

How to enhance the High Availability and Disaster Recovery for virtualized mission-critical application

Technical white paper



The Challenges for HA&DR in a Virtual infrastructure

Until now, missions/business critical application that requires more than 99.99% of high availability has been deployed in physical environment and HA and DR has been configured to ensure continuity of the service. From the physical environment in the past, these applications have now developed in virtual environment such as VMware.

There are definitely a lot of benefits of virtual environment, one of the best benefits is cost efficient and it is easy to configure HA&DR. Especially for VMware, since HA function is provided as bundled service for vSphere standard and it's higher edition, high availability for virtualized application server is easy to configure with no extra cost and hard labor.

Easy configuration of virtual environment with no extra cost is definitely engaging but the fact that it can also provide complete HA and DR functions in VMware HA in mission/business critical application is another issue to be considered.

Current HA&DR solutions in VMware Environments

VMware HA

The first thing that comes up to mind when consider a HA in VMware is no doubt VMware HA which is bundled. VMware HA comes as first priority because of the following benefits:

Key Features of VMware HA:

- ✓ Easy configuration and operation: Easy to configure through UI of vCenter without the need to install software in every VM for HA configuration,
- ✓ Affordables: It is available to be configured and used without verifying compatibility of other applications within VM and there is no extra charge for software license.

As consequence of key features listed above, there is no doubt VMware HA is widely used in high availability solution for virtual environment. However, additional solutions may can be considered for the following issues.

- ✓ An environment where SAN is unnecessary: A SAN Storage is needed for VMware HA configuration. However, there are needs for environment that does not require SAN Storage but need high availability solution.
- ✓ Measures of a SAN Storage failure: When configure VMware HA, VMs are stored in the SAN Storage and the hosts of HA pool shares the storage. This is a single point of failure. When failure occurs in a

host, automatic failover is triggered to standby host through VMware HA, but when failure occurs in the SAN Storage, service downtime cannot be avoided.

- ✓ Availability management within a VM: If a physical host has replaced data center in the past in virtual environment, VM has replaced physical server environment. Therefore, host provides the physical infrastructure services that VM provides and the operating application and important data is given through VM. In that case, when a problem occurs in the VM, or failure occurs within O.S, application, data storage, network, you must consider how to solve these problems. Unfortunately, VMware HA cannot really solve all of these problems and 3rd party solution is definitely needed to ensure higher level of high availability.

VMware FT

VMware FT extends functionality of VMware HA and provides real-time replicate a VM state between two physical hosts. VMware FT ensures service continuity without any downtime even when a failure occurs in active host. However, same as VMware HA, VMware FT has the same considerations such as SAN Storage failure, and failures in VMs. For that matter, 3rd party solution is needed to ensure higher level of high availability.

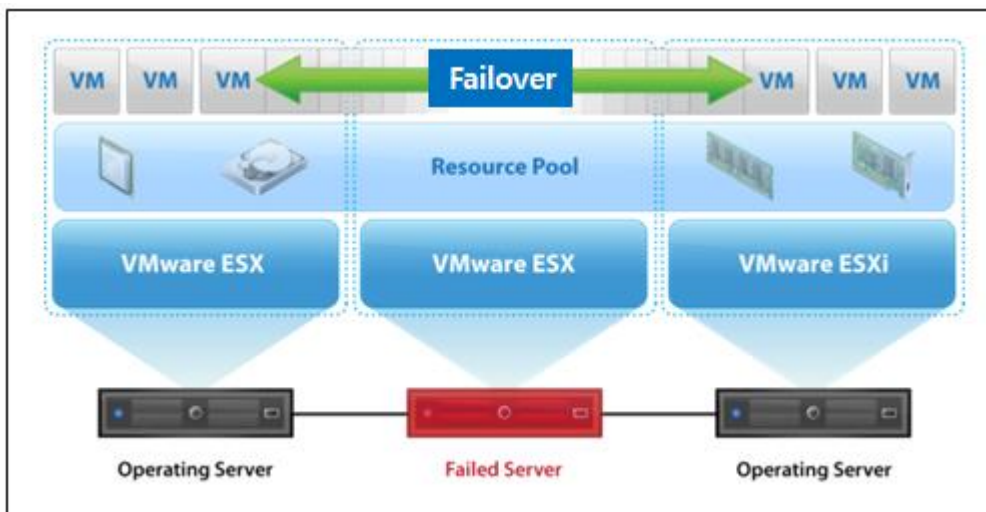


Figure 1. Host failover using VMware HA

Additional 3rd party HA/DR solutions for VMware

The first thing that comes up to mind when consider the way to increase high availability level in virtual application server is HA software such as MSCS, which is installed in physical server environment, or 3rd

party software that can monitor the applications within VM.

