Summary

This document discusses integration tips between Storage Center and VMware Data Recovery.

Details

As businesses transform their datacenters from physical to virtual, consideration should be given to how legacy processes, such as backup, will evolve. Traditional agent based backups will continue to work in a virtual environment but they will no longer be the most efficient or cost effective approach to data protection and disaster recovery. VMware Data Recovery is a backup solution offering quick and simple data protection for vSphere virtualized datacenters. vDR is bundled with the Essentials Plus, Standard, Enterprise, and Enterprise Plus vSphere 5 Editions which means the majority of vSphere environments already have entitlement to vDR. Dell Compellent Storage Center integrates with vDR by providing flexible tiers of enterprise storage which can be used as a repository for data deduplicated backups. In addition, with Remote Data Instant Replay, backup data may be replicated to a remote Storage Center which a vDR appliance can be connected to and VMs can be recovered from.

VMware Data Recovery has many features. One of the key features from a storage perspective is that it deduplicates backup data written to the destination storage leveraging VMware’s Changed Block Tracking (CBT) technology on vSphere 4.0 and later. In addition, Windows pagefile and Linux swap partitions are excluded from backups by default. Both features combine with Dell Compellent Storage Center’s Dynamic Capacity and Data Progression to provide a tremendous amount of storage efficiency.

Storage Presentation:

Compatible backup destinations are virtual disks (residing on block or NFS storage), virtual Raw Device Mappings (block storage), physical Raw Device Mappings (block storage), or a CIFS share (NAS storage). VMware supports up to a maximum of two of the following per vDR appliance:

- 1TB virtual disk
- 1TB physical or virtual RDM
- 500GB CIFS share
For performance reasons, VMware recommends virtual disk or RDM block storage over NAS based CIFS. Up to 1TB virtual disks may be created on Dell Compellent Storage Center volumes equal or great in size. In most Storage Center environments, all volumes are carved and presented from the same disk pool. Unless a separate Dell Compellent Storage Center storage profile is desired for each virtual disk which serves as a vDR destination, multiple virtual disks may be stored on a single volume. For example, a vDR appliance may be configured with two (2) destination virtual disks, each 1TB in size, which resides on a single 2TB Storage Center volume. RDMs on the other hand represent a 1:1 relationship between a virtual disk and the volume which backs it. In this case, a vDR appliance may be configured with two (2) destination RDMs (virtual or physical), each 1TB in size, each residing on their own respective 1TB Storage Center volumes.

Whether using traditional virtual disks or RDMs, the Dell Compellent Storage Profile defined for each volume will dictate what tier of disk the deduplicated backup data is written to and how Data Progression will migrate blocks between RAID levels and tiers to provide storage efficiency and cost savings. Thinly provisioned Tier 3 7,200 RPM spindles will provide the most cost effective storage for backup data given advancements made in capacity and reduction in price, although 10k, 15k, or even SSD disk could be used in theory. The Low Priority (Tier 3) storage profile which ships with Storage Center is suitable to use. It will provide the fastest write I/O possible on tier 3 at RAID10 coupled with the storage efficiency of RAID6 where the blocks are migrated to via Data Instant Replays and Data Progression. Choose a tier and storage profile which meets project and budget requirements.

From a capacity standpoint, VMware recommends starting with backup storage space equal to the amount of used disk space on all virtual machines being protected (i.e. a VM having a 100GB virtual disk which is 50% filled would require at least 50GB of destination storage plus overhead which will be discussed shortly). 1TB block destinations are supported at a maximum. Dell Compellent Storage Center natively thin provisions all volumes. This Dynamic Capacity feature ensures there is no penalty in provisioning large deduplication store volumes up front. Storage capacity is only consumed as data is written to virtual disk and ultimately the volume. Smaller volumes may be used but one thing to keep in mind is that vDR reserves (and immediately consumes) 10GB of a destination storage for indexing and restore point processing. VMware recommends block storage destinations of 50GB to 1TB in size. VMware also supports growing smaller sized block destinations up the 1TB maximum without negatively impacting the vDR environment (such as losing restore points or hydrating deduplicated data). Regardless of what volume size is initially chosen to back up data to, format the volume with a VMFS block size that will support the maximum virtual disk size of 1TB. In vSphere 5, this will be a 1MB block size. Prior to vSphere 5, block sizes of 4MB or 8MB will both support a 1TB virtual disk file. Keep in mind though that VMFS-3 volumes with a 4MB or 8MB block size likely won’t be compatible with the block copy VAAI primitive when upgraded to VMFS-5. Backup job configuration will also impact storage utilization and efficiency. Similar or identical virtual machine types (i.e. Windows) grouped within a backup job will provide more data deduplication opportunities than backup job containing a broad mix of operating systems and applications. There is nothing wrong with blending VMs in a backup job, but this is one area where an optimization can be made to stretch storage CAPEX.
Thin Provisioned Storage Center volume with a 1TB virtual disk formatted as a vDR destination.

