allows an organization to integrate Vblock management with their choice of management tools.

Data protection using VMware

The following important VMware features can both enhance and simplify high availability for SAP deployed using Vblock technology:

- VMware High Availability
- VMware VMotion
- VMware Site Recovery Manager (SRM)
- VMware Fault Tolerance

VMware High Availability

VMware High Availability (HA) provides easy-to-use, cost-effective high availability for applications running in virtual machines. In the event of physical server failure, affected virtual machines are automatically restarted on the other production servers with spare capacity. In the case of operating system failure, VMware HA restarts the affected virtual machine on the same physical server. The combination of VMware HA and the other high availability features of the VMware vSphere platform enables SAP organizations to select and easily deliver the level of availability required for all of their important SAP applications.

VMware HA enables IT organizations to:

- Minimize unplanned downtime and IT service disruption while eliminating the need for dedicated standby hardware and additional software installation
- Provide affordable uniform high availability across the entire virtualized IT environment without the cost and complexity of failover solutions that are tied to either operating systems or specific applications.

VMware HA continuously monitors all VMware ESX™ hosts in a cluster and detects hardware failures. The VMware HA agent placed on each host maintains a heartbeat with the other hosts in the cluster using the service console network. Each server sends heartbeats to the other servers in the cluster at regular intervals. If any servers lose heartbeat, VMware HA initiates the failover action by restarting all affected virtual machines on other hosts.

Figure 5 depicts a typical scenario with the SAP database (DB) and the Central Instance (CI) running in a single virtual machine with VMware HA applied; this is a configuration often found in existing installations.

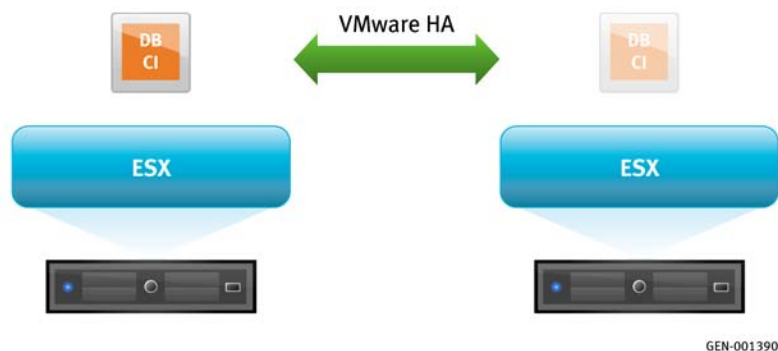


Figure 5. SAP VMware HA Configuration

VMware VMotion

VMotion™ enables you to move mission-critical workloads between members of an ESX array without downtime. VMotion is a key enabling technology for creating the dynamic, automated, and self-optimizing datacenter. This application makes it possible to service hardware and software without missing a beat so that you can configure, manage, maintain, and update your SAP applications without the risk of the application going offline.

For maintaining high availability, VMotion enables you to:

- Perform hardware maintenance without scheduled downtime
- Proactively migrate virtual machines away from failing or underperforming servers
- Keep your resources optimized to align with business priorities

The migration of a virtual machine with VMotion preserves the precise execution state, the network identity, and the active network connections. As a result, there is zero downtime and no disruption to the user. This ensures that your SAP applications remain online, even under conditions in which a non-virtualized instance of the application becomes unavailable.

VMware Site Recovery Manager

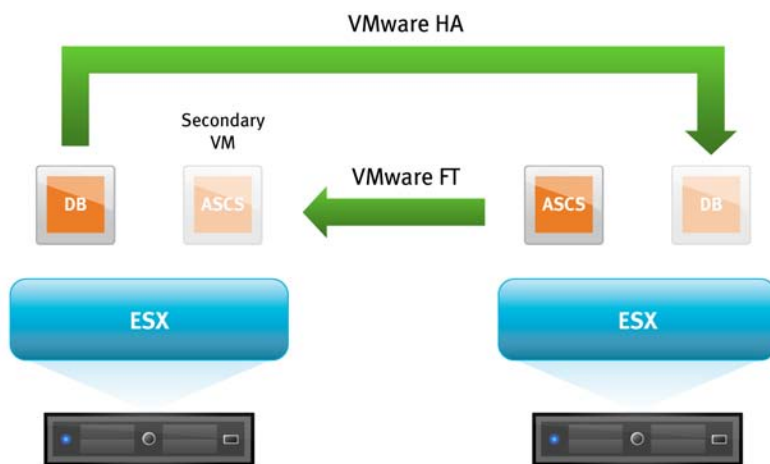
VMware Site Recovery Manager (SRM) is a pioneering disaster-recovery manager and automation solution for VMware vSphere 4. SRM accelerates recovery by automating the recovery process and simplifying disaster-recovery plan management by integrating disaster recovery with the management of your VMware virtual infrastructure. SRM also ensures reliable recovery by eliminating complex manual recovery steps and by enabling non-disruptive recovery plan testing. SRM integrates tightly with VMware vSphere, VMware vCenter Server, and storage replication to make failover and recovery rapid, reliable, affordable, and manageable. It enables organizations to take the risk and worry out of disaster recovery and to expand protection to all their systems and applications, including SAP.

SAP Central Services and VMware Fault Tolerance

Fault Tolerance (FT) relies on VMware® vLockstep technology to establish and maintain an active secondary virtual machine that runs in virtual lockstep with the primary virtual machine. The secondary virtual machine resides on a different host and executes precisely the same sequence of virtual (guest) instructions as the primary virtual machine. The secondary machine observes the same inputs as the primary and is ready to take over at any time without any data loss or service interruption if the primary machine fails. You manage both virtual machines as a single unit, but they run on different physical hosts. By allowing instantaneous failover between the two virtual machines, FT enables zero downtime for the application deployed within the virtual machine.

Note: For technical details of VMware FT, see the document entitled *Protecting Mission-Critical Workloads with VMware Fault Tolerance*. See the document link in the [References](#) section on page 22 of this document.

Currently, VMware FT supports only one virtual CPU and as such is a good candidate for the "lighter" central services component. Figure 6 shows a high availability configuration of the SAP database (DB) and ABAP SAP Central Services (ASCS). VMware HA protects the database virtual machine, and VMware FT protects the ASCS virtual machine.



GEN-001391

Figure 6. SAP VMware HA Configuration with a Secondary VM



Use Cases Demonstrating High Availability with SAP on Vblock

This section describes two use cases that demonstrates achieving high availability for virtualized SAP servers on Vblock. The uses cases are as follows:

- SAP recovery using EMC RecoverPoint CRR
- Using VMware VMotion to reduce planned downtime by performing a SAP live/hot migration

SAP Recovery Using RecoverPoint CRR

If you need to install a software update, apply a patch, or promote new business processes to your SAP production instance, you can capture a point in time of your data when you know that the data is accurate. This protects you if your system experiences data corruption or integrity loss during the change process. RecoverPoint allows continuous data protection, either locally or remotely. This section describes how to perform a recovery using RecoverPoint Bookmarks.

You can capture a “point in time” of your data by:

- Creating a RecoverPoint bookmark
- Enabling access to the image
- Creating a Consistency Group
- Bringing up the Consistency Group
- Verifying successful operation

Step 1: Create a RecoverPoint Bookmark

You can view and manage your SAP environment through the RecoverPoint GUI and protect data based on individual LUNs or groups of LUNs. Using RecoverPoint “bookmarks,” you can create reference points in the indefinitely granular landscape of point-in-time protection, which you can use to perform a production rollback, if necessary as displayed as shown in Figure 10.

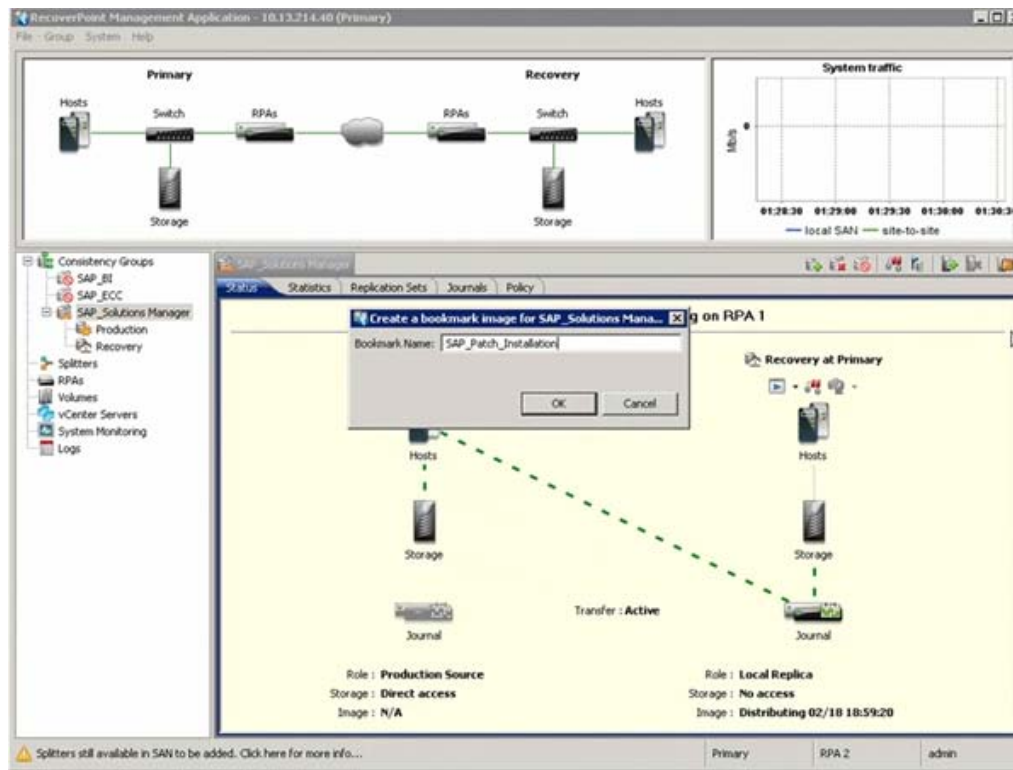


Figure 7. Creating bookmarks in RecoverPoint

Step 2: Enable access to the bookmarked image

Next, you need to enable access to the bookmark image you created, by clicking on the arrow icon and selecting **Enable Image Access** on the recovery host as shown in the **Enable Image Access** wizard in Figure 11.

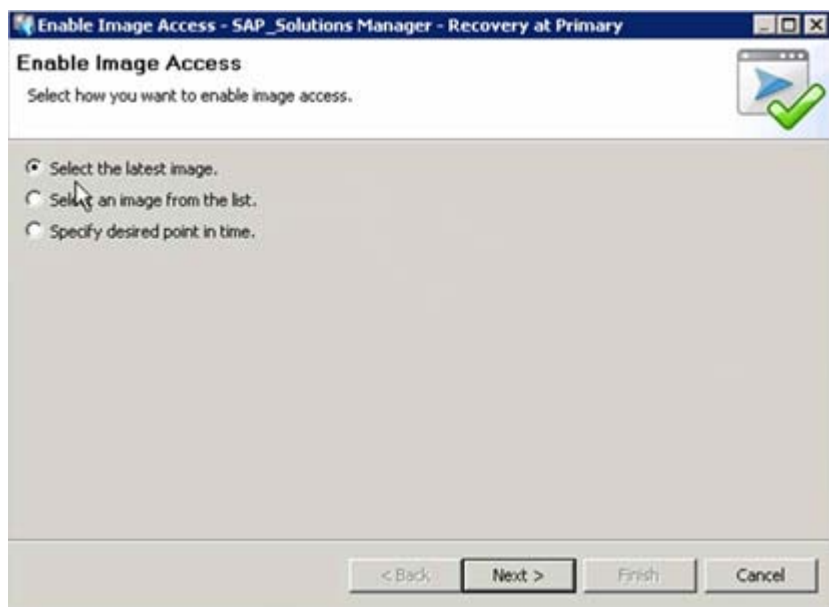


Figure 8. Enabling Image Access

This allows you to transfer this bookmark image to the recovery server.

