



An Oracle Technical White Paper
August 2011

Oracle VM 3: Storage Connect Overview

Introduction	1
Oracle VM Storage Connect Architecture	4
Customer Use Cases for Oracle VM Storage Connect	6
Cloud and Hosting Providers	6
Large Enterprises Using On-Demand Provisioning Capability with Oracle VM	6
Midsize Enterprises	7
Oracle VM Storage Connect Plug-in Example	7
Registering the Axiom SAN Storage Plug-in	7
Getting Information About the Axiom Array	8
Provisioning Storage on the Axiom Array	9
Summary	9

Introduction

The growing need for storage and data management is presenting new operational challenges to IT organizations. As more and more businesses move to virtualized environments, the challenge of managing storage resources is becoming increasingly complex. And as operational and capital costs rise, companies are looking for ways to get a better return on their storage assets by making more-efficient use of these resources.

The traditional IT organizational structure does not simplify matters—different areas such as storage, network, compute, and application functions are handled by different individuals, and coordination requires processes that may take longer than the business can afford. As we move to the cloud era, the problem is intensifying, because the need for rapid storage provisioning and reclamation may have a direct business impact on the company's bottom line. Acknowledging this trend, Oracle is introducing, with Oracle VM 3, a new way to manage storage resources and shorten processes by delegating more control over resources closer to where they are needed.

Traditionally storage management has been done by a specialized storage administrator who provides users with disks and access control, based on need. Provisioning of every new storage device has to go through the storage administrator for approval and execution. Once provisioned, storage is usually static and cannot be automatically reclaimed or resized. Every operation that requires storage changes such as resizing must, again, go through the storage administrator. As a result, users often request more than they actually need, just to be on the safe side. Every action that involves control of access to the storage and that changes a storage characteristic requires intervention from the storage administrator. This situation is not optimal for either the user who has to go through the storage administrator for every request or for the administrator who needs to get involved with every provisioning operation.

In the virtual world, this problem is even more complicated: now every request from the application owner has to be routed through the virtualization administrator, with the result being an environment with more processes and less flexibility.

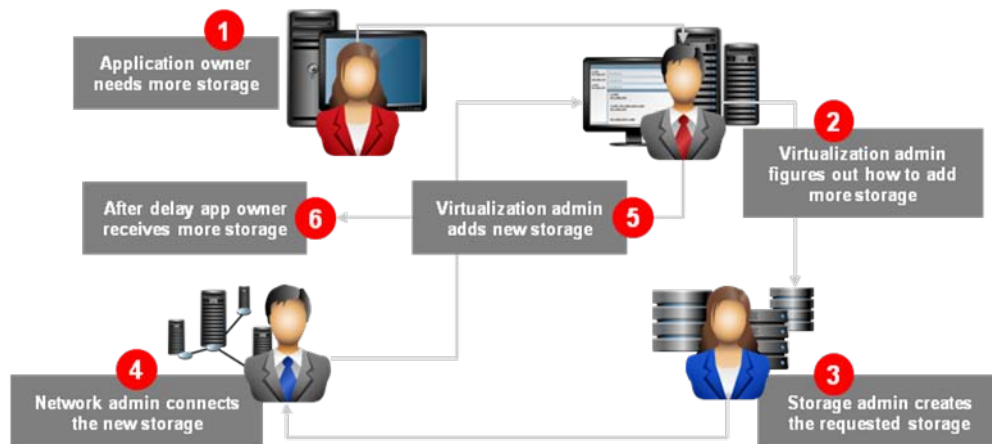


Figure 1. Storage provisioning process

Storage systems have made significant improvements in recent years. Today's storage systems have advanced features that allow for efficient provisioning and give the users a complete set of tools for managing storage resources. These out-of-the box capabilities—such as deduplication, thin cloning, and replication—were available only through specialized software several years ago but are now standard with storage devices. With the Oracle VM 3 launch, Oracle is introducing the Oracle VM Storage Connect program, to help reshape the IT landscape and offer an alternative way to manage storage. Through the Oracle VM Storage Connect API, introduced with Oracle VM 3, users can harness the capabilities of the storage system and the virtualization administrator has an integrated platform for managing all user needs. With Oracle VM Storage Connect, functions such as storage provisioning and storage management are available directly from the virtualization console, Oracle VM Manager, which makes the management process simpler, more efficient, and therefore faster. Oracle VM Storage Connect uses advanced capabilities that exist in most modern storage systems and delivers them in a logical, useful manner to the administrator.

