The Definitive Guide to Implementing a
Highly Scalable and Highly Available Dynamic Provisioning Solution
Using Citrix® Provisioning Services™ and Sanbolic® SAN Software

By Andrew Melmed, Director of Enterprise Solutions, Sanbolic Inc.

www.sanbolic.com
# Table of Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>About this guide</td>
<td>3</td>
</tr>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>How Sanbolic SAN software enhances Citrix Provisioning Services</td>
<td>6</td>
</tr>
<tr>
<td>Recommendations for improving SAN storage performance</td>
<td>9</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>10</td>
</tr>
<tr>
<td>Installation</td>
<td>11</td>
</tr>
<tr>
<td>Configuration</td>
<td>12</td>
</tr>
<tr>
<td>Conclusion</td>
<td>22</td>
</tr>
<tr>
<td>Recommended Reading</td>
<td>23</td>
</tr>
</tbody>
</table>
About this guide

This guide, which was originally published in October of 2008, has been updated to provide readers with the steps necessary to implement a highly scalable and highly available dynamic provisioning solution using Citrix Provisioning Services (PVS) 5.1, Sanbolic SAN software Melio FS 2009 and LaScala, and Storage Area Network (SAN) storage.

This guide is designed to complement the product documentation that accompanies Citrix Provisioning Services 5.1, Sanbolic Melio FS 2009, and LaScala software. It is strongly advised that readers of this guide carefully read through all relevant Provisioning Services 5.1, Melio FS 2009, and LaScala product documentation prior to commencing with the implementation of a highly scalable and highly available dynamic provisioning solution. (See Recommended Reading on last page.)

It should also be noted that this guide was written with the assumption that storage has been previously allocated on the SAN, or the reader or individual responsible for implementing a highly scalable and highly available dynamic provisioning solution is able to allocate LUNs on the SAN to store the PVS vDisks and target device write cache files. For information regarding how to provision LUNs on SAN storage, please refer to the SAN vendor’s product documentation.
Introduction

Citrix Provisioning Services 5.1

Rebranded “Provisioning Services,” Citrix PVS 5.1 builds on the enhanced feature-set introduced in PVS 5.0, which included a scalable database architecture based on Microsoft® SQL Server 2005™; a commonly supported and well-known management console via Microsoft Management Console™ (MMC); a standard virtual hard disk format (Microsoft VHD); and an intelligent, hierarchical approach to managing a Provisioning Server implementation.

With PVS 5.1, platform flexibility and availability have been further enhanced with the incorporation of several new features, including the ability for target devices running as Hyper-V virtual machines to boot directly off PVS vDisks (VHDs); the option to assign vDisks to user groups or machines; the ability for target devices to boot and run when unexpected events occur that result in the database being temporarily unavailable; and improved logging for both servers and target devices. These additional features allow organizations to realize the benefits of a true, dynamic provisioning solution, which serves as a solid foundation upon which to build a highly scalable and highly available dynamic delivery center powered by Citrix server (XenServer™), desktop (XenDesktop™), and presentation (XenApp™) virtualization technologies.

Citrix PVS HA (High Availability)

Using Citrix PVS, IT administrators can deliver physical and virtual server and desktop workloads (including OS, core applications and configuration information) on-demand from a centrally-managed platform; reducing total cost of ownership while improving manageability and business agility.

To ensure business continuity, PVS includes a High Availability feature that allows target devices to access their vDisks (workloads) via other Provisioning Servers automatically in the event that the initial server to which the devices were connected were to go offline unexpectedly (i.e., loss of network connectivity or hardware failure).

Another key benefit afforded by PVS HA is the ability to load-balance target device I/O requests amongst all Provisioning Servers participating in a PVS Farm, providing significant improvements in overall system performance.

Offering high availability and load-balancing, PVS HA allows organizations to minimize system downtime and maximize user productivity.

Note: To enable PVS HA, the vDisks and, optionally, target device write caches, must be placed on shared storage; allowing multiple PVS Servers to share concurrent read/write access to these files.
Sanbolic Melio FS 2009

Sanbolic Melio FS is a 64bit cluster file system that provides multiple servers with simultaneous block-level access to the same storage partition or Logical Unit Number (LUN) on a SAN. With its advanced transaction managers, symmetrical architecture, full journaling, and dynamic clustering capability, Melio FS ensures that the integrity of data stored on the shared LUN is never compromised by controlling read/write access to data by multiple servers at all times.