Step 3: Create a new consistency group

RecoverPoint uses consistency groups for controlling error situations and for maintaining data consistency at a recovery site. It allows you to create a consistent point-in-time copy across multiple data volumes, thus allowing you to restore that data during a production rollback. You can use the RecoverPoint GUI to create a consistency group as shown in Figure 12.

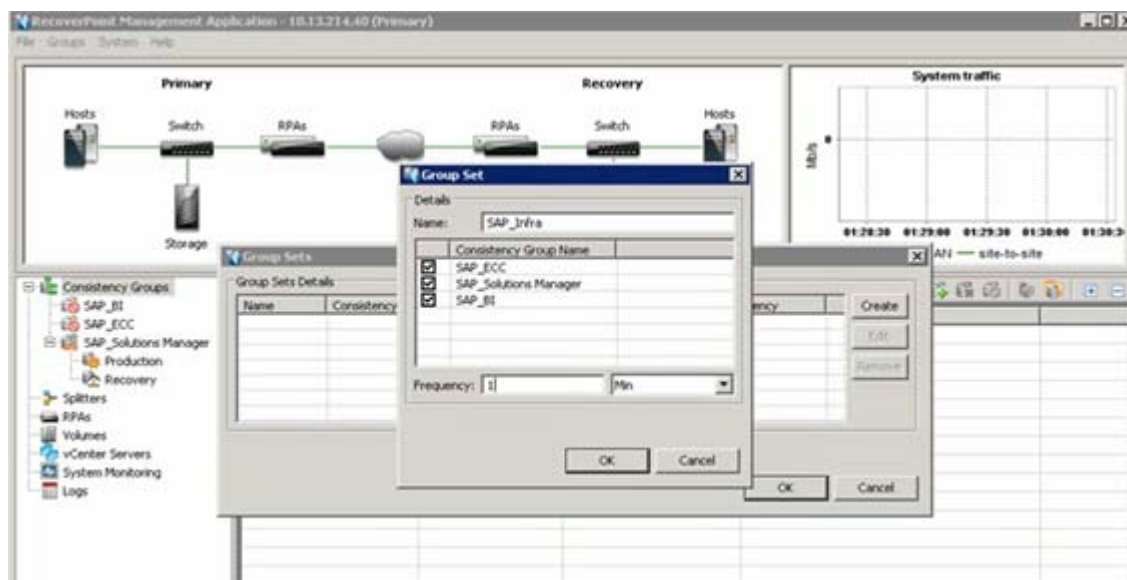


Figure 9. Creating a consistency group

Step 4: Bring up the consistency groups

To bring up consistency groups simultaneously, you need to put the production environment into a “suspend” state to ensure there are no IP address conflicts as shown in Figure 13.

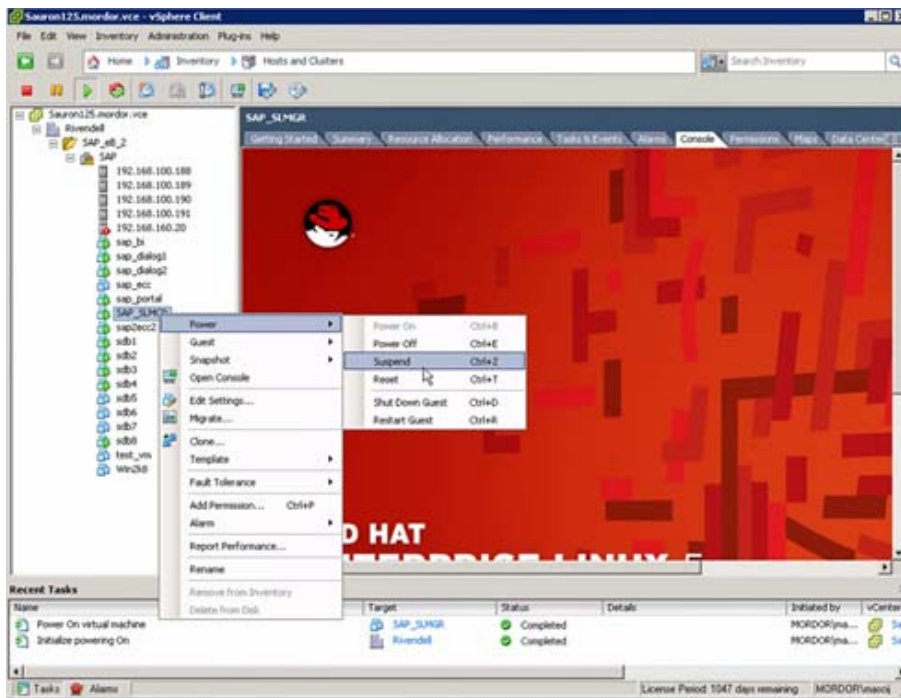


Figure 10. Suspending the production environment

Next, enable access to the SAP bookmark that you created earlier, allowing you to roll your production data back to the point in time of the bookmark as shown in Figure 14.

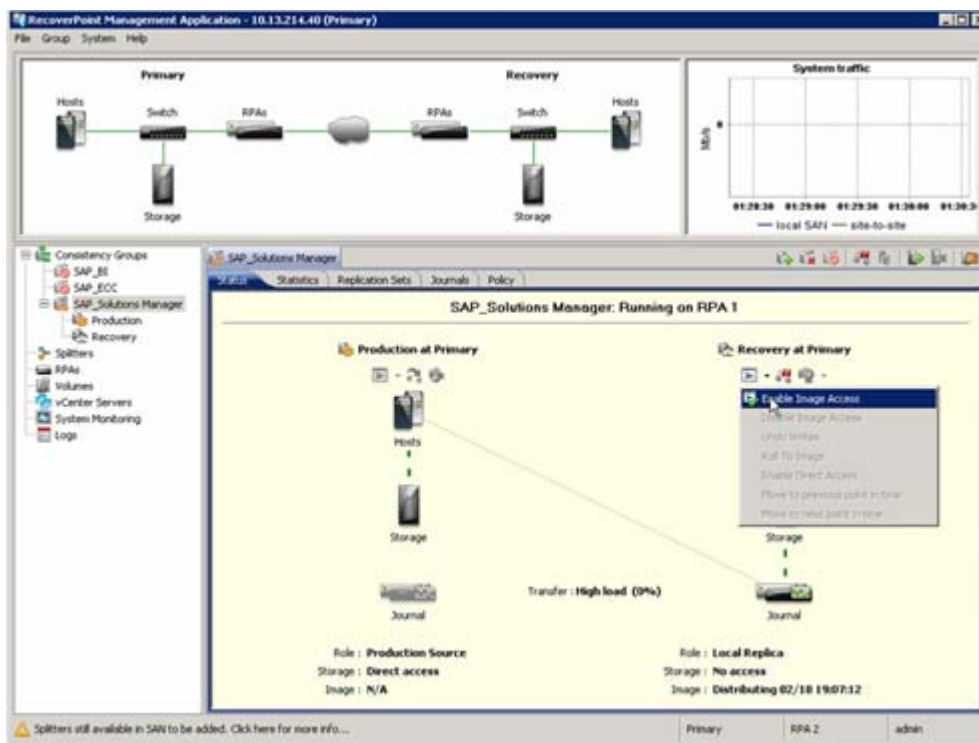


Figure 11. Enabling bookmark access

Step 5: Verifying operational success

The final step is to verify that everything is operating properly by booting up the virtual machine, and verifying that the SAP services are running in SAP Solutions Manager as shown in Figure 15.

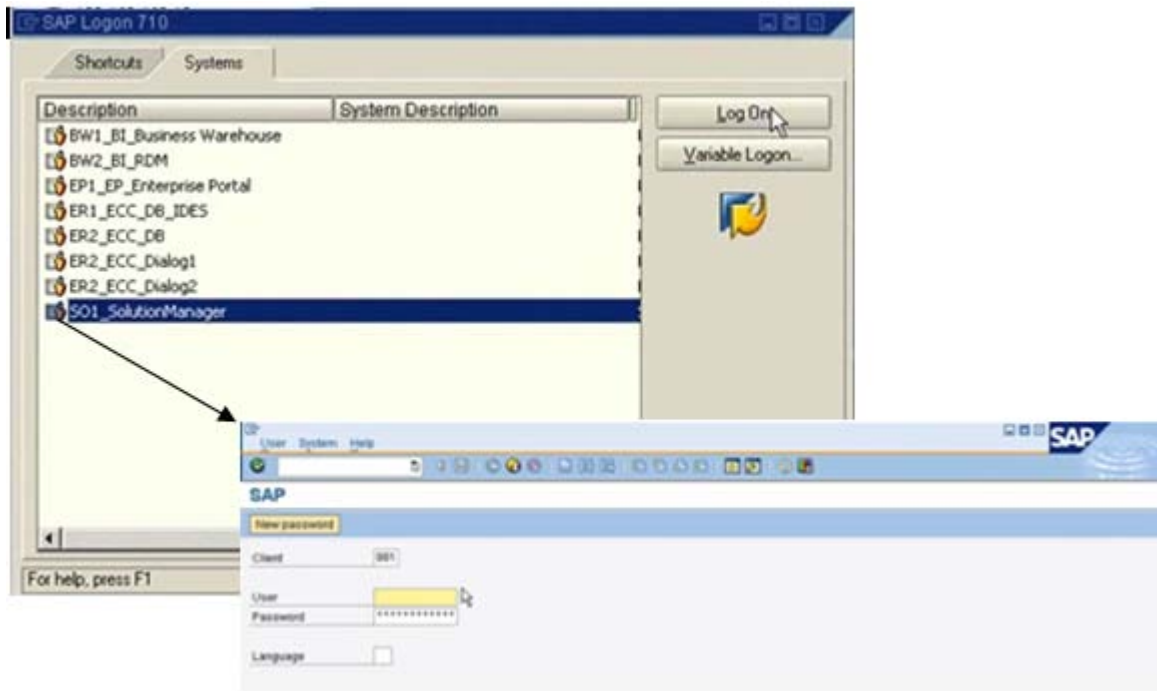


Figure 12. Verifying that SAP is up and running

You can now return to RecoverPoint to view your recovery options as shown in Figure 16.

