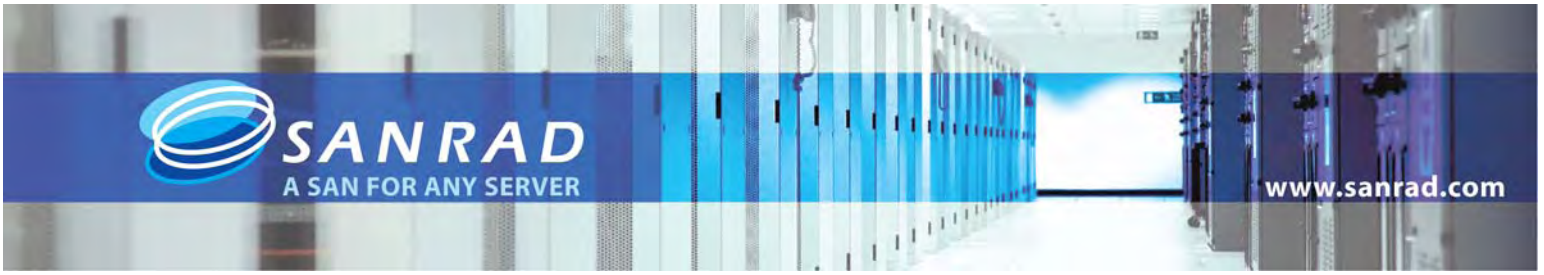


Best Practices: Server Virtualization and Snapshots

Although taking snapshots of data is a well-known feature in the physical server world, server virtualization introduces new paradigms which IT managers must consider to optimize their data protection strategy.

Traditionally, snapshots have been taken and maintained at the storage network layer; however recent advances in server virtualization now enable the ability to take snapshots at the virtual server layer as well. This leaves the IT manager with the open question of what is the best practice for taking snapshots in a virtual server environment. IT managers need to decide which option will provide more value: the snapshot functionality at the storage network, the snapshot functionality at the server virtualization layer, or perhaps some combination of the two.

When to Take a Snapshot

Essentially, snapshots provide an image of a virtual machine "frozen" to the instant the snapshot was taken. What makes snapshots such an important capability is the wide array of critical functionality they provide both to traditional servers and to virtual servers.

By using snapshot technology, for example, an IT manager can "keep" copies of the server configuration at given points in time throughout the day. If a virus attacks the system (or a software upgrade ruins the configuration) the user can revert to the last snapshot taken before the attack. Essentially, the IT manager simply "rolls back" to the system configuration before the virus attack. Another important functionality snapshots provide is the capability to perform consistent backups of data without interruption to a working application. The IT manager can create a snapshot of a volume and backup the data from the snapshot while the application keeps running on the original volume. In this way a backup copy of the data, consistent to a point in time, is created without the need to take the system offline.

The advent of virtual servers also created a third high value snapshot usage: snapshots of "golden masters." IT managers of virtual server environments often need to keep "golden masters" of virtual servers containing a given configuration and specific installed applications. Under certain circumstance one or more instances of these virtual servers need to be created to support running the applications without changing the "golden master" itself. Snapshots provide the best practice for providing this exact functionality.

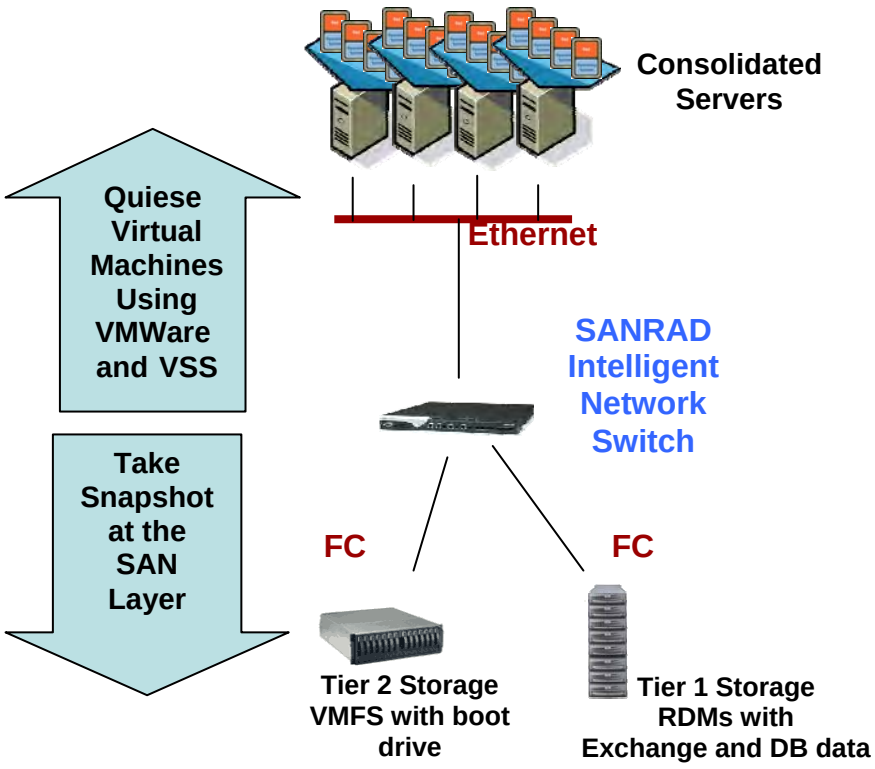
Comparing Virtual Server Layer Snapshots to Storage Array Snapshots