Melio FS 2009 features significant enhancements in performance and scalability, allowing it to support the intense I/O demands imposed by mission and business-critical applications running in today’s enterprise datacenters.

Sanbolic LaScala

LaScala is a host-based volume manager that incorporates advanced transaction management, locking, and clustering technology, to simplify management and improve the flexibility and reliability of shared storage environments. With LaScala, multiple hosts can access and administer storage volumes spanning multiple storage controllers, and access to volumes can be secured by defining host access to specific volumes using native Windows® security tools such as ACLs and Active Directory. Used in conjunction with Melio FS, LaScala provides high performance shared access to data on volumes striped across many disks residing on multiple storage arrays.

Easy to install and configure, Melio FS and LaScala allow scalable, flexible pools of shared storage to be created in minutes and are compatible with all industry-standard server and SAN hardware.

SAN Storage

Offering block-level access to data stored on LUNs, SANs offer optimal performance for applications and/or environments requiring fast read/write operations, such as large-scale clustered processing and real-time data transactions. In addition, SANs offer levels of scalability, availability, and reliability unmatched by other storage solutions such as Network Shares or NAS devices, making it the ideal choice for mid-to-large size PVS implementations.

Summary

Leveraging the performance, scalability, and reliability capabilities afforded by the collaboration of Melio FS 2009, LaScala, and SAN storage, organizations are able to fully realize the benefits of dynamic provisioning of server and desktop workloads to physical and virtual machines from a centrally-managed platform.
How Sanbolic SAN software enhances Citrix Provisioning Services

Before we explain how to implement a highly scalable and highly available dynamic provisioning solution using Citrix Provisioning Services and Sanbolic SAN software, let’s review how Sanbolic SAN software enhances Citrix Provisioning Services.

The fact is, there is no single solution available to address the shared storage requirement of PVS HA that is appropriate for every size and type PVS implementation. The decision regarding which storage solution to deploy with PVS depends on a variety of factors, including, but not limited to:

- Initial and potential scope of the implementation
- Types of applications running on the target devices
- I/O patterns generated by applications running on the target devices
- Number of target devices running concurrently
- If storage is readily available that can be configured to support shared access
- If it is more sensible to leverage prior investments in storage or purchase new storage
- What, if any resources (i.e., time, skills, knowledge, finances) are available to procure, install, and configure the storage
- How much time and effort is needed to manage the storage

All of these elements must be carefully weighed in an effort to determine which storage solutions should be considered to support a highly scalable and highly available dynamic provisioning solution.

With numerous options available for supporting highly available Provisioning Services, including Network Shares (i.e., Windows, Samba, etc.), NAS, and SANs, it is essential that the pros and cons of each be thoroughly scrutinized to determine which option not only supports, but enhances, a dynamic provisioning solution; and does so with the least amount of effort in terms of both the initial deployment and ongoing management of the total solution.

Although all of the options mentioned above allow storage to be shared, or accessed concurrently by multiple devices, only shared storage provided by the combination of SAN storage and Sanbolic software offers the levels of performance, scalability, and reliability necessary to support the potentially intense I/O demands imposed by many of the prominent technologies (i.e., desktop virtualization via Citrix XenDesktop and presentation virtualization via Citrix XenApp) deployed in today’s enterprise datacenters whose capabilities are greatly extended when deployed on top of PVS.

In addition, unlike other storage options, Sanbolic SAN software simplifies storage management, allowing organizations to expand their PVS-based solutions quickly and easily by adding more PVS Servers and/or storage resources on the fly; providing a seamless, cost-effective growth path to meet ever-increasing I/O demands.
Advantages of using a Sanbolic Melio FS cluster file system:

- Unlike Network Shares or NAS, Melio FS does not rely on CIFS (Common Internet File System) or NFS (Network File System) to provide shared access to data, allowing PVS to scale without experiencing the locking contention issues incurred by CIFS and NFS in larger environments.

- Using Melio FS and SAN storage, storage operations are offloaded from the LAN, creating separate data paths for storage operations and application traffic. This allows bandwidth to be dedicated to each traffic type, improving the performance and scalability of PVS.

- With Melio FS, if one or more Provisioning Servers were to lose network connectivity or encounter a system failure, the remaining servers would continue to have access to the storage containing the PVS vDisks and target device write cache files, complementing PVS HA by ensuring there are no single points of failure.