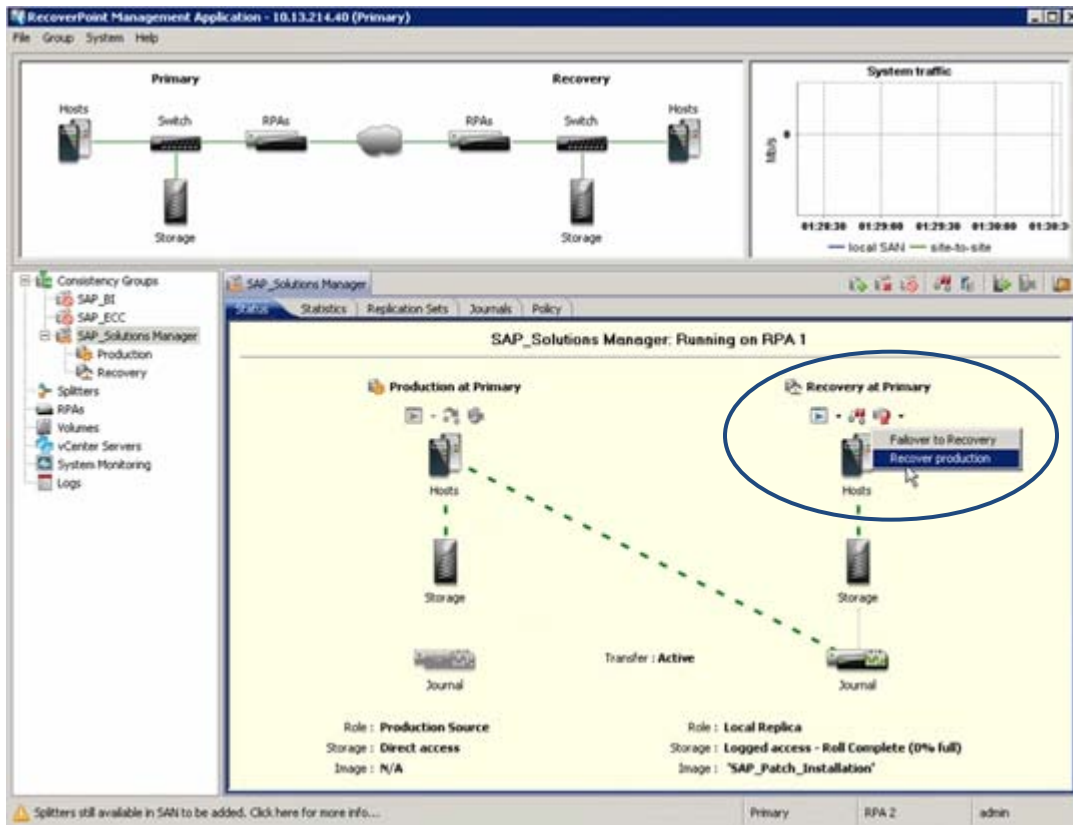


Figure 13. Viewing recovery options

For detailed steps for using RecoverPoint CRR to recover SAP production data, see Appendix B—Recovering data using RecoverPoint on page 23.

Using VMware VMotion to reduce planned downtime by performing a live/hot migration

In the Vblock environment, customers can move SAP instances running on virtual machines from one UCS blade server to another using VMware’s VMotion technology. Moving SAP instances between blades allows administrators to schedule maintenance (for example, installing a software update or patch) on a blade while ensuring minimal production downtime. You can also enable redundancy through the migration of SAP instances, ensuring that SAP production data is not lost in case of blade failure.

The process of migrating an online SAP instance (running on virtual machine) from one UCS blade to another is known as a “hot” VMotion. These migration types are especially useful for reducing planned downtime because the SAP instance is migrated from one physical host to another while still processing read/write operations.

Before moving an SAP instance from one blade to another, make sure that:

- SAP is running in a virtual machine on an ESX Server.
- Both ESX Servers:
 - have compatible CPUs
 - are connected to a virtual switch assigned for VMotion
 - are connected to a production switch enabled for user access.
- SAP virtual disk and VMFS configuration files reside on shared storage connected to both ESX Server hosts.

Figure 17 shows the virtual machine, `sap_dialog2`, installed on the host `pippin188.mordor.vce` (a UCS B200 Blade Server). During migration, SGEN generates Abap loads on the SAP system. After the migration completes, `sapdialog2` will be running on the new host `pippin192.mordor.vce`, while SAP Abap load generation continues to run.

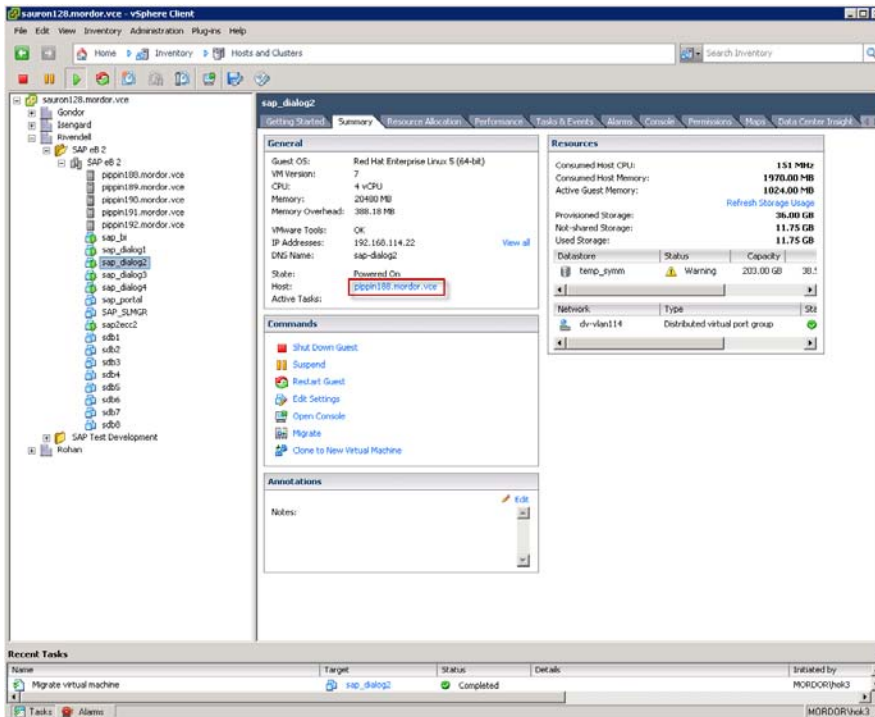


Figure 14. The `sap_dialog2` instance on the host `pippin188.mordor.vce`

To migrate the instance using VMware's VMotion, you can choose that instance and select **Migrate** from the vSphere client menu tree as shown in Figure 18.

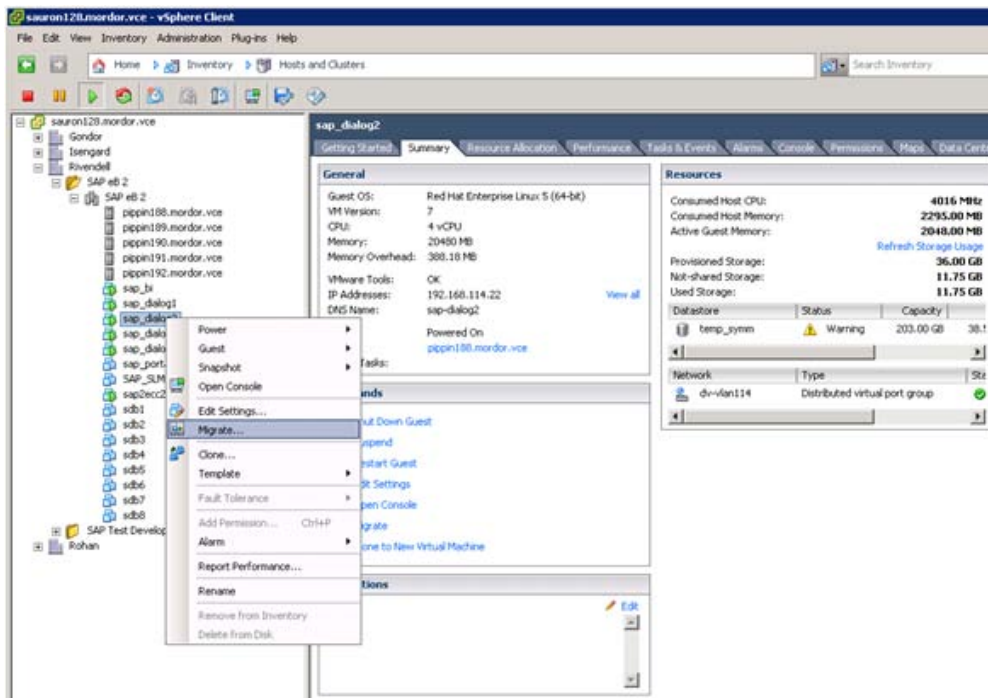


Figure 15. Migrating the instance using VMware's VMotion

Once the migration is complete, you can use the Summary tab to see that the online virtual machine **sap_dialog2** has been migrated to the new host **pippin192.mordor.vce** as shown in Figure 19.

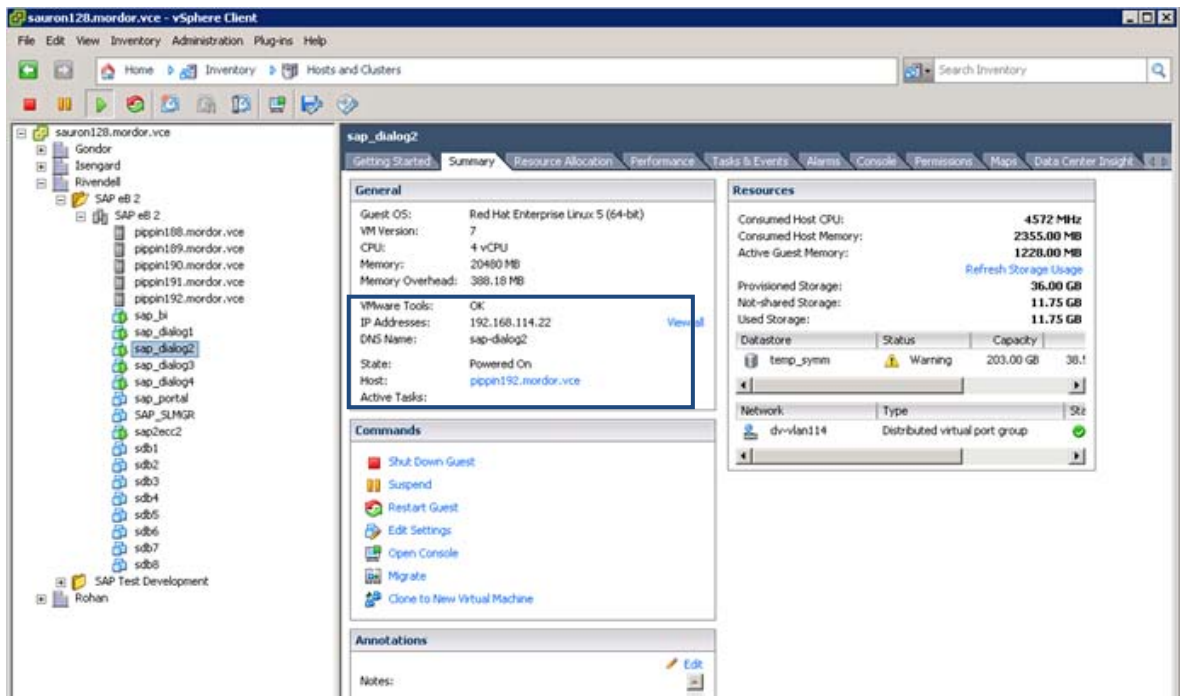


Figure 16. Hot migration view

For detailed steps on performing a hot migration using VMotion, see Appendix C—Using VMotion to reduce planned downtime by performing a live/hot migration on page 30.