As more and more IT organizations move to cloud-based environments, provisioning control is moving to end users via self-service portals and also to first-line administrators via management capabilities. Oracle VM Storage Connect will play a major role in this process. In large organizations, individual datacenters can now carve out larger portions of the storage resources and then easily manage them. In smaller organizations, there is less need to maintain a storage-only view and the administrator can efficiently manage storage as part of an integrated environment. For cloud and hosting providers, this trend, supported by Oracle VM Storage Connect, is an opportunity to automate more pieces of the storage provisioning process and reduce reliance on overburdened specialized administrators.

Oracle VM Storage Connect Architecture

Oracle VM 3 gives users great flexibility and options for configuring their storage. The platform enables repositories to be shared between server pools or selectively grant access to certain pools and servers. The storage can be directly mapped to virtual machines as needed, and virtual and physical devices can be shared between VMs and servers. All these configurations are available from the user interface.

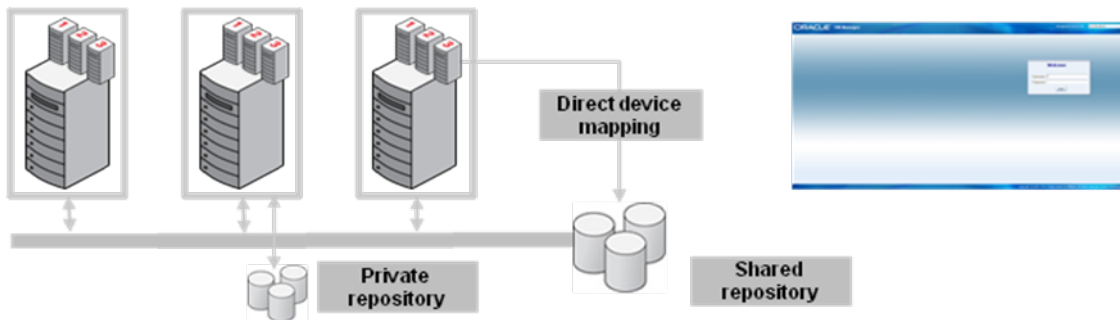


Figure 2. Oracle VM 3 storage options

Besides being a program, Oracle VM Storage Connect is also a framework that provides a storage discovery and provisioning API. It enables customers to provision and manage partner storage platforms through Oracle VM Manager and Oracle Enterprise Manager, simplifying virtual infrastructure management and delivering faster virtual machine configuration and control. Public and private cloud infrastructures using virtualized compute and storage services will also benefit from accelerated provisioning and simpler, integrated management. An Oracle VM Storage Connect plug-in is written by the storage vendor to leverage the unique capabilities of that vendor's storage array and take advantage of the advanced features already built into its products.

In addition, Oracle VM Storage Connect provides a layer of abstraction, so virtualization administrators do not need to know the specific behavior of each storage array they control and are therefore able to perform many operations as a natural part of the resource provisioning process. This opens up a variety of opportunities and enables the IT organization to become more agile by reducing dependencies, shortening the provisioning cycle, and empowering the virtualization administrator to complete the storage provisioning process in the most efficient way.

A partner's Oracle VM Storage Connect plug-in resides on the Oracle VM Server, in the closest location to the actual storage. The top layer of the plug-in is implemented in Python, and the Oracle VM Server calls Python functions. Python provides the abstraction layer that enables Oracle VM to treat all storage arrays in the same manner.