Advantages of using a Sanbolic LaScala cluster volume manager:

- Unlike Windows LDM (Logical Disk Manager), administrators using LaScala can create and manage basic partitions or volumes (volume sets or stripe sets) dynamically, without restarting disk management services or rebooting servers.

- Volumes comprised of multiple disks located on multiple heterogeneous storage arrays can be created, allowing the use of additional drives to improve I/O performance.

- Volumes can be expanded on the fly, allowing storage to scale quickly and easily to support future expansions of PVS.

- Volumes can be managed from any server, with all volume-related information disseminated instantly amongst all servers managing the volume.

- Volumes can be secured by defining host access to specific volumes using native Windows™ security tools such as ACLs and Active Directory™.

In addition to the advantages described above, implementing highly available Provisioning Services with shared storage provided by Sanbolic Melio FS and LaScala offers organizations the flexibility to create, manage, and maintain PVS vDisk workloads from any Provisioning Server in a PVS Farm.

Since all Provisioning Servers share access to a LaScala-managed, Melio-formatted volume containing the PVS vDisks, administrators can perform maintenance (OS updates, anti-virus updates, driver updates, add/remove programs, etc.) on vDisk workloads without having to copy or replicate the vDisk images from one server/volume to another, greatly simplifying vDisk workload management while dramatically reducing storage utilization.
The following diagrams present examples of Citrix XenDesktop and Citrix XenApp virtual infrastructures powered by a highly scalable and highly available dynamic provisioning solution comprised of Citrix Provisioning Services 5.1, Sanbolic Melio FS 2009, LaScala, and SAN storage.
Recommendations for improving SAN storage performance

The following recommendations should be considered for optimizing the performance of SAN storage supporting a highly scalable and highly available dynamic provisioning solution.

**Drives**
- Using Fibre Channel or SAS drives operating at 10K or 15K RPM
- Employing a larger number of drives to distribute I/O across a larger number of spindles

**Storage Controllers**
- Taking advantage of dual I/O controllers that can operate in active/active mode
- Configuring separate I/O paths within the storage controller to maximize throughput capacity

**Switch Fabric**
- Creating zones to dedicate bandwidth for PVS storage operations
- Enabling multipathing (MPIO) to increase bandwidth between PVS Servers and SAN storage
- Using Fibre Channel switches that support bandwidth up to 8Gbps.

**Servers**
- For iSCSI SANs, installing the latest version of Microsoft’s iSCSI Initiator or the latest firmware and drivers for iSCSI HBAs
- For Fibre Channel SANs, installing the latest firmware and drivers for Fibre Channel HBAs
- Using two single-port HBAs or one dual-port HBA with MPIO to increase bandwidth between PVS Servers and SAN storage
- Installing 4Gbps. or 8Gbps. Fibre Channel HBAs

Sanbolic invites resellers and customers to contact their Sanbolic Sales representatives *prior* to commencing with the design phase of a highly scalable and highly available dynamic provisioning solution comprised of Citrix Provisioning Services, Sanbolic SAN software, and SAN storage.

Engaging Sanbolic in the initial project stages affords its sales and technical engineers the opportunity to work closely with resellers and customers from the outset to ensure that the proposed storage infrastructure, including components, configuration, and topology, is able to meet the I/O demands imposed upon it both now and in the foreseeable future.

In addition, maintaining ongoing communication with Sanbolic throughout the testing and deployment phases helps to mitigate the potentially adverse affects of unknown variables which may emerge during either of these phases, thus facilitating a rapid, more seamless implementation and a greater return on investment.
Prerequisites

The following is a list of prerequisites for implementing a highly scalable and highly available dynamic provisioning solution using Citrix Provisioning Services 5.1, Sanbolic Melio FS 2009, and LaScala.

Servers:

- Microsoft® Windows Server 2003™ or 2008™ Standard or Enterprise editions
- The latest OS service packs and updates, along with the latest video and network drivers
- Microsoft iSCSI software Initiator v2.07 or later or latest firmware and driver for iSCSI Host Bus Adapter (HBA) for iSCSI SAN connectivity
- Latest firmware and driver for Fibre Channel HBA for Fibre Channel SAN connectivity
- Microsoft Management Console 3.0 or later
- Microsoft .NET Framework™ 3.0 or later
- Sun Microsystems® Java™ v5.0.11 or later
- Application Server such as Microsoft IIS™ or Apache® Web Server
- Microsoft SQL Server 2005 or SQL Server Express 2005 with SP1
- Microsoft SQL Server 2005 Management Studio™
- The latest version of Citrix Licensing Server (included with PVS 5.1)
- Citrix Provisioning Services 5.1 Server
- Sanbolic Melio FS 2009 and LaScala