Summary

Virtualization technology has matured to the point where it is now suitable for deploying mission-critical applications, such as SAP, in large data center environments. Today's business imperatives for IT demand that the deployment of applications, such as SAP, be accomplished securely and safely, without affecting production environments. With the availability of Vblock systems in the marketplace, the deployment of SAP on this platform meets the most demanding customer requirements.

Cisco, EMC, and VMware have extensive experience deploying business-critical applications in virtual environments and they can help you quickly and confidently achieve better utilization of infrastructure assets while maintaining performance and availability. Your SAP applications and infrastructure will benefit from improved deployment speed, greater business agility and operational efficiencies through template-based provisioning. Vblock powered solutions for SAP will enable efficient and rapid response to continually evolving business needs while improving service levels

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<http://www.emc.com/collateral/software/white-papers/h2781-emc-recoverpoint-3-new-features.pdf>
- *EMC Continuous Data Protection for SAP Enabled by EMC Symmetrix DMX-4 and EMC RecoverPoint Reference Architecture white paper*
<http://www.emc.com/collateral/hardware/technical-documentation/h6058-emc-cdp-for-sap-symm-dmx-4-recoverpoint-ref-arc.pdf>
- *Deploying a Virtual Infrastructure for SAP with EMC and VMware Technologies Applied Technology white paper*
<http://www.emc.com/collateral/software/white-papers/h6055-deploying-virtual-infrastructure-for-sap-with-emc-vmware-wp.pdf>

Appendixes

The following appendixes are included in this document to provide further details on the high availability tools for SAP in a Vblock.

- Appendix A—Recovering data using RecoverPoint
- Appendix B—Using VMotion to reduce planned downtime using a live/hot migration

Appendix A—Recovering data using RecoverPoint

This appendix provides detailed steps for using RecoverPoint to recover SAP production data.

1. Create a bookmark in the RecoverPoint GUI by clicking on the **Bookmark** link. The Create a bookmark image for the SAP Solutions Manager page appears as shown in Figure 28.

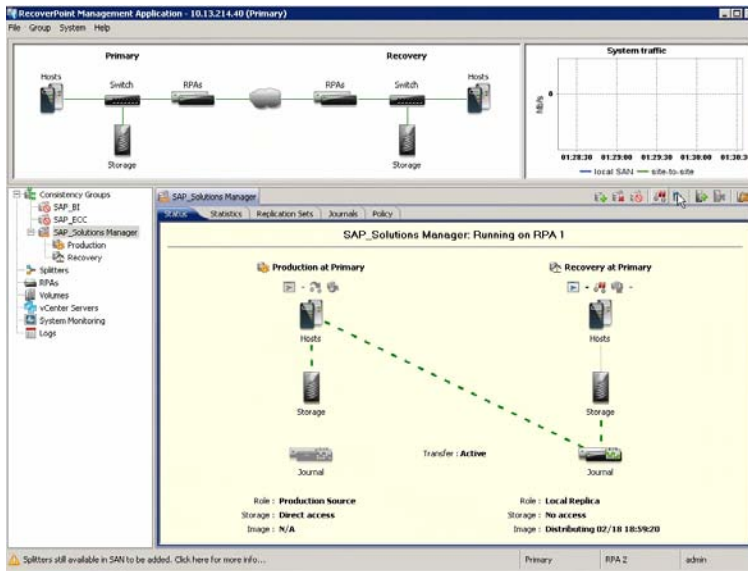


Figure 17. Creating a bookmark

1. Enter a name for the bookmark in the Bookmark Name field and click **OK** as shown in Figure 29.

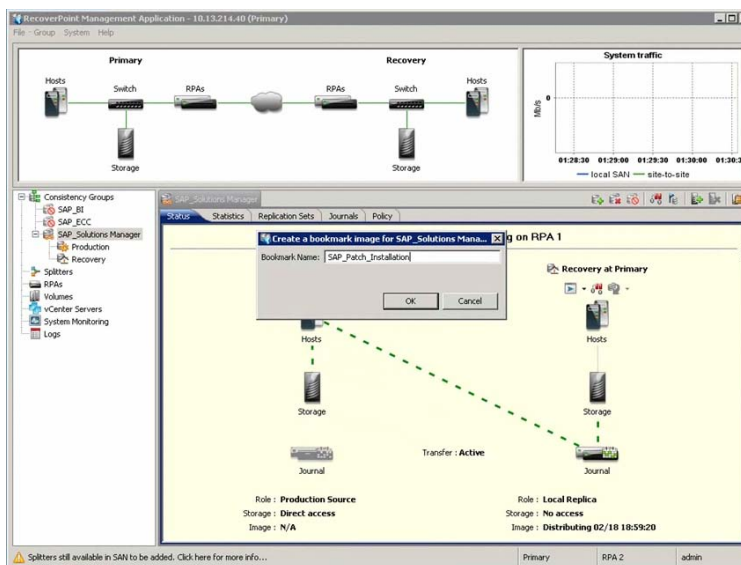


Figure 18. Specifying a bookmark name

- On the Recovery GUI, click on the arrow icon and select **Enable Image Access** on the recovery host. An Enable Image Access wizard appears allowing you to transfer this bookmark image to the recovery server as shown in Figure 30.

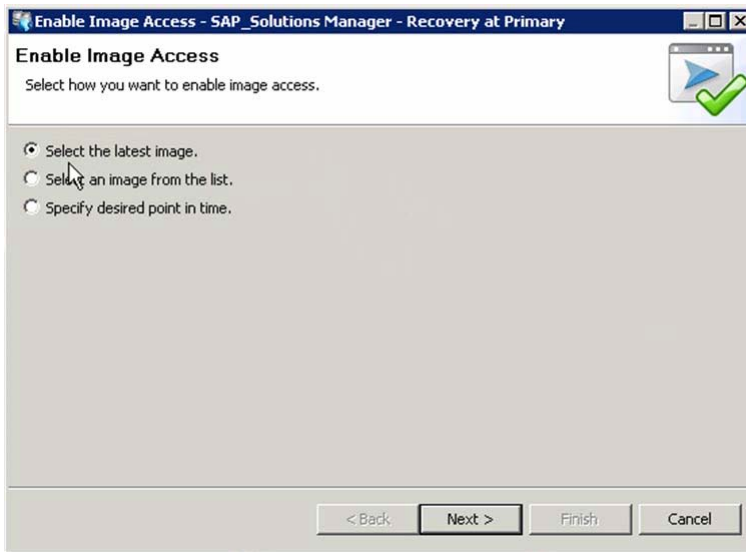


Figure 19. Enabling image access

- Choose **Select the latest image** and click **Next**.
- Select **Groups** from the RecoverPoint GUI menu and select **Group Sets** as shown in Figure 31. This allows you to create a new consistency group.

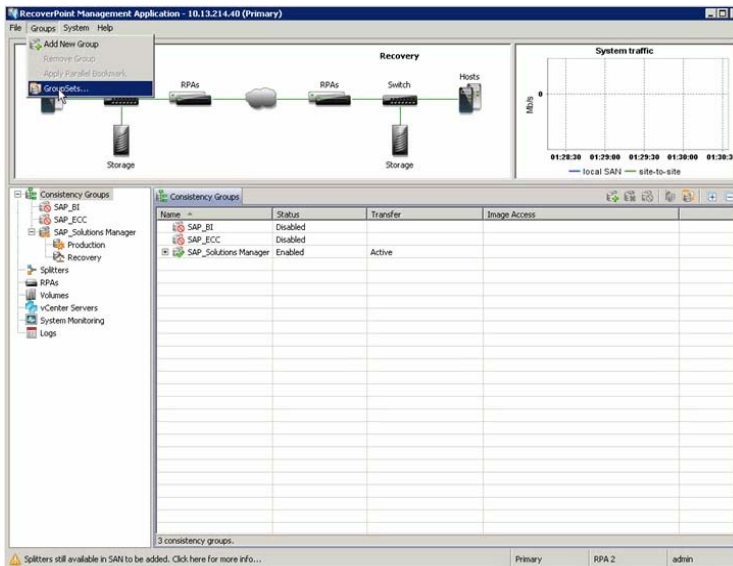


Figure 20. Selecting groups and group sets

- Create a new consistency group by clicking **Create**. A Group Set dialog appears as shown in Figure 32.

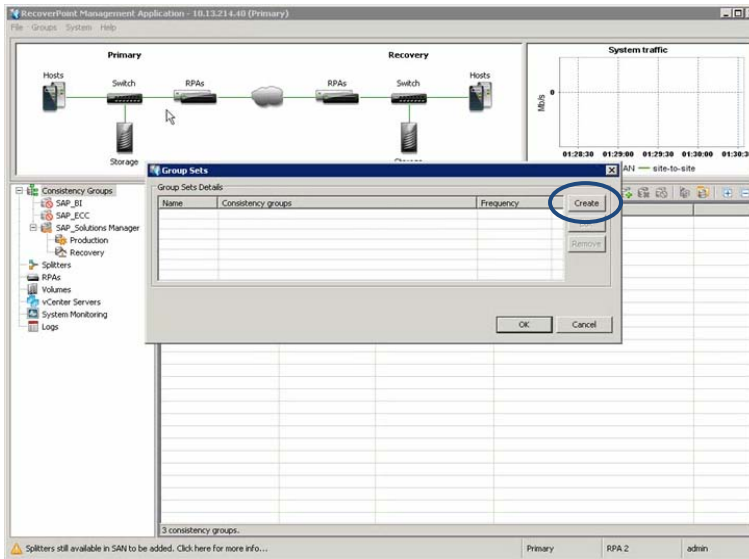


Figure 21. Group Set dialog box

6. Select the consistency groups you want to group together for the new consistency group as shown in Figure 33.

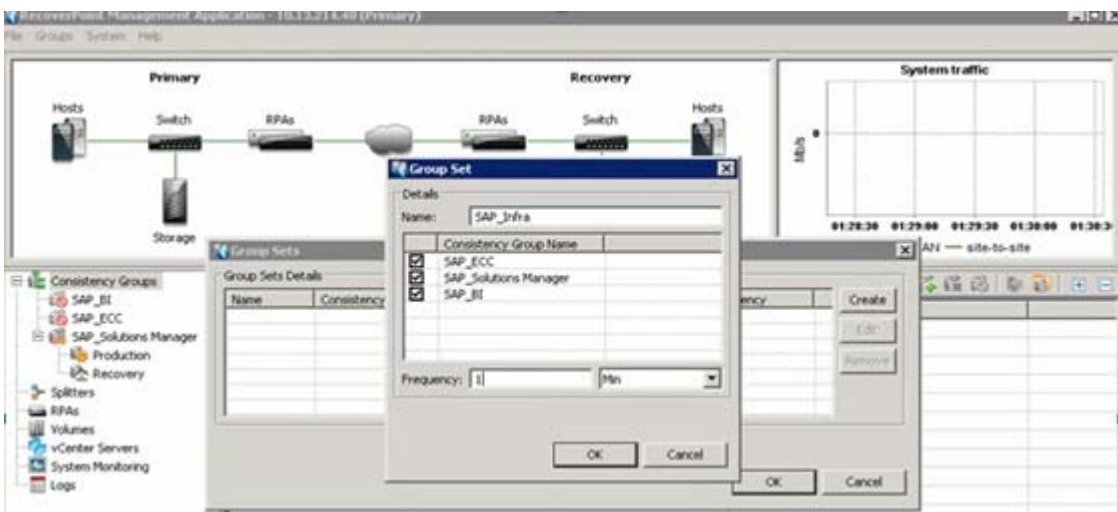


Figure 22. Choosing the consistency groups

7. Enter a name for the SAP consistency group and click **OK**.
8. Select the frequency you want to use for bookmarks. Setting the frequency sets how often bookmarks will be created across your consistency groups and allows you to have granularity to roll back just one at a time, or present only one bookmark to the recovery server while still maintaining a common point in time across all three consistency groups in your SAP environment.
9. To bring up consistency groups simultaneously, you need to put the production environment into a “suspend” state to ensure there are no IP address conflicts. From the RecoverPoint GUI, right-click on **SAP Solution Manager** and select **Suspend** as shown in Figure 34.

