

STORAGE SWITZERLAND

THE IMPACT OF VMWARE AND HYPER-V SNAPSHOTS ON BACKUP TECHNOLOGY



George Crump, Senior Analyst

VMware has been the dominant platform in the early part of the virtualization era. Having to support only a single platform has made the job for software and hardware providers much easier. Now though Microsoft's Hyper-V is gaining traction in many virtualized infrastructures and it's becoming more common to see both hypervisors used in a single data center. Just as supporting multiple operating systems was a key differentiator for legacy backup applications, modern backup applications will need to support multiple hypervisors.

One of the key differences between VMware and Hyper-V is their snapshot technology, the process that most modern backup applications leverage when backing up virtual machines. Differences in capabilities and functionalities in each hypervisor's snapshot implementation needs to be hidden as much as possible from the user in both GUI integration and potentially adding capabilities that are lacking in one hypervisor vs. another. This challenge is going to differentiate good developers from great developers. Failure to do so will make the users job of managing backups more difficult.

What is a Snapshot?

“Snapshot” is a term overused in the storage industry to describe capturing a volume state at a certain point in time. Most snapshots are initially capacity-neutral. The blocks of a volume are typically set to read only and updates to those blocks are written to a separate disk area. How these changes are tracked impacts the performance of the volume and the quantity of snapshots that can be taken and managed.

VMware Snapshots

When VMware issues a snapshot or when it's told to by a software application or storage array it essentially creates a redo log for each VM's snapshot. Changes to the VM's primary disk volume are recorded in the redo log until the snapshot has expired. VMware will allow multiple snapshots per VM but as the number increases and the length of time that the snapshot is in effect, performance can degrade because each represents another redo log which VMware must keep track of.

The length of time that the snapshot is in existence also impacts performance. When the snapshot has expired the recorded changes are rolled back into the VM's primary volume. To do this the VM needs to be "stunned" which is basically a very short, typically milliseconds, pause of the VM. However, there are times, when rolling a very large redo log back into the primary volume, that multiple and more time consuming stuns have to occur. This can cause application degradation and even application lockup. As a result backup applications should finish their use of snapshot data quickly so that fewer changes need to be rolled back in.

Hyper-V Snapshots

Hyper-V handles the snapshot process differently than does VMware and it's something that backup applications that count on snapshots need to be aware of. Hyper-V is more of a classic snapshot technology. The virtual volume is set to read-only and as changes to blocks come in, the old block to be updated is copied to a snapshot volume and the new block is written into the active virtual volume. This eliminates the need for a rollback and the potential issues that stunning a VM can cause. When a snapshot has expired Hyper-V has to simply drop the association to the snapshot and start using the primary volume as normal.

However Hyper-V snapshots do have their limitations. Probably the biggest issue for backup vendors is that it can only have one active and accessible snapshot per VM. Also, when a snapshot expires it's not deleted from disk until the virtual machine is rebooted. How the backup software handles this difference from the VMware method is critical. If they count on the snapshot technique and one is already active for the VM, that means they are either going to have to delete it or use what is there. The problem with deleting and taking a new up-to-date snapshot is there may be other tasks active that are counting on the

current snapshot, like a replication job or even a reporting function. The problem with leveraging a snapshot that is already in place is that the backup application is not getting the latest version of the data which will impact the accuracy of the recovery.

There is an alternative however; Hyper-V does support Volume Shadow Copy Service (VSS) which allows storage arrays or backup software to trigger volume level snapshots and then maintain those snapshots. This brings significant benefits. First the number of snapshots that can be kept are now limited to the capabilities of the storage system itself. An increasing number of storage systems can now maintain near limitless snapshots with little to no performance loss. Second, it gives the backup vendor the capability to use a common interface to communicate with a variety of storage systems without having to individually create support for each one.

Bridging the Differences

Backup applications have always had to deal with differences in what various platforms would be able to support. They have to balance how to provide similar functionality between platforms without manually recreating missing capabilities unless absolutely needed. [Veeam](#) is one of the first companies to tackle the differences between VMware and Hyper-V snapshots. They have continued to leverage their support of VMware's vSphere API set while leveraging Hyper-V's VSS to provide similar functionality on that platform. This allows them to bridge the differences between platforms without having to write custom code for specific storage systems and then combine the backup of these two platforms into a single user interface, making protection easier on the backup administrator. In an upcoming Briefing Report, Storage Switzerland will detail Veeam Backup and Replication for Hyper-V and how it compares to their VMware offering.

About Storage Switzerland

Storage Switzerland is an analyst firm focused on the virtualization and storage marketplaces. For more information please visit our web site: <http://www.storage-switzerland.com>

Copyright © 2011 Storage Switzerland, Inc. - All rights reserved