Oracle supports two types of Oracle VM Storage Connect plug-ins, one for file systems and another for storage arrays. The Oracle VM Storage Connect framework is able to present the capabilities of these two different types of storage facilities in a similar way, and a user would need to have only basic knowledge of storage to be able to manage either of them.

The plug-ins are executed in a Dom0 Linux environment and are stateless, meaning that the Oracle VM Storage Connect plug-in is designed to be Dom0-independent, so it can be used in any Linux environment in the future.

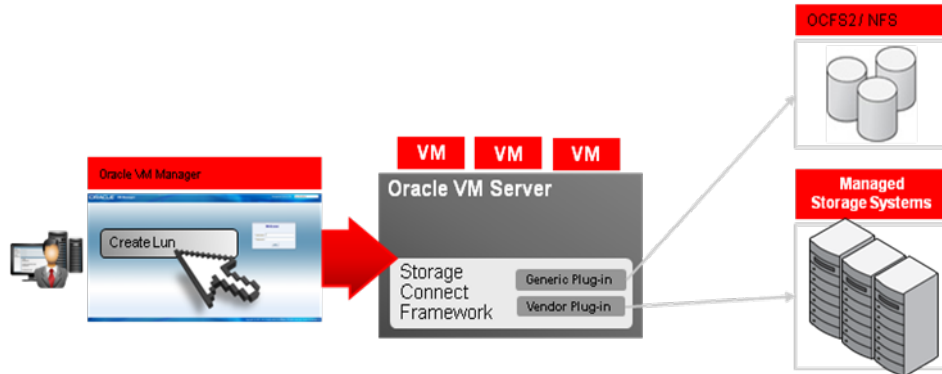


Figure 3. Oracle VM Storage Connect architecture

The Oracle VM Storage Connect plug-in enables several types of operations to be accomplished directly on the file system server:

- Getting information about the file system or storage array.** The Oracle VM Storage Connect plug-in enables the user to get all the standard information from the storage resource as well as specific information provided by the vendor about the storage server, file systems, and the set of capabilities the file system or array supports. This information tells Oracle VM what calls can be made to the plug-in in a generic manner and what the most efficient way is to perform a certain action such as cloning or snapshotting. It also gives the user information about the disks, files, and mount points in the storage system.
- Creation and resizing of disks and file systems.** The plug-in enables the user to create new file systems and disks on the storage system. This is a key benefit of Oracle VM Storage Connect and part of what makes it unique. The storage creation capability is what enables the storage administrator to provision a whole storage system or parts of it to a business unit or a department. After the provisioning has been completed, the plug-in enables the user to resize the disk or the file system. This is a basic capability that makes it possible to ensure that the storage is used in the most efficient manner. The plug-in also enables complete removal of a disk or a file system to reclaim unused or unneeded resources.
- Management and access control.** The Oracle VM Storage Connect plug-in provides a method of controlling access to a specific array from a specific server. It enables creation of access groups and offers the ability to match them to the right storage resources, for complete access control on the server level.
- Cloning and snapshots.** The plug-in enables creation and destruction of snapshots and clones via the native storage array capabilities with the optimal method available. The Oracle VM Storage Connect API has multiple ways to produce snapshots and clones and to query the array for the different features for doing so, making this capability robust and powerful for the user.

- **Access to vendor-specific features.** In many cases, storage vendors have more features they would like to make available to end users. For that purpose, the Oracle VM Storage Connect framework has fields that enable the user to pass down parameters to the storage device and use the features that vendors have made available to end users.

Customer Use Cases for Oracle VM Storage Connect

The ability to control many storage capabilities on demand enables IT organizations to deploy more-agile, cloudlike environments. This is useful for cloud and hosting providers and organizations that have moved to an on-demand model and are using automated provisioning systems.