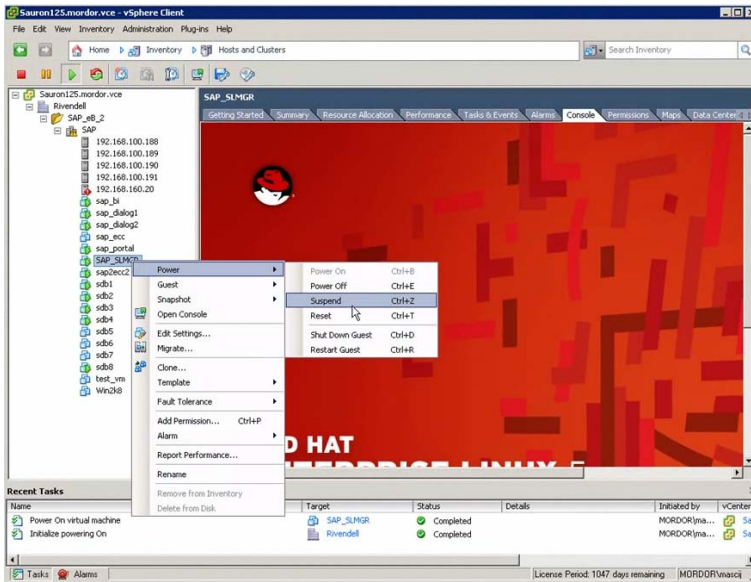


Figure 23. Suspending the production environment

10. The Confirm Suspend dialog prompt appears. Click **Yes** to suspend the virtual machine.
11. Once you initiate the “suspend” state, you can enable access to the SAP bookmark that you created earlier. If there is data corruption or data integrity loss, this bookmark allows you to roll your production data back to the point-in-times of the bookmark. Enable image access to the bookmark by selecting the Image Access icon and clicking **Enable Image Access** as shown in Figure 35.

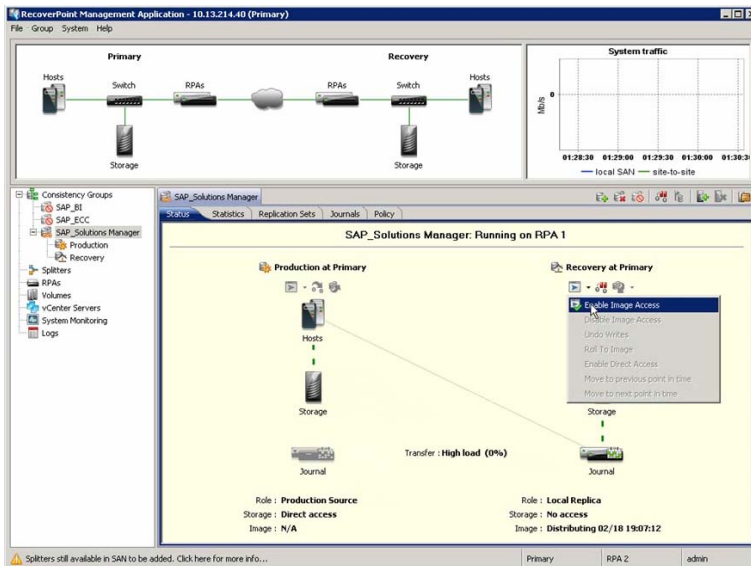


Figure 24. Enabling image access

12. The Enable Image Access window appears. Click the **Select image from the list** radio button as shown in Figure 36 and click **Next**.

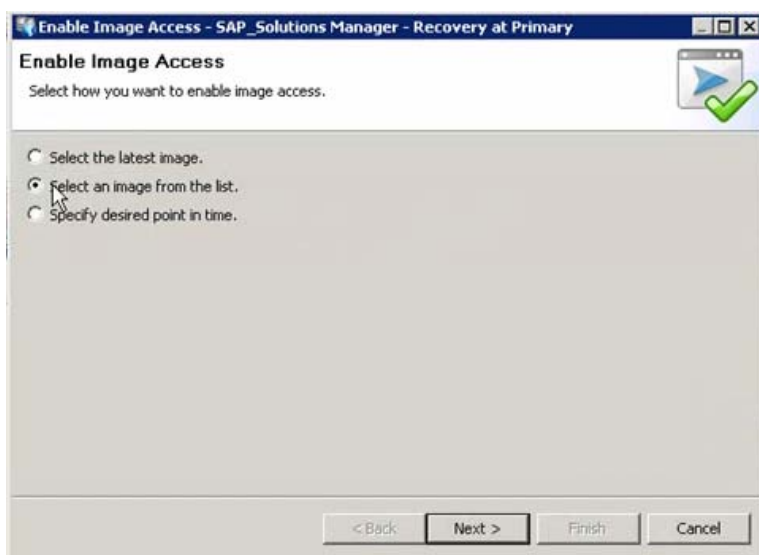


Figure 25. Selecting an image from the list

13. Browse to the SAP Patch Installation bookmark. Click **Next**. The Image Access Mode window appears.
14. Select the **Image Access Mode** radio button. There are two options for this selection: logged access and virtual access.
 - **Logged access** takes the point-in-time and copies the data to the target LUNs.
 - **Virtual access** allows for immediate access to the data through memory mapping technologies. You can also select the **Roll image in background** checkbox to copy the data to the target LUNs as shown in Figure 37.

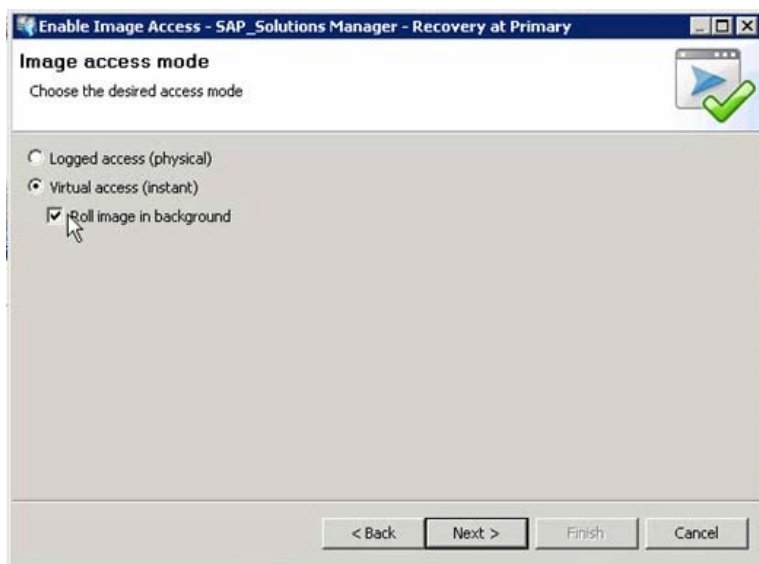


Figure 26. Choosing the access mode

15. To verify that everything is operating properly, boot up the virtual machine, and verify that the SAP services are running in SAP Solutions Manager.
16. On the desktop for the virtual machine, click on the SAP Logon icon to log in to SAP. In the SAP Logon window, select **Solution Manager** as shown in Figure 38.



Figure 27. Logging in to SAP

17. The SAP credentials login window appears as shown in Figure 39 indicating that SAP is up and running.

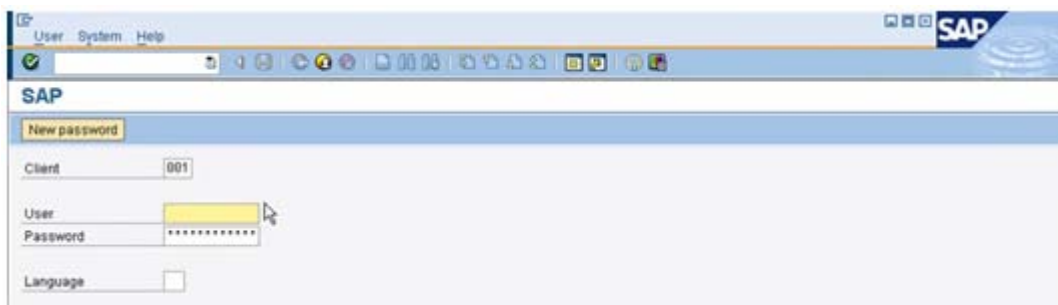


Figure 28. SAP Login screen

18. Return to the RecoverPoint GUI. Notice that there is a Recovery Options icon on the right (see Figure 40) that allows you to select either of the following options:
- Failover to Recovery
 - Recover Production

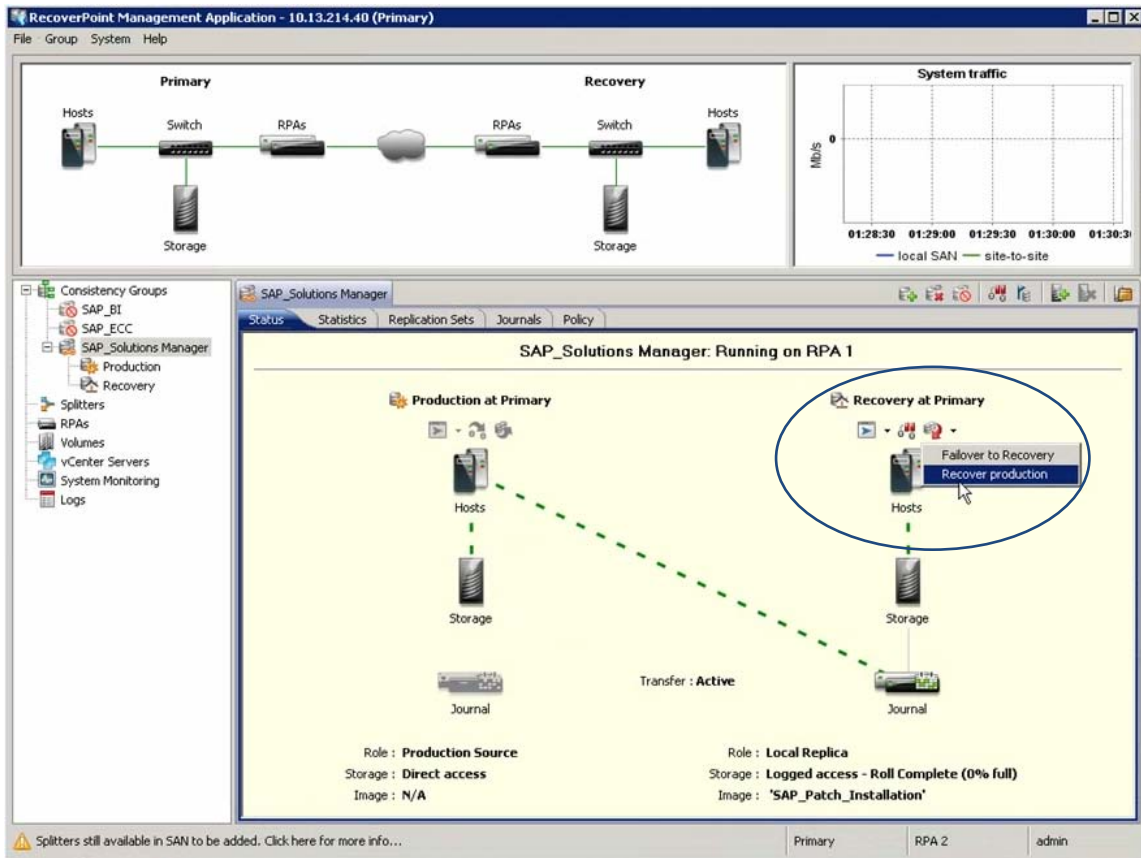


Figure 29. RecoverPoint recovery options

Appendix B—Using VMotion to reduce planned downtime by performing a live/hot migration

This section demonstrates the ability to perform a hot migration from one UCS blade server to another using VMware's VMotion technology.