Advantages of applying 3rd party HA and DR solution are:

- ✓ Provides redundancy for VM itself
- ✓ Measures for failure such as O.S crash, application, data storage and network
- ✓ HA&DR policy settings of each individual VMs

However, most of these 3rd party solutions are designed for physical server environment and is too time consuming and hard labor for installation and management and it is difficult to configure and manage HA/DR.

Disadvantages of applying 3rd party HA and DR solution are:

- ✓ Needs to be installed and configured one by one for each VM
- ✓ Additional management console and engineer with HA/DR knowledge is needed for HA management
- ✓ Installation, configuration and management comparably difficult and is time consuming.

Needs of enhanced HA/DR in VMware environment

As mentioned above, to improve HA/DR of mission/business critical application in VMware environment, availability management for each individual VMs and service related resources in the VMs is required.

The fact that configuration and management of HA/DR should be easy when build several virtual machines on one physical server. As VMware release vSphere 4.1, 3rd party software manages availability of VMs and VMware has announced application programming interface (API) so that vCenter of VMware can be managed.

By maintaining existing high availability of VMware and management of vCenter and monitoring the states of all the resources running in each VM. If continuity of service is secured with automatic recovery and failover function when a failure occurs, it will increase the reliability for mission/business critical application in virtual environment.

Introducing ManTech's HA/DR solution for virtual infrastructure

Mantech's MCCA for virtual what is stands for Mantech Continuous Cluster Server is a solution that increases HA/DR of mission/business critical application in VMware environment. MCCA provide the following enhanced HA/DR solutions in virtual machine.

Key features and benefits of MCCS:

- ✓ Failure detection and automatic recovery of each VM and its applications and resources
- ✓ Supports redundant copy of VM
- ✓ Supports data redundancy within VM through real-time data replication
- ✓ Automated HA/DR configuration through Wizard
- ✓ Easy management through consolidation GUI with vCenter

Architecture of MCCS for virtual

MCCS consists of 100% software and there is no need for additional hardware or change of existing VMware environment to configure high availability. MCCS consists of the following components.

- ✓ Global Availability Manager (GAM) – GAM is a management console of plug-in consolidation with vCenter. HA/DR can be easily configured for single VM and state of each application and resource and each VM can be managed through GAM.
- ✓ Guest Component – Guest component is an agent to monitor the states of application and resources within VM and real-time replicate data component. You don't need to hard labor to install and configure guest component in each VM, just select VM that HA/DR should be configured in vCenter and then creation of standby VM and HA/DR environment is automatically done.

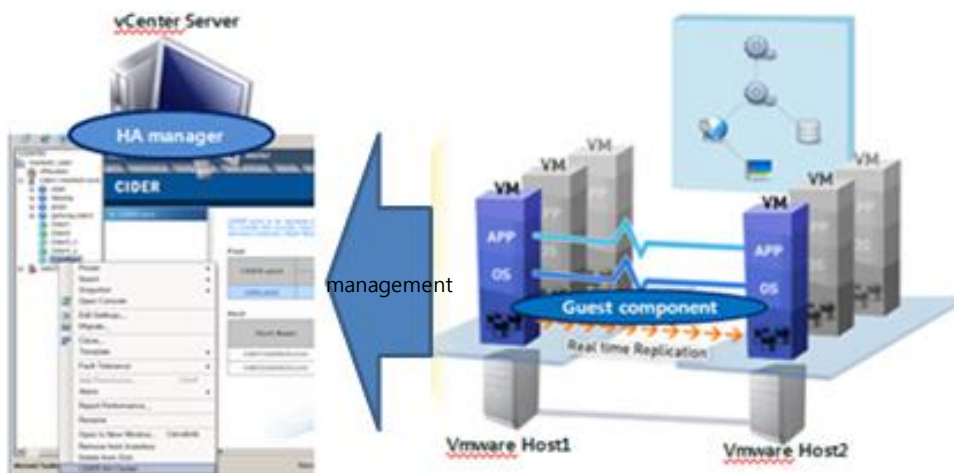


Figure 2. MCCS components and configuration diagram

Application-awareness

MCCS includes the agent that can monitor, start, stop, failover the resources that are related to application operated within VM. Roles of these agents are to automatically aware of service resources related to process of mission-critical application such as MS-SQL DB service and automatically create dependency between each resource.