VMware Data Recovery utilizes VMware created snapshots during the backup process of a virtual machine. During the snapshot process, a 16MB delta virtual disk is created. For as long as this delta disk remains in snapshot mode, the delta disk will grow in 16MB increments as write I/O occurs. The growth of the delta disk requires the updating of metadata on the VMFS datastore which in turn requires a temporary lock. Storage Center 6 supports the Atomic Test and Set VAAI primitive, providing a granular locking mechanism resulting in better performance and less latency for virtual machines sharing the same datastore but running on other hosts. Storage Center 6 is recommended for vDR solutions. Earlier versions of Storage Center are supported but will use a legacy locking method called a SCSI Reservation. In this situation, it is recommended to try running the vDR appliance on the host which is running the majority of the VMs on the datastore(s) where VMs are being backed up. The host which owns the lock can still perform I/O requests for the majority of the VMs running on it. Only the minority number of VMs running on other hosts will experience higher latency due to the SCSI reservations which may be tolerable at that point.

**Scheduling:**

vDR backup jobs do not run on a precise schedule. Rather, the backup engine is given a window of time in which a job can run inside of. This is a departure from most other backup applications. When creating a backup job, by default the job window wraps around outside of predefined production hours of 7am-5pm. Backup jobs consume considerable shared storage operations and the goal is to avoid causing storage contention with other key processes and production applications. Keep this in mind when defining windows each backup job can run in.

Maintenance tasks run once per day and perform duties such as incremental and full integrity checks, indexing, restore point processing, and reclaim operations. The reclaim process trims expired restore points from the deduplication store. This process increases available capacity on the deduplication store to be used for future backups but it’s important to note that Storage Center pages are not unmapped and returned as free pages to the pool; they still belong to the volume they were originally allocated to. By default, maintenance is allowed the opportunity to run at any time throughout the day. The maintenance schedule should be configured to avoid integrity check compute resource contention with compute resources needed for backup jobs. In short, the backup window and maintenance window should not overlap.

**Miscellaneous:**

- Each vDR appliance supports up to two (2) deduplication destination stores and the protection of 100 virtual machines.
- VMware supports running one vDR appliance per ESX(i) host.
- Each vCenter Server instance supports up to ten (10) vDR appliances.
- Up to eight (8) virtual machines may be backed up concurrently by a single vDR appliance.
- VMware Data Recovery will protect VMs having traditional virtual disks and virtual mode RDMs, however, physical mode RDMs cannot be backed up by vDR. For VMs having pRDMs, consider using Storage Center Replays or Replay Manager.
- vDR can be used to back up VMware View linked clones but only a full clone restore may performed.
- vDR cannot protect virtual machines configured for Fault Tolerance, or independent virtual disks.
- vDR File Level Restore (FLR) and vCloud Director (vCD) have known compatibility issues. VMware recommends disabling this feature in the datarecovery.ini file (set EnableFileRestore to 0).
- Windows pagefile and Linux swap partition backup may be enabled by setting BackupUnusedData=1 in the datarecovery.ini file.
- Over the network backups may be disabled by setting DisableNetworkCopy=1 in the datarecovery.ini file. This will force hot add disk backups which are more efficient.
- Concurrent number of virtual machines being backup and/or restored can be throttled with the MaxBackupRestoreTasks=x setting in the datarecovery.ini file (default/max value is 8).

**Document History**

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