The virtual machine, sap_dialog2, is installed on the host **pippin188.mordor.vce** (a UCS B200 Blade Server). During migration, SGEN generates Abap loads on the SAP system. After the migration completes, sapdialog2 will be running on the new host **pippin192.mordor.vce**, while SAP Abap load generation continues to run. Figure 41 shows the sap_dialog2 instance on the host **pippin188.mordor.vce**.

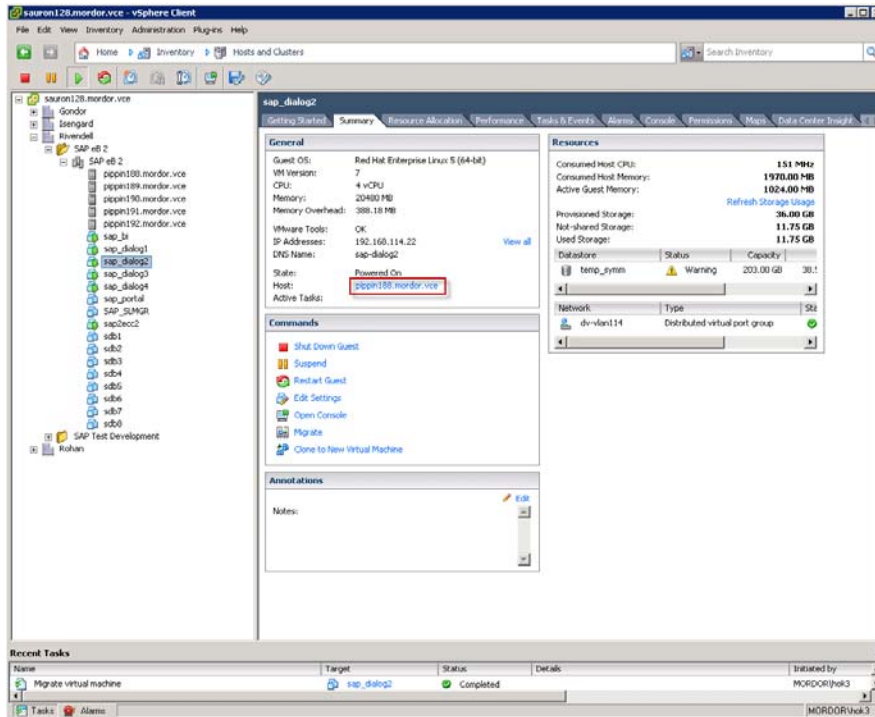


Figure 30. SAP instance before migration

To perform an SAP instance “hot” migration on the Vblock, perform the following steps:

1. Log in to SAP and start a SGEN transaction task by selecting **Generate All Objects of Selected Software Components** and clicking **Continue** as shown in Figure 42.

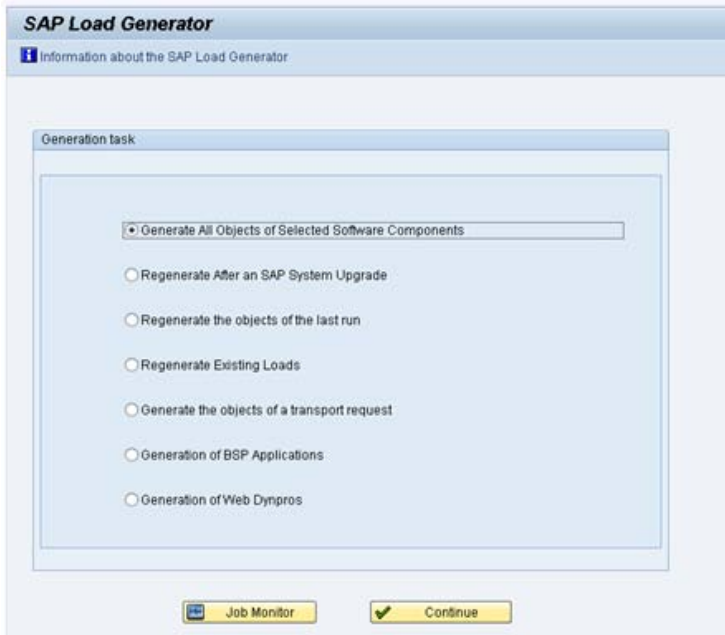


Figure 31. Starting an SGEN transaction

2. SAP Load Generator displays a list of software components already installed on your system as shown in Figure 43. Select **SAP_BW** and click **Continue**.

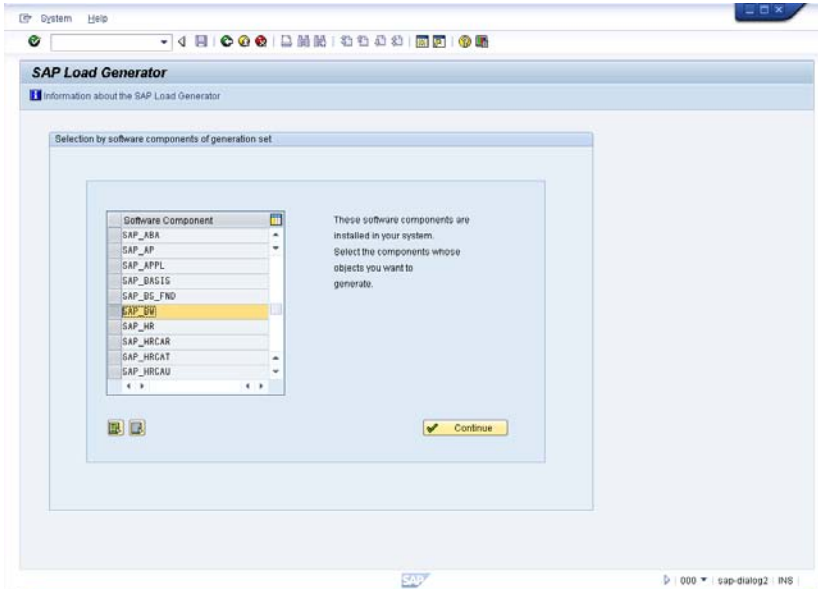


Figure 32. Software component list

3. Select the load to run on the sap-dialog2 virtual machine as shown in Figure 44 and click **Continue**.

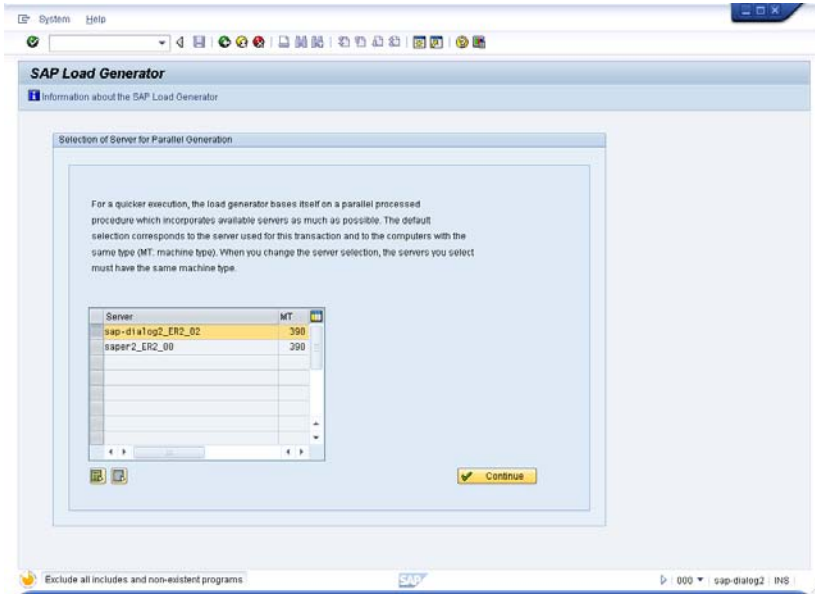


Figure 33. Selecting the virtual machine server

4. A Load Generator Status screen displays as shown in Figure 45. Verify that the information displayed is correct, and select **Job Overview**.

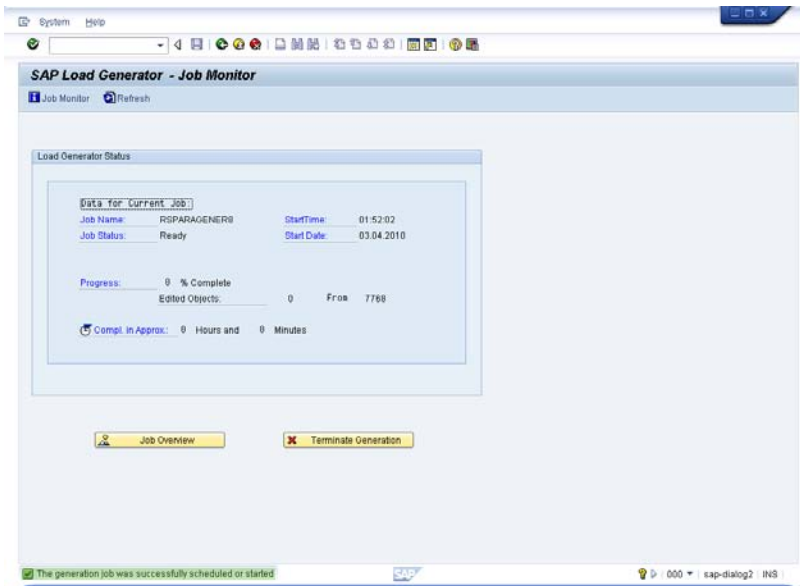


Figure 34. Verifying the job information

5. Start the load generation by setting the Start Time to run immediately. The job then begins running.

- Monitor the job's progress by viewing the Progress field and viewing the percentage shown in Figure 46.