Target Devices:

- Microsoft Windows Server 2003 or 2008, Windows XP™, Windows Vista™, Red Hat® Enterprise Linux Server™ 4 or 5, Novell® SUSE Linux Enterprise Server™ 9 or 10 SP1
- The latest OS service packs and updates, along with the latest video and network drivers
- Citrix Provisioning Services 5.1 Target Device (including Citrix XenConvert 2.0)

SAN Storage:

For iSCSI SANs:

- Server running iSCSI Target software (i.e., Microsoft, StarWind®, etc.) or iSCSI storage controller
- Additional GigE NICs or iSCSI HBAs installed in Provisioning Servers
- MPIO for multiple paths to SAN
- GigE switch

For Fibre Channel SANs:

- Fibre Channel storage controller
- Fibre Channel HBAs installed in Provisioning Servers
- MPIO for multiple paths to SAN
- Fibre Channel switch
Installation

After all the proper hardware and software listed in the previous section have been acquired, the following steps should be taken to install the necessary components.

1. On the Citrix License Server, install the following:
   a. Microsoft Server 2003 or Server 2008 with the latest service packs and updates
   b. Microsoft .NET Framework
   c. Java Runtime Environment
   d. Application/Web Server (i.e., IIS, Apache, etc.)
   e. Citrix License Server and License Server Management Console

2. On the server running SQL Server 2005 or SQL Server Express 2005, install the following:
   a. Microsoft Server 2003 or Server 2008 with the latest service packs and updates
   b. Microsoft .NET Framework
   c. Java Runtime Environment
   d. Microsoft SQL Server 2005 or SQL Server Express 2005
   e. Microsoft SQL Server 2005 Management Studio

3. On each Provisioning Server participating in the PVS Farm, install the following:
   a. Microsoft Server 2003 or Server 2008 with the latest service packs and updates
   b. Microsoft iSCSI Initiator (include MPIO for multiple paths to the SAN) or iSCSI HBA or Fibre Channel HBA. Install MPIO software for HBAs for multiple paths to the SAN.
   c. Microsoft .NET Framework
   d. Java Runtime Environment
   e. Microsoft Management Console (MMC) 3.0
   f. Citrix Provisioning Services 5.1 Server
   g. Sanbolic Melio FS 2009
   h. Sanbolic LaScala

4. On the Master Target Device, install the following:
   a. OS with the latest service packs and updates
   b. Latest video and network adapter drivers
   c. PV tools (such as Xentools or VMtools) for target devices running as virtual machines
   d. Citrix Provisioning Services 5.1 Target Device (including Citrix XenConvert 2.0)
Configuration

Once the hardware and software components have been installed on the servers and target devices, the following steps can be taken to implement a highly scalable and highly available dynamic provisioning solution using Citrix Provisioning Services 5.1, Sanbolic Melio FS 2009, and LaScala.

Citrix License Server:

1. On the License Server, open the License Management Console (Start > Programs > Citrix > Management Consoles > License Management Console).
2. Select Configure License Server and follow the instructions for installing a Citrix Provisioning Services 5.1 Datacenter and/or Desktop license file(s).
3. Select the Current Usage tab and confirm that the correct license file(s) have been installed.
4. Restart the following services on the License Server:
   a. Citrix Licensing
   b. Citrix License Management Console

Citrix Provisioning Servers:

On each Provisioning Server participating in the PVS Farm, perform the following steps to establish connectivity to the SAN that will store the PVS vDisks and target device write cache files (optional):

1. For iSCSI SANs using software-based iSCSI Initiators:
   a. Connect the GigE interface(s) used exclusively for iSCSI data traffic to the SAN.
   b. Use Microsoft iSCSI software Initiator configuration utility to configure connectivity (using the GigE interface(s) dedicated for iSCSI data traffic, i.e., non-PVS, non-Melio FS) to the Target LUN(s) on the SAN.
   c. Confirm connectivity between the servers and the Target LUN(s) on the SAN.
   d. For multiple paths to the SAN, confirm all paths are available via MPIO.