Cloud and Hosting Providers

The ability to create an autoprovision and to dynamically change storage attributes is particularly cost-effective in environments in which provisioning is done on a large scale and resources need to be reused quickly and efficiently. Cloud providers' operational efficiency is measured by their ability to maximize their resource utilization and achieve the highest return on their assets. The typical cloud provider will need to provision VMs and reclaim resources from retired sessions. Oracle VM Manager with Oracle VM Storage Connect plug-ins is aware of each VM's storage resources. The plug-ins give Oracle VM Manager information about the kind and size of storage a particular VM is using and the state of the storage array at any time. With this information and the ability to create, resize, and reclaim storage resources, the cloud provider is easily able to make most-efficient use of its storage resources, with minimum or no intervention from the storage administrator.

Large Enterprises Using On-Demand Provisioning Capability with Oracle VM

Large enterprises' IT organizations typically manage several datacenters in multiple geographical locations. Each location serves one or more business units that need their own specific IT services. To achieve that, IT needs to divide available resources to serve these different functions. It quickly becomes a significant challenge to manage such an operation efficiently and in time to meet business needs. Among the pain points is provisioning time. A large, shared infrastructure requires coordination between different functions, so the provisioning process tends to take a long time and require many approvals. With Oracle VM Storage Connect, storage administrators can give a higher degree of freedom to users, with the ability to self-manage and self-service their storage needs. They provide this autonomy by assigning storage resources to the customers and enabling them to manage those resources with Oracle VM Storage Connect. The storage administrators can change the way they operate, moving from handling provisioning tasks to monitoring the efficiency of usage in the different departments, thus being able to focus on their organization's overall storage needs instead of spending time actively provisioning storage resources.

Midsized Enterprises

Midsized enterprises' IT organizations are typically more centralized, and their administrative functions must often be performed by a smaller staff, with each staff member having to manage bigger portions of the provisioning process, so the administrator has to manage both compute and storage resources. With Oracle VM Storage Connect, the administrator can now manage the entire process from Oracle VM or Oracle Enterprise Manager. That person can create disks, assign them to an access group, resize them, and clone them—all from the Oracle virtualization management platform—without needing to go to the storage management console. This is a critical time-saver when the IT staff is limited.

Oracle VM Storage Connect Plug-in Example

The Pillar Axiom is an example of a storage array that provides a vendor-specific plug-in for Oracle VM Storage Connect. This plug-in helps provide a seamless user experience that makes it easy and efficient to provision and manage storage in Oracle VM 3. Following are some examples of using the Axiom SAN Storage plug-in for Oracle VM Storage Connect.

Registering the Axiom SAN Storage Plug-in

Registering an Axiom array with the Axiom SAN Storage plug-in enables Oracle VM 3 to discover that Axiom array's storage characteristics. The plug-in provides cohesive integration of the Axiom storage array into the Oracle VM 3 environment, by taking advantage of Axiom-specific functionality such as LUN modification and mapping/masking to hosts. By registering the Axiom array with the plug-in, administrators can make configuration changes to the storage array directly through the Oracle VM 3 user interface. The screen shot in Figure 4 illustrates the process of registering an array; the red circle shows where the user can choose the appropriate plug-in.

The screenshot shows a 'Register Storage Array' dialog box. At the top, there are two tabs: 'Register Storage Array' (selected) and 'Add Admin Servers'. Below the tabs, the 'Register Storage Array' section contains the following fields:

- Name:** AZAXM203
- Description:** Axiom located in Arizona.
- Storage Type:** SAN Storage Server
- Storage Plug-In:** Axiom SAN Storage
- Plugin Private Data:** (empty)

Below these fields are two sections:

- Administration Information:**
 - Admin Host:** azaxm203.eng.trans.corp
 - Admin Username:** administrator
 - Admin Password:** (masked with dots)
- Access Information:**
 - Access Host:** (empty)
 - Access Port:** (empty)
 - Access Username:** (empty)
 - Access Password:** (empty)
 - Use Chap:** (checkbox, unchecked)

At the bottom of the dialog, there are four buttons: 'Cancel', 'Back', 'Next', and 'Finish'.

