Delivering a Highly Available Citrix® Provisioning Server™ using Sanbolic Melio FS®

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Introduction

Compelled by company executives and upper-level management to reduce IT operating costs and enhance user productivity, today's IT Administrators often find themselves overwhelmed in their quest to uncover innovative, cost-effective products and/or solutions that will allow them to meet the mandates placed before them.

As they venture through the arduous exploratory process, IT Administrators will undoubtedly be presented with an abundance of new technologies, each of which requires their due diligence in an effort to garner enough information to make an astute decision regarding which technology or technologies warrant further consideration and evaluation.

While this task may seem daunting at first, IT Administrators can take solace in knowing they needn't look any further than ***Citrix Provisioning Server*** – the latest addition to Citrix Systems' award-winning portfolio of products designed to ease the burden of meeting the everyday demands of enterprise environments.

This white paper describes the Citrix Provisioning Server, the benefits it affords IT Administrators in their pursuit to lower IT operating costs while enriching the overall user experience, and best practices for delivering a highly available Citrix Provisioning Server using ***Sanbolic Melio FS***.

About Citrix Provisioning Server

Citrix Provisioning Server (PVS) offers IT Administrators the ability to deliver server and desktop workloads (operating systems, core applications and configuration information) on-demand via a centralized management platform, reduce total cost of ownership, and improve manageability and business agility.

Some of the key benefits include:

- Simplifying and streamlining server and desktop workload management

By simplifying the delivery and maintenance of server and desktop workloads throughout the enterprise, IT staff can focus their time and attention on the myriad of other tasks presented to them on a daily basis.

- Reducing software rollout risk

The risk of user downtime due to incompatibility or failed upgrades as a result of OS and/or software updates can be mitigated or eliminated as changes to workloads are made using one system, while all other servers and desktops continue to operate using the previous “last-known working” workload.

- Rapid repurposing of servers with minimal effort

Using the following steps, servers can be repurposed at any time, quickly and easily, ensuring minimal system downtime and maximum user productivity:

1. Shut down
2. Reassigned a different workload
3. Booted up

- Extending Citrix Presentation Server™ application delivery and Citrix XenServer™ server virtualization capabilities

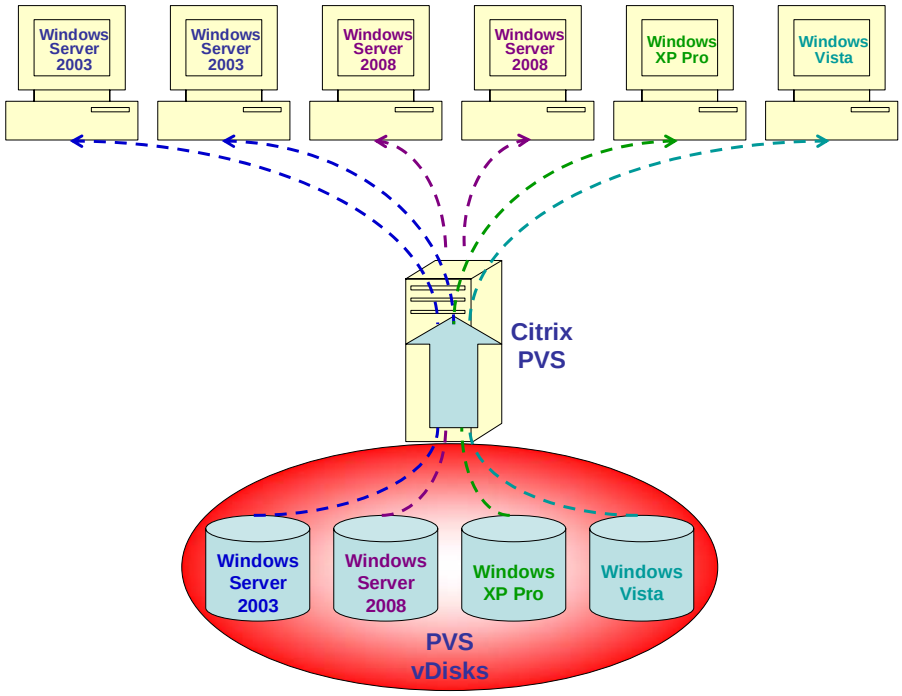
With its centralized management platform, Citrix Provisioning Server can be used to efficiently and effectively provision Citrix Presentation Servers and XenServer virtual machines, complementing and extending Citrix application delivery and server virtualization infrastructure capabilities.