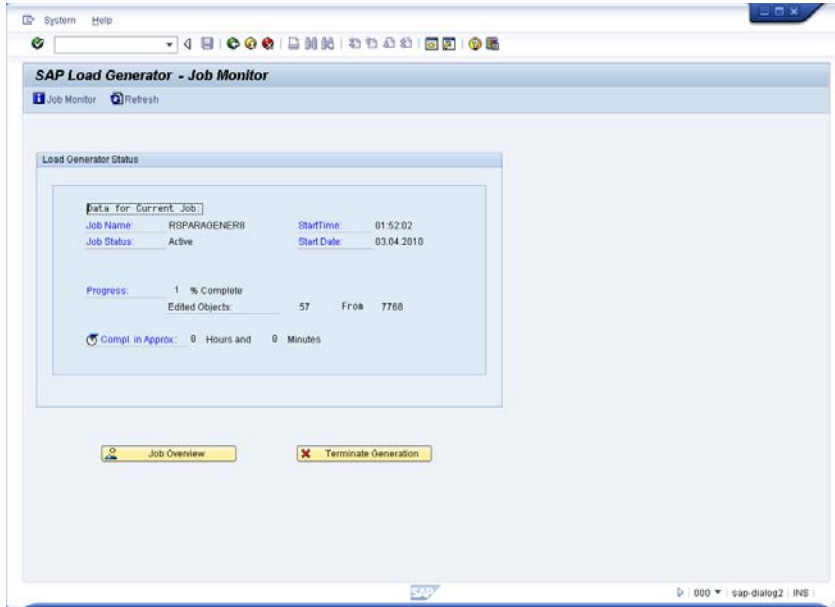


Figure 35. Monitoring progress

Note: You can also view the job's progress on the Job Overview page by selecting **Job Overview** shown in Figure 47.

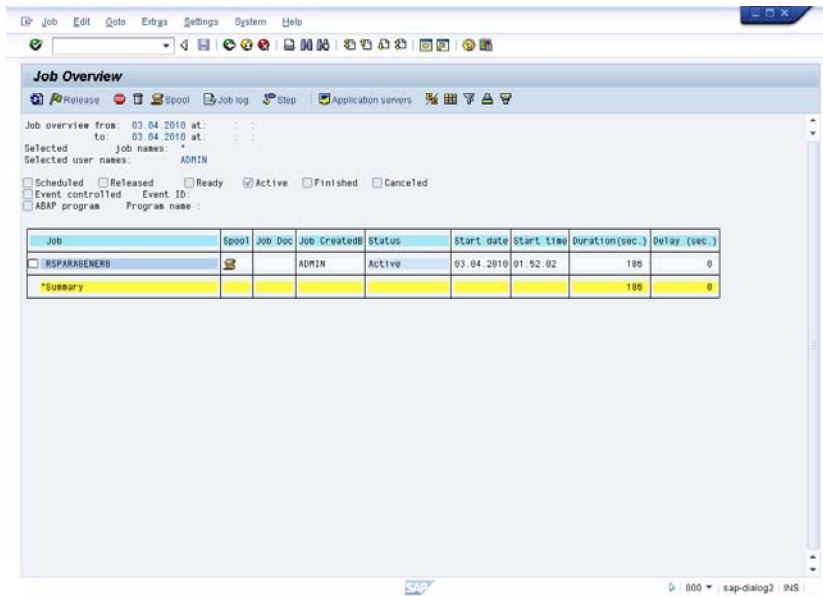
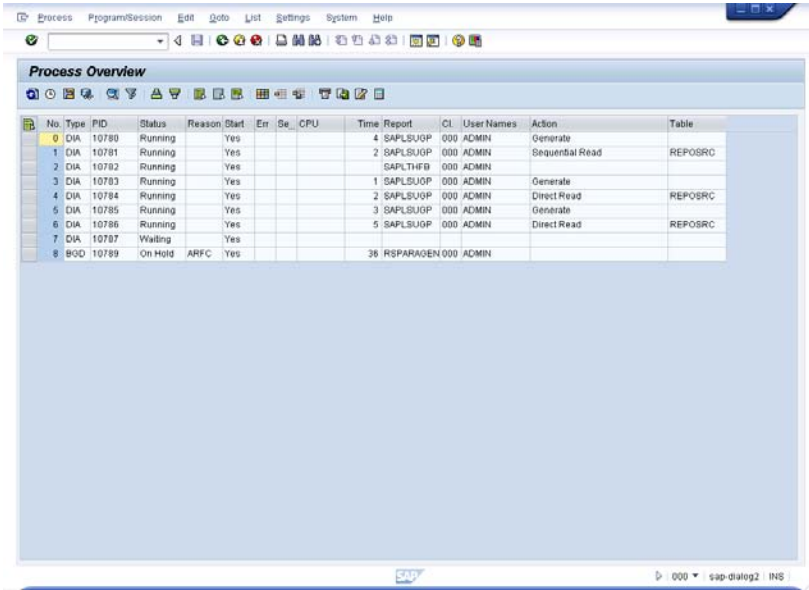


Figure 36. Progress using the Job Overview screen

Note: Transaction SM37 indicates that the batch job is running as shown in Figure 48.



No.	Type	PID	Status	Reason	Start	Err	Se	CPU	Time	Report	Cl.	User Name	Action	Table
0	DIA	10780	Running		Yes					4	SAPLSUOP	000 ADMIN	Generate	
1	DIA	10781	Running		Yes					2	SAPLSUOP	000 ADMIN	Sequential Read	REPOSRC
2	DIA	10782	Running		Yes					2	SAPLTHFB	000 ADMIN		
3	DIA	10783	Running		Yes					1	SAPLSUOP	000 ADMIN	Generate	
4	DIA	10784	Running		Yes					2	SAPLSUOP	000 ADMIN	Direct Read	REPOSRC
5	DIA	10785	Running		Yes					3	SAPLSUOP	000 ADMIN	Generate	
6	DIA	10786	Running		Yes					5	SAPLSUOP	000 ADMIN	Direct Read	REPOSRC
7	DIA	10787	Waiting		Yes									
8	BOD	10789	On Hold	ARFC	Yes					36	RSPARA0EN	000 ADMIN		

Figure 37. Batch job

Note: Transaction SM50 shows that dialog processes are running.

7. Open vCenter, right-click on sap_dialog2, and select **Migrate** as shown in Figure 49.

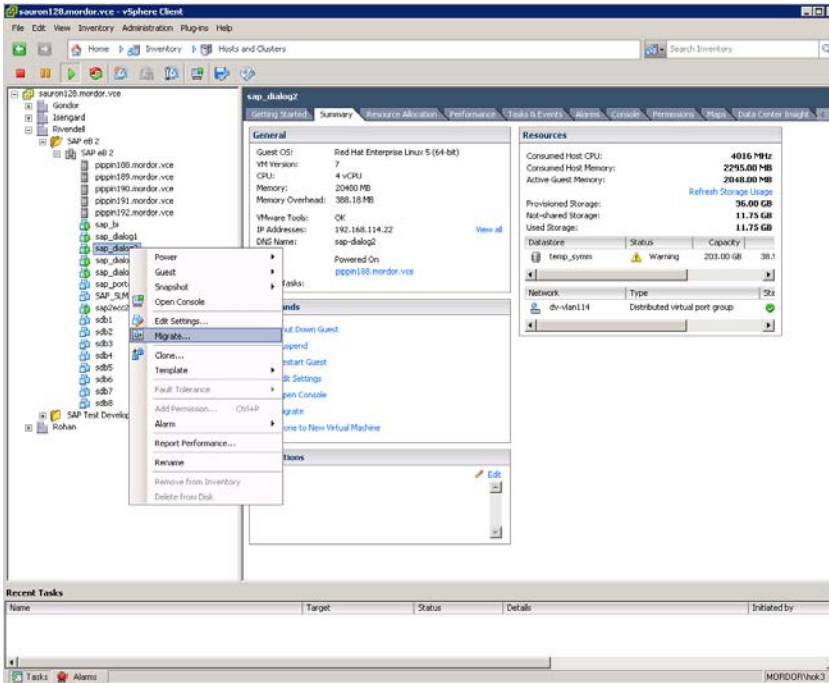


Figure 38. Selecting Migrate from the vCenter window

8. The Select Migration Type page displays as shown in Figure 50. Select **Change host** and click **Next**.

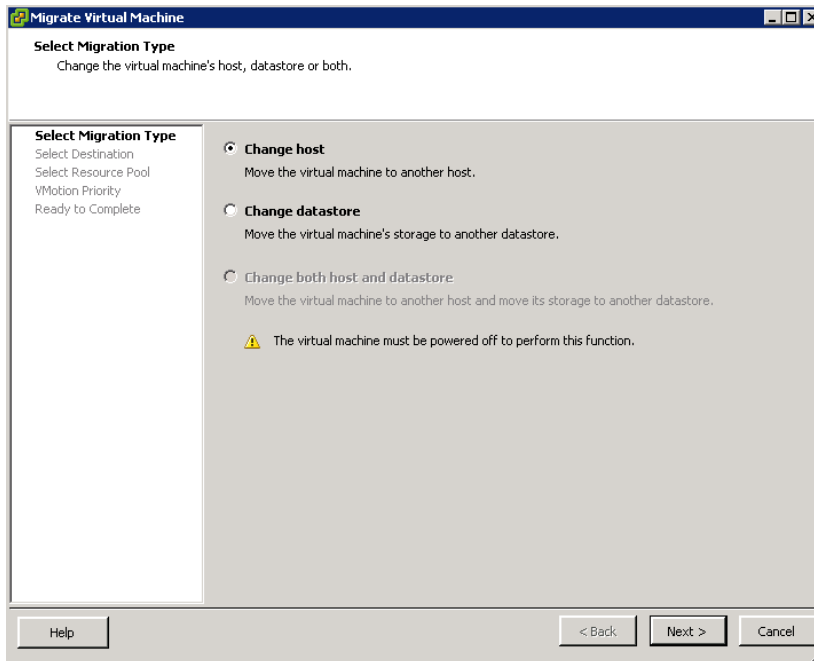


Figure 39. Selecting the migration type

9. On the Select Destination page, select **pippin192.mordor.vce** as shown in Figure 51 and click **Next**.

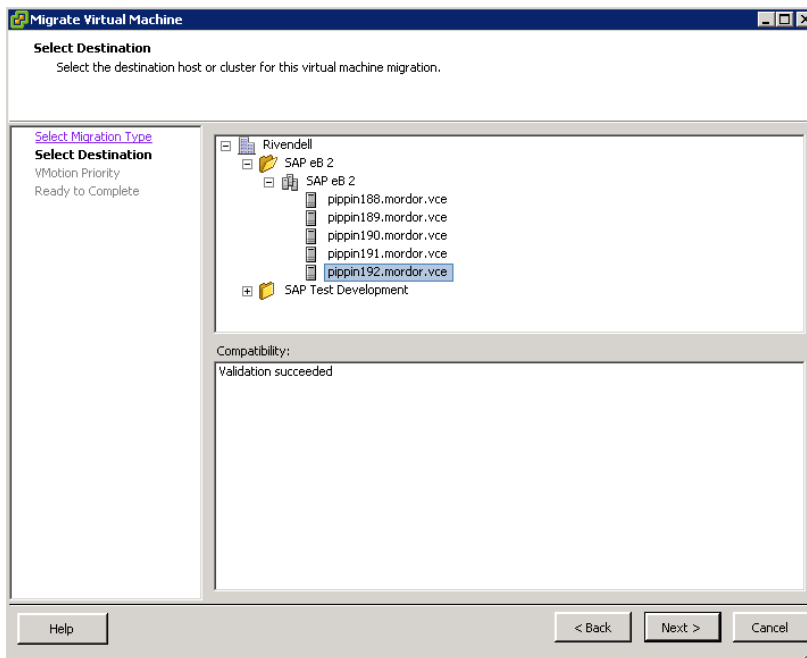


Figure 40. Selecting the migration's destination

10. The VMotion Priority page displays. Select **Reserve CPU for optimal VMotion performance** as shown in Figure 52 and click **Next**.

