Data Protection

Hyper-V Checkpoints

Checkpoints are a built-in Microsoft Hyper-V technology that enable the ability to save the state of a virtual machine. Current versions of Hyper-V support the use of production checkpoints, which creates a data-consistent copy of a virtual machine. Data consistency is achieved using Volume Shadow Copy Service on Windows virtual machines and using File System Freeze on Linux virtual machines.

By themselves, checkpoints may be useful when making changes to a virtual machine and there is a potential need to revert to the state of the virtual machine at the point in time when the checkpoint was created. Examples include the testing of software changes, applying patches, or performing configuration changes.

Checkpoints, however, do not take the place of traditional backups. By default, a checkpoint resides on the same storage as the virtual machine it was created from. A catastrophic storage failure may render a checkpoint useless such it could not be used to successfully perform a revert operation. Additionally, checkpoints may negatively impact virtual machine performance during the time period that they are retained. This stated, checkpoints are used in conjunction with popular backup solutions to create a data-consistent point in time copy of a virtual machine. The checkpoint is deleted by the backup solution when the backup job ends. In this sense, production checkpoints form the basis for capturing a data-consistent point in time copy of a virtual machine.

Hyper-V Replica is another built-in Microsoft Hyper-V technology that enables a disaster recovery strategy where one or more virtual machines from a primary Hyper-V host are replicated to a secondary Hyper-V host. Extended replication is also possible, where virtual machines replicated to a secondary host can then be replicated to a third host.

After the initial replication of a virtual machine, where an identical replica virtual machine is created on a secondary host, change tracking is used capture changes on the virtual machine VHD. Changed data is synchronized based on the configured replication frequency. Replication frequency is typically based on the RPO of the virtual machine, and available replication network bandwidth. By default, only the most recent replica (recovery point) is saved at the replication destination, however the feature can be configured to retain additional recovery points if required.

When configured as a replica server, a Hyper-V host can receive replicas from one or more source Hyper-V hosts. Failover capabilities include “test”, “planned”, and “unplanned” operations.

Partner Solutions

Microsoft Hyper-V can store VM files in shares using the SMB 3.0 protocol. Cisco HyperFlex clusters configured for Hyper-V present storage in the cluster as an SMB share for use by Hyper-V. Popular backup solutions support the protection of Hyper-V virtual machines residing on SMB3 shares. The partner solutions highlighted include Commvault, and Veeam.

Commvault requires the installation of a Virtual Server Agent (VSA) on all Hyper-V nodes that host VMs on SMB shares. The installation process is simple and straightforward. The Hyper-V failover cluster is then added and registered as a virtual server and each Hyper-V node acts as a proxy when performing backup and recovery operations. Commvault leverages VM checkpoints when performing backups, and promptly deletes any checkpoints it created at backup completion time.

Veeam requires the user to configure virtualization infrastructure for Hyper-V. In the case of HyperFlex, this can be configured at the cluster level. In cases where multiple HyperFlex clusters are managed using the same instance of Microsoft SCVMM, Veeam allows the user to simply configure the SCVMM instance instead of configuring multiple clusters independently. When the virtual infrastructure is configured, all required Veeam components are automatically deployed on all Hyper-V nodes in each HyperFlex cluster. Veeam leverages VM checkpoints when performing backups, and promptly deletes any checkpoints it created at backup completion time.