By introducing Citrix Provisioning Server into an organization’s enterprise Datacenter, the above benefits can be realized immediately, ensuring a high ROI within a very short period of time.

How Citrix Provisioning Server Works

Using Citrix Provisioning Server, target devices (server-class and/or desktop systems) are configured to boot off the network via PXE (Pre-boot eXecution Environment, part of Intel’s Wired for Management (WfM) specification). During the initial stages of the boot process, a target device requests its IP address and boot information, including the name or IP address of the boot server and the name of the bootstrap file, from a DHCP server on the LAN. Upon receipt of this information, the device initiates a TFTP download request for

the bootstrap file from the boot server, which instructs the device to connect to the Provisioning Server for the purpose of registration. During the registration process, the Provisioning Server determines which vDisk is assigned to the target device and instructs the device to download its vDisk to complete the boot process. Once the target device has obtained its workload, it is able to operate as a fully-functional server or desktop system, *taking full advantage of its local processing capabilities*. (See figure below.)



About Sanbolic Melio FS

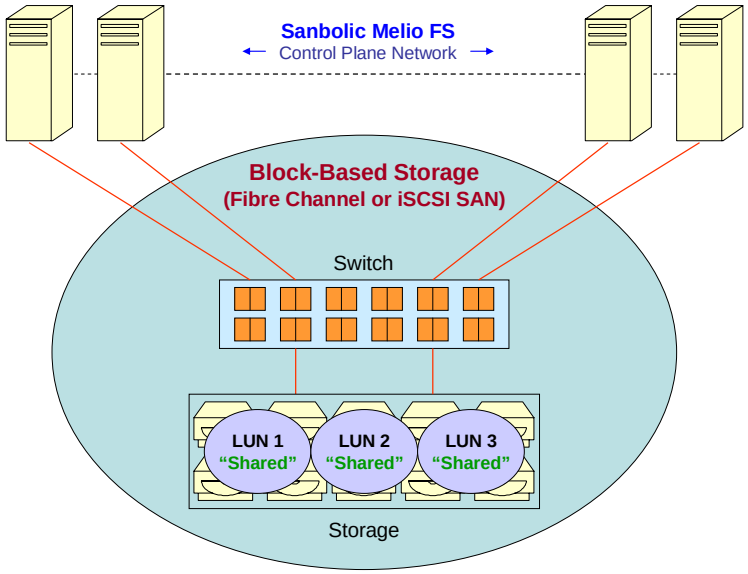
Sanbolic Melio FS is a cluster file system that allows multiple servers to access the same storage partition or Logical Unit Number (LUN) simultaneously. Designed for Storage Area Networks (SANs), Melio FS supports block-level access to storage and is responsible for maintaining the integrity of the data stored on the shared LUN by controlling read/write access to the data by multiple servers at any given time. In addition to the cluster file system, Sanbolic also offers a Volume Manager called LaScala®, which supports the dynamic expansion of storage volumes in the event that additional storage capacity is needed; further extending the capabilities of Melio FS.

Melio FS runs on Windows® 2000, 2003 and 2008 Server Operating Systems, as well as Windows XP Professional and Windows Vista Desktop Operating Systems. Using a GUI-based management utility, administrators can assign administrative (control plane) traffic to a particular network interface (NIC) on each server. The management utility can also be used to modify I/O parameters and configure QoS at the system, application or process level. Using LaScala Volume Manager, administrators can combine multiple LUNs to create one large volume, which can be assigned to multiple server nodes for immediate use.