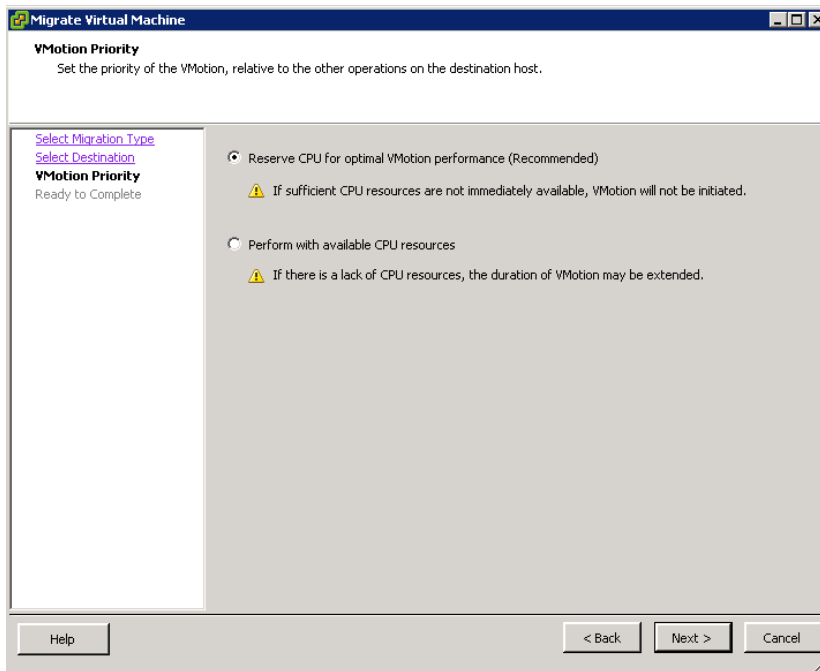


Figure 41. Setting the VMotion priority

11. The Ready to Complete page is displayed as shown in Figure 53. Verify that the selections are correct and click **Finish**.

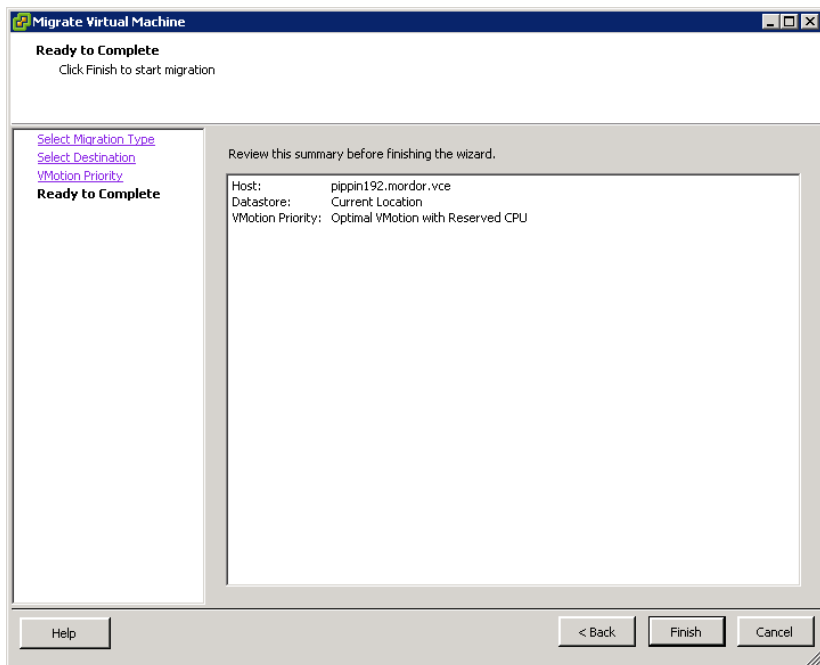


Figure 42. Verify that the selections are correct

- On the vSphere client screen, select `sap_dialog2` and click on **Summary** to view the migration task in progress. The progress displays in the Recent Tasks pane (in this case, **Complete**). The online virtual machine `sap_dialog2` has been migrated to the new host **pippin192.mordor.vce** as shown in Figure 54.

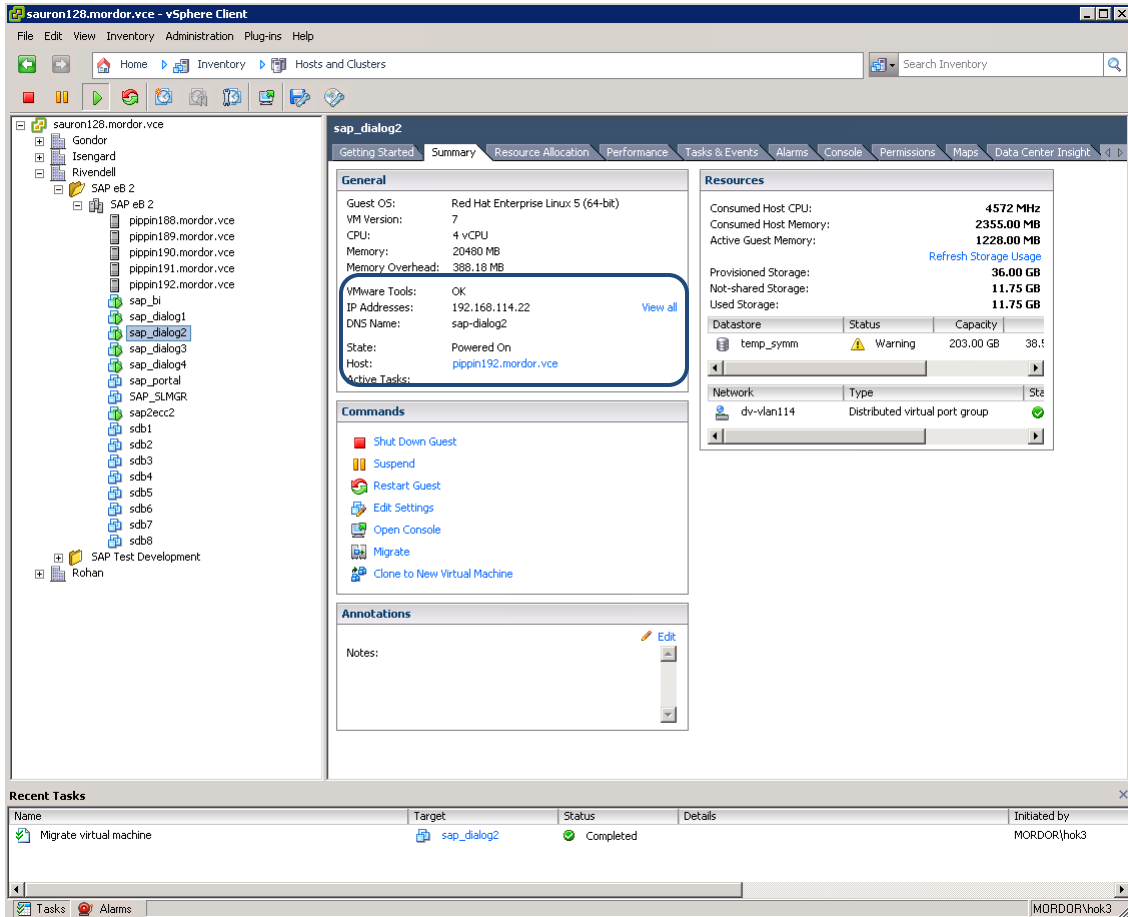


Figure 43. Migration complete

13. From the SAP Load Generator screen, you can see that the SAP SGEN transaction shows Abap load generation is still in progress without interruption as shown in Figure 55.

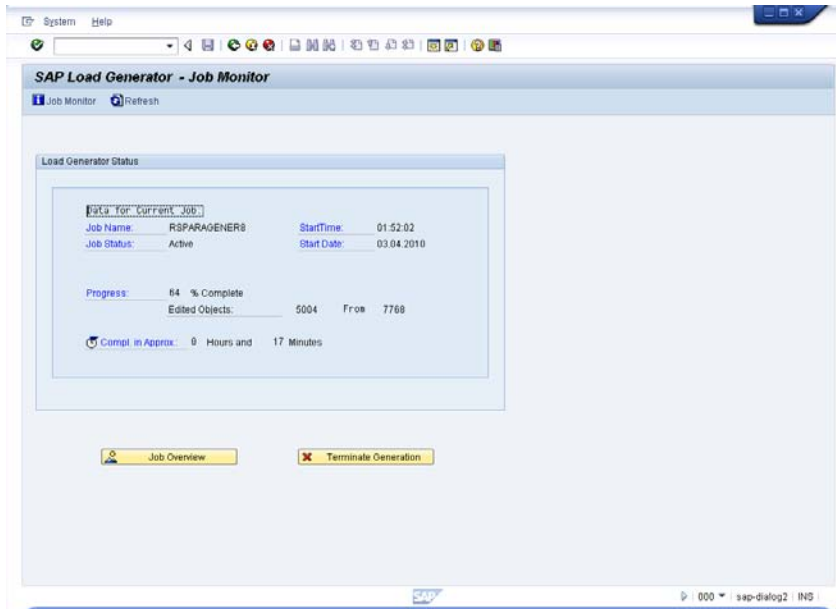


Figure 44. Abap load generation in progress

14. The same as in SAP transaction SM37, Figure 56 shows that the batch job continues to run even after hot migration without disconnection.

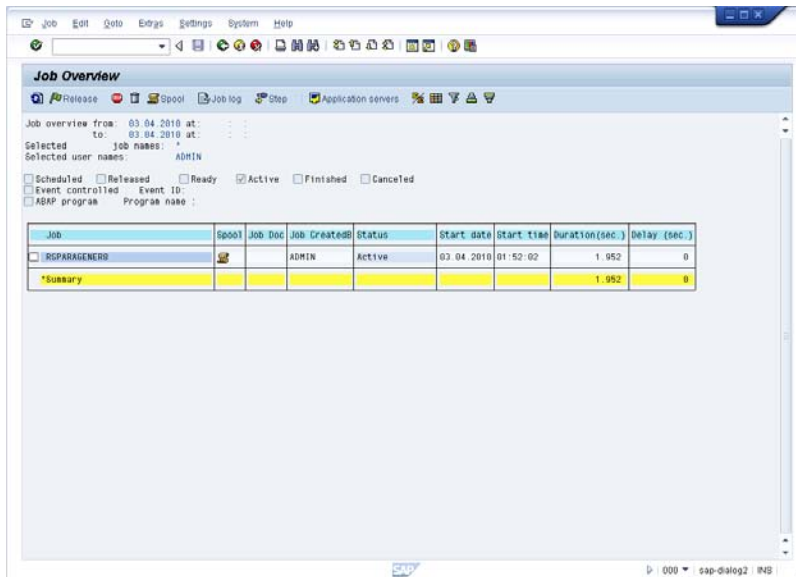


Figure 45. Batch job continues without interruption



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