For example, to provide MS-SQL DB service, at least MS-SQL server and MS-SQL agent such as Windows Service, IP Address, NIC and database that can store virtual store resources are required. If there are any failure in one of these resources, DB service is stopped, and there are orders to start, stop, recover and failover DB service.

Agent of MCCS will automatically find the resources of MS-SQL DB service and configure dependency of each resource. Agent of MCCS is also automatically aware of the failures of each resource and provides automatic recovery and failover function.

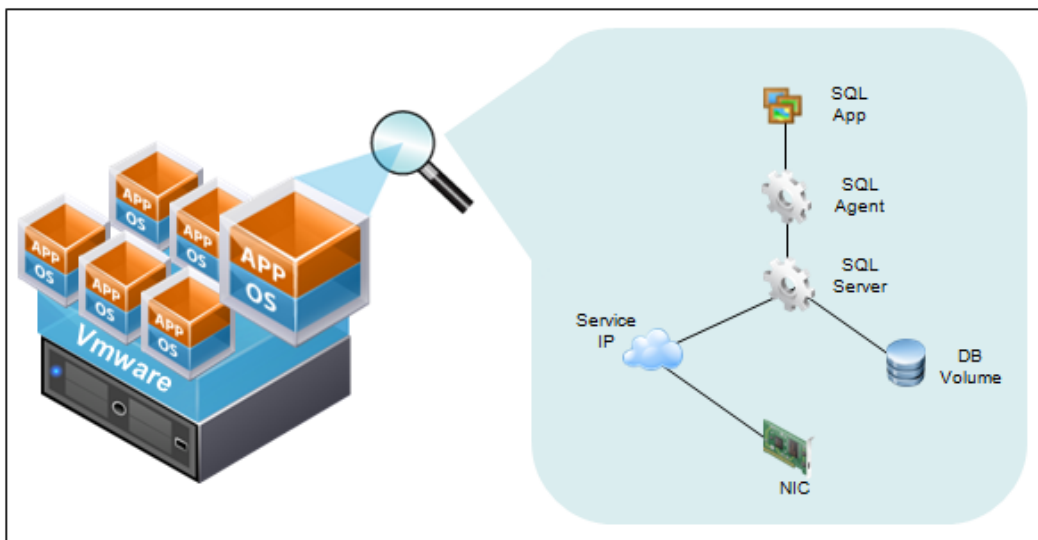


Figure 3. Application awareness and auto discovery

Automated VM redundancy – No hard labor for clustering

To configure service level of HA/DR of two servers, whether in physical environment or virtual environment, knowledge of HA/DR and a lot of time is required. With only a few minutes, HA/DR of VM can be easily configured through automatic wizard of MCCS.

Features that MCCS provides:

- ✓ Automatic Guest component pushing

- ✓ Auto-discovery of application service resource and to-be-replicated volume through application agent
- ✓ Automatic creation of dependency of main resources for application service
- ✓ Automatic creation of standby VM
- ✓ Automatic clustering between active VM and standby VM
- ✓ Automatic monitor/recover/failover for an application failure
- ✓ Automatic data re-sync when online back an original VM