How Sanbolic Melio FS Works

Once Melio FS has been configured on the PVS servers, the LUN(s) formatted with Melio FS will appear under “My Computer” on each server participating in the storage cluster. As files are saved to, and/or deleted from, the LUN(s), the changes to the contents of the LUN can be observed instantaneously on each server, demonstrating that the LUN(s) is truly “shared.” Utilizing a seven layer locking mechanism allows Melio FS to maintain the integrity of the data as well as the file system itself.

When compared with other cluster file systems used to provide multiple servers with simultaneous read/write block-level access to data stored on SANs, Sanbolic Melio FS offers several distinct advantages, most notably in the areas of manageability, scalability, and reliability – all pivotal elements for any shared storage environment. (See figure below.)



Delivering a Highly Available Citrix Provisioning Server

With the ability to simplify server/desktop workload delivery, reduce software rollout risk, reprovision servers quickly and easily and extend Citrix Presentation Server application delivery and XenServer server virtualization capabilities, Citrix Provisioning Server makes for a very flexible and powerful solution.

As organizations look to their IT Administrators to reduce costs and improve the overall user experience, the value-add provided by Citrix PVS becomes evident. By deploying Citrix PVS in the Datacenter, the nucleus of the enterprise, both objectives can be achieved, ensuring lower costs and enhanced user productivity. With such a robust system proving invaluable to meeting and exceeding their objectives, IT Administrators are going to insist that such a vital resource be readily available at all times.

Acutely aware of the need to instill IT Administrators with the confidence afforded by a highly reliable system, Citrix is proud to offer a high-availability feature fully integrated into the PVS product. When this feature is enabled, IT Administrators can be assured their Citrix PVS will be readily accessible at all times, thereby minimizing system downtime and maximizing user productivity.

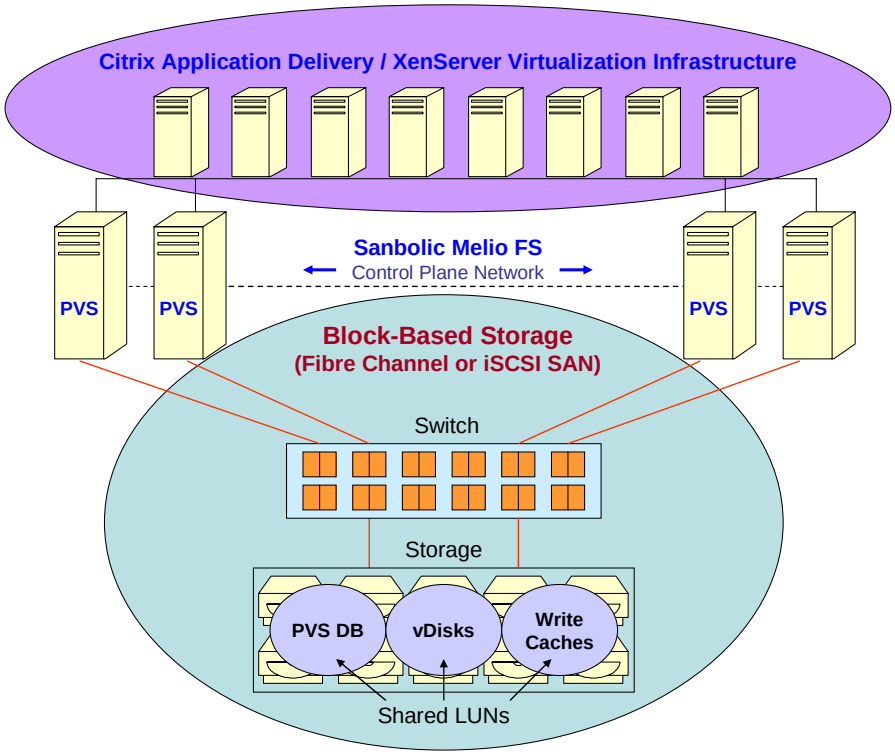
How Citrix Provisioning Server High-Availability Works

Comprised of two or more Citrix Provisioning Servers sharing read/write access to the same LUN(s) containing the PVS database, vDisks and target device write caches, a highly available Citrix Provisioning Server offers IT Administrators the following benefits:

- Facilitates load balancing of I/O (Input/Output) operations by effectively distributing I/O requests from target devices amongst all servers.
- Allows target devices to automatically re-establish connectivity (failover) to the vDisk containing their workload through another PVS server in the event that connectivity to the vDisk through an initial PVS server is lost unexpectedly, i.e. server hardware failure or loss of network connectivity.