Using snapshot functionality at the server virtualization layer certainly has its advantages, but also has some drawbacks that must be taken into account. The main advantage is the ability to use the

server virtualization capability of quiescing the virtual machine. Quiescing a virtual machine assures that the data in the snapshot is crash consistent. This is especially important when the snapshot is to be used for backup and recovery. Another important advantage of using a server virtualization layer for snapshots is that the virtual server center has the best knowledge of where the files owned by a certain virtual machine reside. For example VMware's virtual center can be queried for the location of the vmdk files of specific virtual machines.

However, there are also some drawbacks associated with using the server virtualization layer for snapshots. For example, server virtualization snapshots do not support all the data accessible to a virtual machine. For example if you are running VMware and your virtual machines are accessing raw disks or RDM physical mode drives you can not take a snapshot of their data via the virtual center. Another example of a critical drawback is that taking a snapshot is a process that is highly CPU and IO intensive. Using the server to perform many snapshots can easily stress the performance load on the servers and can compete with the resources of the virtual machines themselves.

Figure 1
Consistent Cross Array
VM Snapshots



In comparison, taking snapshots within a storage array is much more efficient and will afford the user much higher performance. But traditional storage array snapshots also have drawbacks. In many cases, such as storage high availability scenarios and tiered resources, the data of a virtual machine may be spread across several storage arrays. In such cases using one array's snapshot capability will create only a partial image of the state of a virtual machine. The same holds true when a virtual machine uses VMFS for its boot disk, but an RDM for its application data. An IT manager will not be able to reconstruct the state of the virtual machine at a given point in time from the partial data collected in the array snapshot. Furthermore, traditional storage array-based snapshots alone can not guarantee a state-consistent snapshot. To achieve state-consistent snapshots, someone has to make sure that the data in the array at the time the snapshot is taken is crash consistent.

SANRAD Snapshots at the Intelligent Network Layer – The Best of Both Worlds

The advent of intelligent network switches from SANRAD with integrated snapshot capabilities enables users to get the best of both worlds. For the first time, IT managers are able to obtain cross-array state-consistent, snapshots of their virtual machines. On top of this, by managing the snapshots at the SAN network layer through the intelligent switch rather than at the server layer, the high efficiency of storage-based snapshots is retained. In addition, the server resources are not strained by any extra effort.

Consider the example presented in Figure 1. In this example, a cluster of virtual servers is connected to a SAN using a SANRAD iSCSI intelligent network switch. To maximize their return on investment, the storage administrator is using two tiers of storage. The data from exchange servers and databases are stored on tier 1 storage as RDMs. VMFS along with boot volumes for the virtual machines are stored in tier 2 storage on the SAN.

The storage administrator is required to provide consistent snapshots of the virtual machines and their data at given intervals. With SANRAD's architecture, the task becomes easy. By using the scripting capabilities of SANRAD V-Switches, the storage administrator runs a simple two-step script. In step 1 the script calls the virtual machine (using the VMware scripting and VSS) to quiesce both the applications and the virtual machines themselves. In step 2 the script activates snapshots of the virtual machine data on both tiers of the storage. The goal has now been achieved. The storage administrator has created a cross array snapshot of a virtual machine at a recovery consistent point in time.

Creating snapshots at the SAN network layer enables IT managers to realize all the benefits of snapshots in a virtualized storage environment. By allowing cross-array state-consistent, snapshots of virtual machines, SANRAD intelligent network switch technology delivers highly efficient storage-based snapshots without impacting the performance of critical production servers.