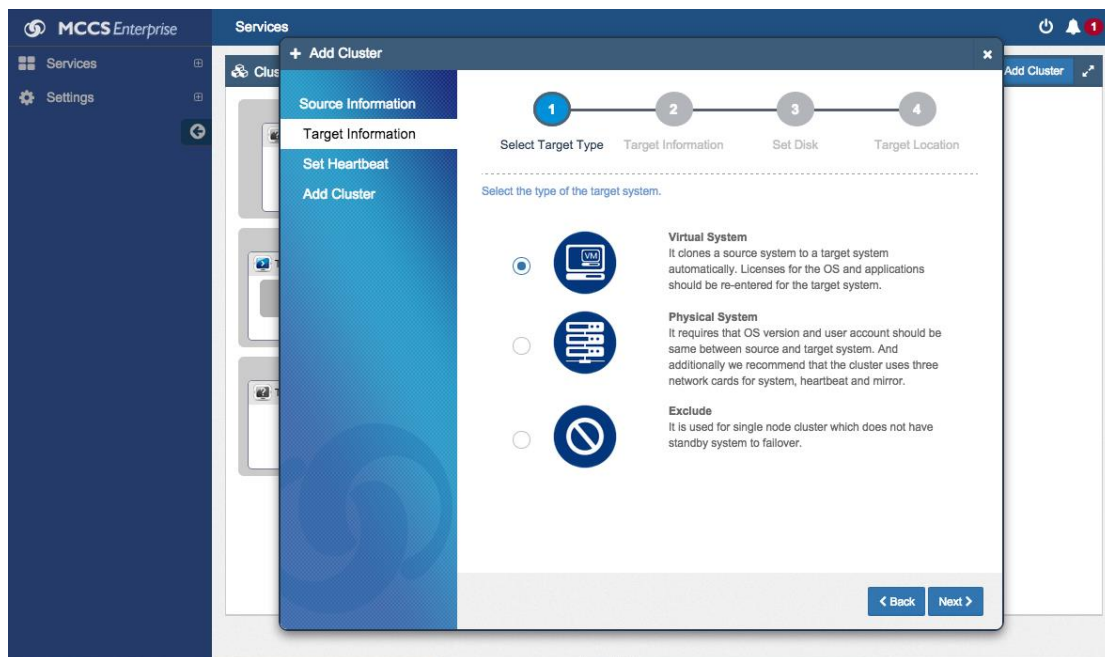


Figure 4. MCCS HA/DR building Wizard

Supports Cost-effective DR

Mission/business critical application, whether in physical environment or virtual environment, is always requires disaster recovery solutions to ensure 24*7/365 service.

Popular considered solutions are storage-based replication solution, host based replication (HBA) from SRM, Guest O.S based 3rd party replication solution.

For storage based replication solution which is provided by storage manufacturer, since replication is done between storage and not by resource of host stored in volumes, management and performance is definitely an advantage. However, the fact that it requires similar level of storage model and great cost for high bandwidth, the fact that VM unit cannot be set individually, the fact that manual work is needed for recovery is some of its disadvantages.

SRM of VMware announced a new version which added HBR function and this HBR function does not need additional external storage to replicate VM image between VM hosts. HBR is definitely a considerable disaster recovery solution in terms of cost effective. However, given that HBR can provide at least 15 minutes of Recovery Point of Object (RPO), it is still not enough to meet the requirement in mission/business critical application that requires real-time replication ($RPO \geq 0$).

Mantech's MCCA provides real-time replication function in addition to HA function, and meets the requirement of $RPO \geq 0$ through real-time back up of data of mission/business critical application. VCCA also provides automated service recovery in back up host in case of disaster through HA function.

Disaster recovery features provided by MCCA:

- ✓ Auto-discovery and replication set of volume to be replicated through application agent
- ✓ Meets the requirement of $RPO \geq 0$, $RTO > \text{min.}$ through automatic failover and real-time replication
- ✓ Replicates changed data block only and utilization of host resource is very low, which enable to replicate with low bandwidth of network
- ✓ Supports automatic failover through backup host
- ✓ Supports automatic data re-sync when online back an original VM