By storing the Citrix Provisioning Server configuration database, vDisks (virtual Disks) and target device write caches on shared LUNs formatted with Sanbolic Melio FS, IT Administrators can achieve reliability and stability where it's most needed: at the core of their enterprise – the Datacenter.

Leveraging the shared storage benefits inherent in Sanbolic Melio FS, IT Administrators can deliver a highly available Citrix Provisioning Server within their Datacenters, confident that the collaboration between the two products will provide them with the optimal levels of performance, reliability and scalability necessary to meet the excessive demands imposed upon their application delivery and server virtualization infrastructures by the mission and/or business critical applications running continuously throughout their enterprise environment. (See figure on following page.)



Benefits of Delivering a Highly Available Citrix Provisioning Server using Sanbolic Melio FS

The data presented on the following page was obtained through extensive testing of a highly available Citrix Provisioning Server using Sanbolic Melio FS v2.3, the latest release available at the time of testing.

Notes:

- "Target devices" refers to a combination of server-class and desktop systems.
- Workloads streamed over the network to the target devices during the boot process included a combination of Windows Server 2003 Standard Edition R2 and Windows XP Professional Edition SP1 operating systems, along with Adobe Acrobat Reader 8.1, WinTask and various business-related applications.
- For comparison purposes, tests were conducted in Citrix labs that entailed booting the target devices off a NTFS-formatted LUN. Results of these tests accompany the results obtained while booting the target devices off a Melio FS-formatted LUN. (See Performance results on following page.)
- Performance results presented below may vary depending on the make, model and components comprising the systems, including the servers, desktops, storage arrays and network infrastructure.

Performance

- 150 target devices booting concurrently with the write cache for each device stored in its RAM resulted in a minimum boot time of 42 seconds, a maximum boot time of 102 seconds and an average boot time of 74 seconds. Performing the same test with target devices booting off a NTFS-formatted LUN resulted in a minimum boot time of 23 seconds, a maximum boot time of 233 seconds and an average boot time of 142 seconds.
- 150 target devices booted concurrently with the write cache for each device stored on its internal hard drive resulted in a minimum boot time of 53 seconds, a maximum boot time of 198 seconds and an average boot time of 116 seconds. Performing the same test with target devices booting off a NTFS-formatted LUN resulted in a minimum boot time of 71 seconds, a maximum boot time of 251 seconds and an average boot time of 148 seconds.
- 50 target devices booted concurrently with the write cache for each device stored on a shared LUN resulted in a minimum boot time of 71 seconds, a maximum boot time of 188 seconds and an average boot time of 104 seconds. Performing the same test with target devices booting off a NTFS-formatted LUN resulted in a minimum boot time of 56 seconds, a maximum boot time of 135 seconds and an average boot time of 93 seconds.

Reliability

In all tests identified above, the minimum time it took target devices to failover to another Citrix Provisioning Server was 17 seconds, the maximum time was 27 seconds and the average time was 24 seconds.

Scalability

Harnessing the inherent features of the Citrix Provisioning Server (including a multi-threaded architecture and support for load-balancing across network adapters for additional throughput) with the symmetrical architecture and advanced dynamic clustering capabilities of Sanbolic Melio FS offers IT Administrators a highly scalable solution capable of supporting thousands of systems operating at optimal performance levels.

Conclusion

With a highly available Citrix Provisioning Server serving as the foundation of their application delivery and server virtualization infrastructures, IT Administrators are offered the peace of mind to focus on the numerous other tasks they are confronted with on a daily basis, confident that the system they rely on to meet the ever-increasing demands of their enterprise environments provides the dependability they require when server hardware or network connectivity issues arise.