Figure 4. Registering an Axiom array with the Axiom SAN Storage plug-in

Getting Information About the Axiom Array

After registration of the Axiom array with the Axiom SAN Storage plug-in, information is automatically collected from the Axiom array. In Oracle VM Manager's Hardware view, the left navigation pane shows a list of access groups and volume groups that currently exist on the Axiom array. On the Info tab, pertinent administrative information such as the Axiom array's total and free capacities, capabilities, and current status is listed.

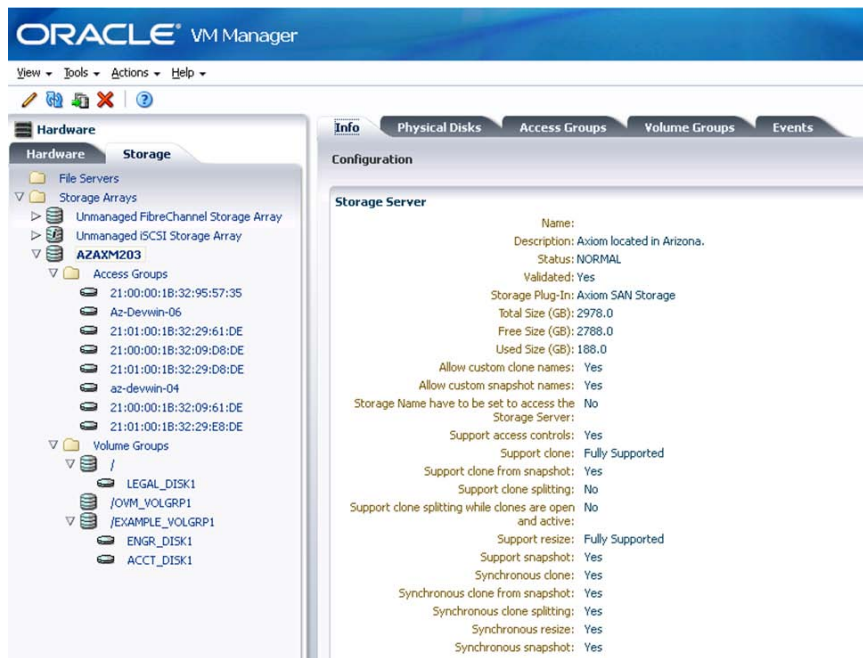


Figure 5. Oracle VM Manager's Hardware view

As another example, the Access Groups tab displays a list of hosts currently defined on the storage array, along with an indication of which physical disks are presented to those hosts.