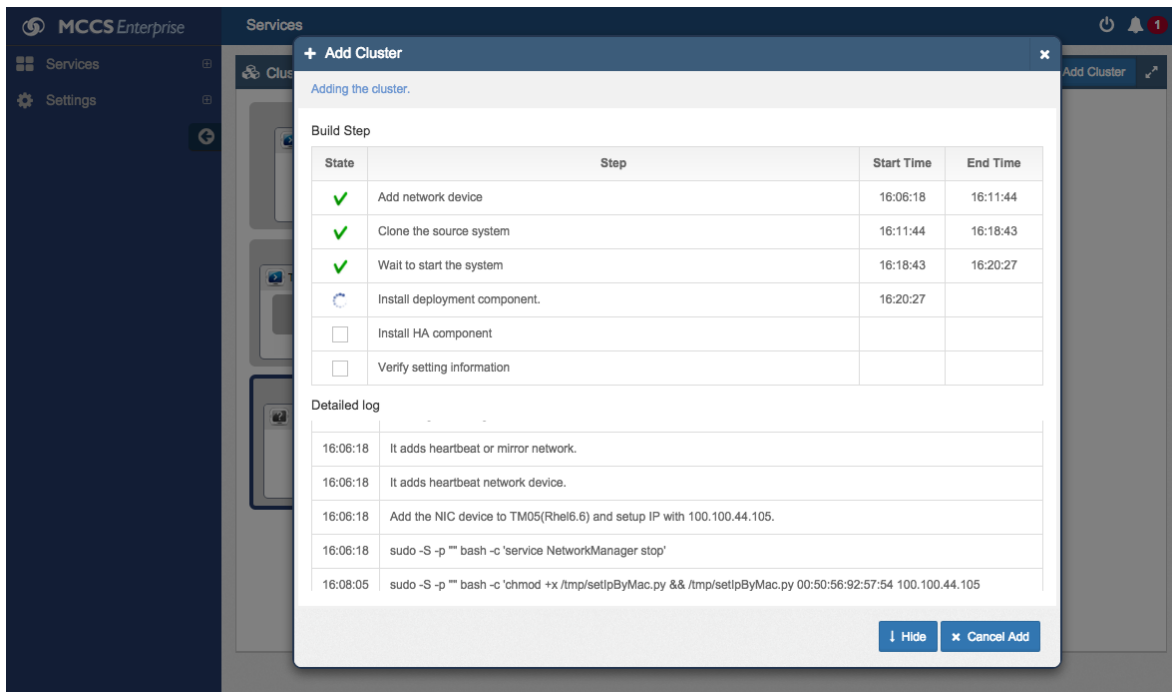


Figure 5. Automatic HA/DR building

Availability Management with consolidated vCenter

MCCS does not require additional management console to configure and manage HA/DR of VMs and all the management is done through web browser or vCenter. VMware administrator can configure HA/DR with just a few clicks, and monitor the states of the resource and applications of each VM through created MCCS tab in vCenter.

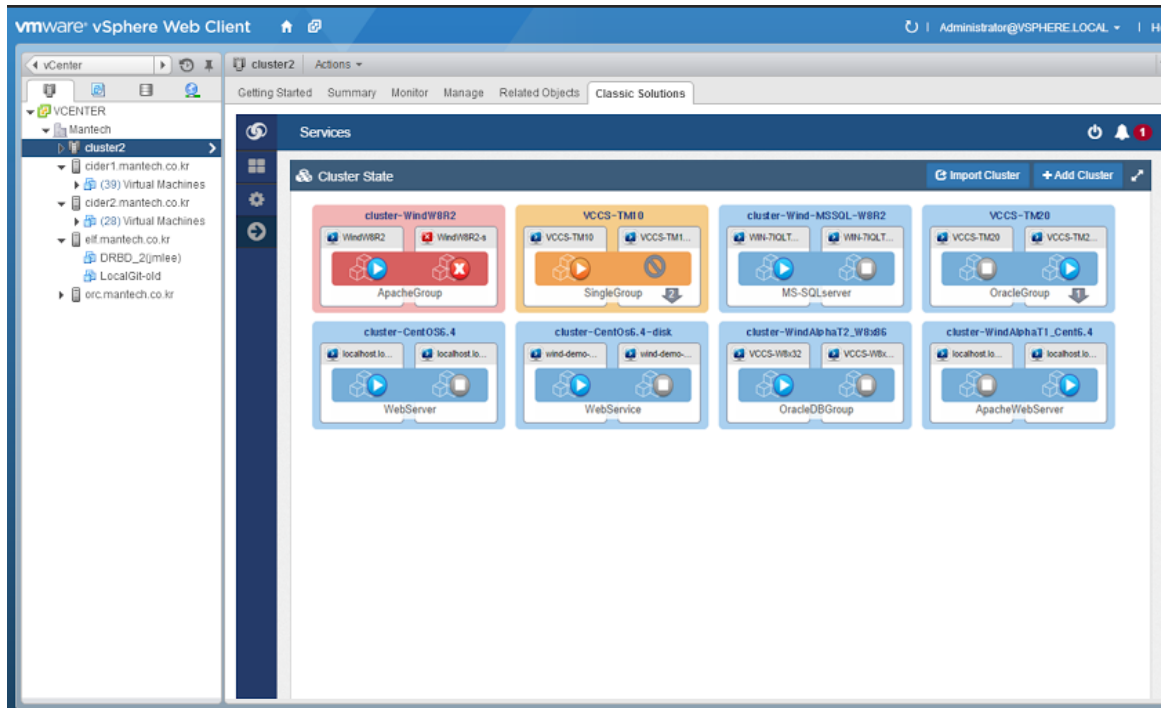


Figure 6.vCenter plug in of Availability manager

Summary

As mission/business critical application is integrated into virtual infrastructure, more and more peoples are interested in HA/DR solutions. At the same time, most of IT administrators are looking forward for higher service level of HA/DR in virtual environment, which has been deploying in the physical environment. In addition, more simplified and easier level of configuration and management are also in demand.

Mantech's MCCS product is the only solution in the industry that provides the higher service level of HA/DR with easy configuration and management.