2. For iSCSI SANs using hardware-based iSCSI Initiators (HBAs):
   a. Connect the iSCSI HBA(s) to the SAN.
   b. Use the iSCSI HBA vendor’s configuration utility to configure connectivity to the Target LUN(s) on the SAN.
   c. Confirm connectivity between the servers and the Target LUN(s) on the SAN.
   d. For multiple paths to the SAN, confirm all paths are available via MPIO.

3. For Fibre Channel SANs:
   a. Connect the Fibre Channel HBA(s) to the SAN.
   b. Confirm connectivity between the servers and the LUN(s) on the SAN.
   c. For multiple paths to the SAN, confirm all paths are available via MPIO.
Once the Provisioning Servers have established connectivity to the SAN, connect the interface associated with the IP address selected during the installation of Melio FS (for cluster administration) and LaScala (for volume management) to a standalone Ethernet switch or VLAN. (See screens below.)

Melio FS:

LaScala:
Note: As the Ethernet switch or VLAN will be dedicated to cluster administration and volume management traffic only, no other Provisioning Server interfaces, target devices, or non-PVS devices should be connected to this switch or VLAN.

Once the LUNs have been created on the storage controller and assigned to the Provisioning Servers, perform the following steps on one Provisioning Server to create the shared storage for the PVS vDisks and target device write cache files:

1. Launch LaScala Volume Manager (Start > Programs > LaScala > LaScala Volume Manager).
2. When the Volume Manager console appears, select View > Rescan Disks from the toolbar.
3. On the lower left-hand side of the management interface, right-click on one of the new LUNs, select Manage Multiple, verify that all the LUNs to be used for PVS are selected, and click OK. A message will appear indicating that the LUNs are being formatted (initialized).
   Note: This process may take up to five minutes.
4. After the LUNs have been formatted, right-click on each LUN on the right-hand side (where it shows as “empty”) and select New > Partition.
5. Select the default values and click OK. The partitions will appear in the top window panes.
6. In the top, left-hand window pane, right-click in an open area and select New > Stripe Set.
7. Select the default values and click OK.
   Note: All partitions making up a stripe set must be of equal size.
8. Select and drag each partition into the stripe set.
9. From the toolbar at the top, select Action > Apply Changes to create the stripe set.
10. After the stripe set is created, right-click on the stripe set and select Create Logical Drive.
    a. Select the option to use the same drive letter for the new drive on each server.
    b. Select the option to format the new drive using Melio FS.
    c. Enter a label for the new drive (optional).
11. Click OK to create the logical drive.
12. When Windows recognizes the new drive, a message will appear prompting the user to format the drive. Click “Cancel” as the new drive will be formatted with Melio FS.
13. Once the logical drive has been created, it will appear in the top, left-hand window pane with an associated drive letter.
14. Open My Computer to view the new drive.
15. On all other Provisioning Servers, open My Computer to view the new drive.
16. Confirm read/write access to the new LaScala-managed, Melio-formatted drive (stripe-set).

Once the SAN is ready to store the PVS vDisks and target device write cache files, use one Provisioning Server to create the PVS database by performing the following steps:

1. Launch the Provisioning Services Configuration Wizard (Start > Programs > Citrix > Provisioning Services > Provisioning Services Configuration Wizard).
2. Follow the instructions (refer to the Citrix Provisioning Services 5.1 Installation and Configuration Guide for details) to create a new PVS database, including configuring the Provisioning Services Farm, Network Services (DHCP, PXE, BootP), License Server, User Account, Streaming service, and bootstrap and start all Provisioning Server services.
Note: For the purpose of this document, the server running the Citrix License Server is also running SQL Server to host the PVS database.

3. If the PVS database is created successfully, the last screen in the Configuration Wizard will appear as follows:

4. Click **Done** to close the Provisioning Services Configuration Wizard.

Once the PVS database has been created, perform the following steps on the server running SQL:

1. Verify the new PVS database (i.e., *PVSDB*) has been created by checking the `C:\Program Files\Microsoft SQL Server\MSSQL.1\MSSQL\Data` directory for the associated PVS database files (.mdf and .LDF). (See screen on following page.)
2. Launch SQL Server 2005 Management Studio and click **Connect** to connect to SQL Server (Start > Programs > Microsoft SQL Server 2005 > SQL Server Management Studio).
3. In the SQL Server console, note the new PVS database under the Databases tree.