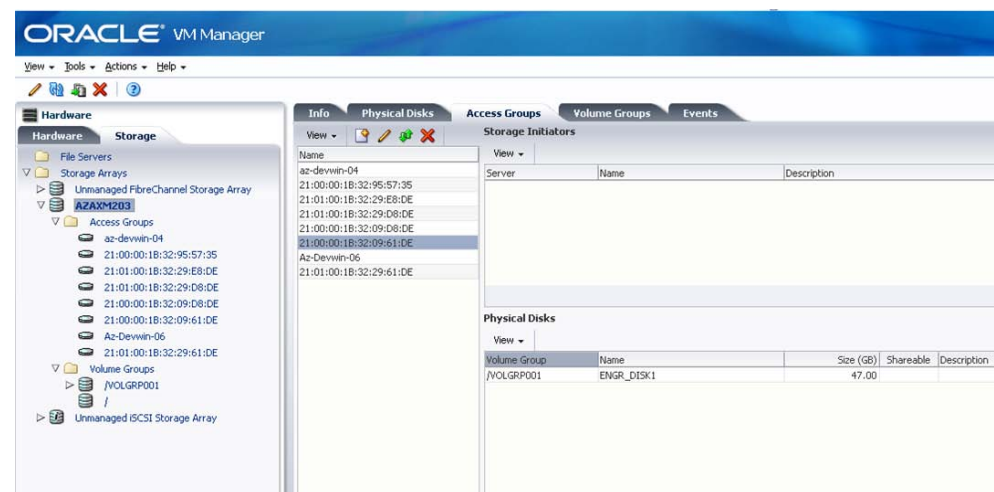


Figure 6. The Access Groups tab

Provisioning Storage on the Axiom Array

A primary advantage of registering the Axiom array with the Axiom SAN Storage plug-in is that it enables Oracle VM Manager 3 to utilize the Axiom native API to most efficiently manage storage provisioning while allowing for more-detailed specifications in the creation of objects. For example, unique Axiom application profiles for tiered quality of service can be specified as part of the creation of physical disks, as shown in Figures 7 and 8.

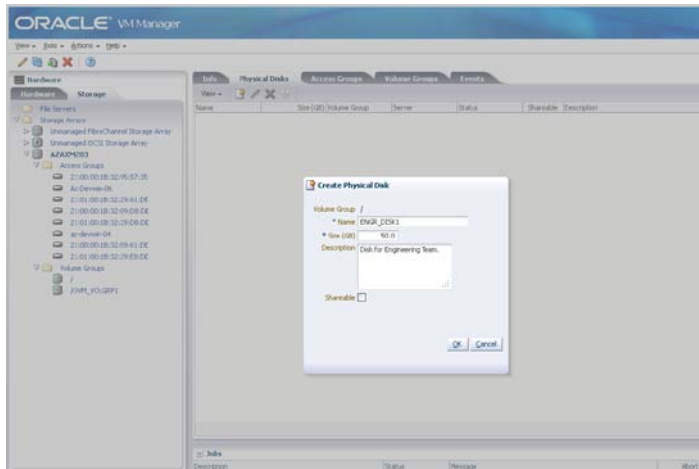


Figure 7. Creation of physical disks

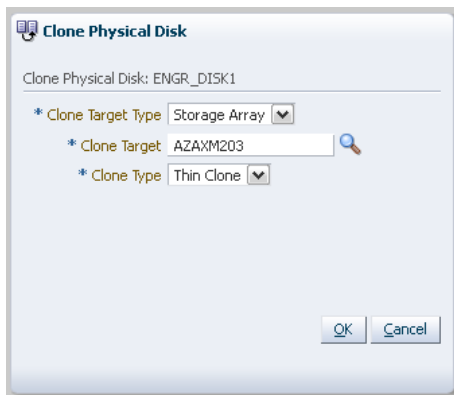


Figure 8. Specification of Axiom application profiles for tiered quality of service

The Axiom SAN Storage plug-in frees the Oracle VM 3 user from learning multiple terminology sets, by providing a unified interface that the plug-in is responsible for interpreting into its own matching API. For example, through Oracle VM 3, the user can present physical disks to and un-present them from access groups without understanding actual Axiom mapping and masking protocols.

Summary

Oracle VM Storage Connect offers a new way to manage storage in the rapidly evolving IT world and breaks traditional barriers that burden IT operations.



Oracle VM 3: Storage Connect Overview
August 2011

Author: Ronen Kofman
Contributing Authors: Adam Hawley

Oracle Corporation
World Headquarters
500 Oracle Parkway
Redwood Shores, CA 94065
U.S.A.

Worldwide Inquiries:
Phone: +1.650.506.7000
Fax: +1.650.506.7200

oracle.com



Oracle is committed to developing practices and products that help protect the environment

Copyright © 2011, Oracle and/or its affiliates. All rights reserved. This document is provided for information purposes only and the contents hereof are subject to change without notice. This document is not warranted to be error-free, nor subject to any other warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document and no contractual obligations are formed either directly or indirectly by this document. This document may not be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without our prior written permission.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark licensed through X/Open Company, Ltd. 0811

Hardware and Software, Engineered to Work Together