To allow each Provisioning Server to access the PVS database, perform the following steps on the SQL Server hosting the PVS database:

1. Launch SQL Server 2005 Surface Area Configuration (Start > Microsoft SQL Server > Configuration Tools > SQL Server Surface Area Configuration).
2. Select **Surface Area Configuration for Services and Connections**.

3. When the **Services and Connections** console appears, select **Remote Connections**.

4. Select **Local and remote connections** **Using TCP/IP only** and click **Apply** to apply the change.

5. Expand the **SQL Server Browser** tree. (See screen on following page.)
6. Click **Start** to start the *SQL Server Browser* service. If the service is already started, click **Stop** and then click **Start** to activate the change that was made to Remote Connections in step 4.

7. Right-click on *My Computer* and select **Manage > Services and Applications > Services**.

8. Scroll down the list and verify that the *SQL Server* and *SQL Server Browser* services are started.
Once the PVS database is accessible to all Provisioning Servers, perform the following steps on each Provisioning Server to join them to the Provisioning Services Farm:

1. Launch the Provisioning Services Configuration Wizard (Start > Programs > Citrix > Provisioning Services > Provisioning Services Configuration Wizard).

2. Select the option **Join existing farm** and then select the PVS database.

3. Complete the Configuration Wizard to configure and start the Provisioning Server services.

Once all the Provisioning Servers have been configured, launch the Provisioning Services Console (Start > Programs > Citrix > Provisioning Services > Provisioning Services Console) on each Provisioning Server in the Provisioning Services Farm.

When the following screen appears, type “**localhost**” in the Name field, select and enter the appropriate credentials, and click **Connect** to connect to the PVS Farm.

![Connect to Farm](image)
In the Provisioning Services Console, expand the Farm to view its contents.

The Provisioning Services Farm is now ready to be managed (refer to the Citrix Provisioning Services 5.1 Administrator’s Guide to configure additional Sites, Servers, vDisks, Target Devices, and Stores).

Citrix Provisioning Services Target Devices:

1. Boot the Master Target Device (i.e., system containing a hard drive with the OS, system files, and user applications to be copied to a vDisk) and enter the system BIOS setup.
2. Enable PXE (Preboot eXecution Environment) on the network adapter and reboot.
3. Enter the system BIOS setup. Move the PXE-enabled network adapter to the top of the system boot sequence and reboot.
4. Follow the instructions provided in the Citrix Provisioning Services 5.1 Installation and Configuration Guide to complete the following:
   a. Add the Master Target Device to the PVS database.
   b. Create and format a vDisk.
   c. Configure the vDisk properties.
   d. Copy the image on the Master Target Device’s hard drive to the new vDisk.
   e. Boot additional target devices off the vDisk.
Conclusion

With a dynamic provisioning solution powered by Citrix Provisioning Services 5.1, organizations are able to realize the numerous benefits afforded by the rapid and secure provisioning of server and desktop workloads to both physical and virtual machines from a centrally-managed platform, including a significant reduction in total cost of ownership; vastly improved server and desktop workload manageability; and a dramatic increase in business agility, all of which can be achieved by:

- Simplifying and streamlining server and desktop workload management.
- Reducing software rollout and upgrade risks.
- Rapidly repurposing servers with minimal effort.
- Extending Citrix server, desktop, and presentation virtualization capabilities for Citrix XenServer, XenDesktop, and XenApp, respectively.

Implementing Citrix Provisioning Services 5.1 in conjunction with Sanbolic Melio FS 2009, LaScala, and SAN storage offers organizations a highly scalable and highly available dynamic provisioning solution capable of supporting the business and mission-critical applications hosted by today’s datacenter while serving as the building block for tomorrow’s dynamic delivery center.
Recommended Reading

The following documents are available at [http://support.citrix.com/]:

* Citrix Provisioning Services 5.1 Installation and Configuration Guide
* Citrix Provisioning Services 5.1 Administrator’s Guide
* Citrix Provisioning Services 5.1 Programmer’s Guide
* Citrix Provisioning Services 5.1 Release Notes

The following documents are available at [http://www.sanbolic.com/]:

* Sanbolic Melio FS 2009 User’s Guide
* Sanbolic LaScala User’s Guide
* Delivering a Highly Available Citrix Provisioning Server using Sanbolic Melio FS (white paper)

To see a video presentation demonstrating the benefits of deploying a highly scalable and highly available dynamic provisioning solution using Citrix Provisioning Services and Sanbolic SAN software, please visit [http://www.sanbolic.com/videosolutions.htm]