



Protecting VMware vCloud™ Director Statement of Support by IBM® Tivoli® Storage Manager

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Version 1.0

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Sponsor

Tivoli Customer Support sponsors the Tivoli Field Guide program.

Authors

Those who write field guides belong to one of these three groups:

- Tivoli Support and Services Engineers who work directly with customers
- Tivoli Customers and Business Partners who have experience using Tivoli software in a production environment
- Tivoli developers, testers, and architects

Audience

The field guides are written for all customers, both new and existing. They are applicable to external audiences including executives, project leads, technical leads, team members, and to internal audiences as well.

Types of Field Guides

Two types of Tivoli Field Guides describe how Tivoli products work and how they are used in real life situations:

- Field Guides for technical issues are designed to address specific technical scenarios or concepts that are often complex to implement or difficult to understand, for example: endpoint mobility, migration, and heartbeat monitoring.
- Field Guides for business issues are designed to address specific business practices that have a high impact on the success or failure of an ESM project, for example: change management, asset Management, and deployment phases.

Purposes

The Field Guide program has two major purposes:

- To empower customers & business partners to succeed with Tivoli software by documenting and sharing product information that provides accurate and timely information on Tivoli products and the business issues that impact an enterprise systems management project
- To leverage the internal knowledge within Tivoli Customer Support and Services and the external knowledge of Tivoli customers and Business Partners

Availability

All completed field guides are available free to registered customers and internal IBM employees at the following Web site:

http://www.ibm.com/software/sysmgmt/products/support/Field_Guides.html

Authors can submit proposals and access papers by e-mail:

mailto:Tivoli_eSupport_Feedback@us.ibm.com

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Protecting VMware vCloud™ Director

IBM® Tivoli® Storage Manager for Virtual Environments – Data Protection for VMware version 6.3

1

Introduction

VMware vCloud Director is a software solution that enables enterprises to build secure, multi-tenant private clouds by pooling infrastructure resources into virtual data centers and exposing them to users through Web-based portals and programmatic interfaces as fully automated, catalog-based services. (source: VMware vCloud Director Datasheet from vmware.com)

This paper will discuss how IBM Tivoli Storage Management software can be used to provide protection of VMware vCloud Director assets (i.e. virtual machines) using IBM Tivoli Storage Manager for Virtual Environments – Data Protection for VMware solution.

2

Statement of Support

IBM Tivoli Storage Manager for Virtual Environments – Data Protection for VMware is designed to provide protection for VMware vSphere Hypervisor infrastructures. Although Tivoli Storage Manager Data Protection does not support the VMware vCloud Director software solution at this time, Data Protection for VMware can be used to backup and restore virtual machines that are created by the VMware vCloud Director software solution to the extent described in this field guide. IBM will support the backup and recovery of virtual machines as explicitly described in this document.

Tivoli Storage Manager Data Protection for VMware does not offer any additional protection for VMware vCloud Director deployments beyond what is described in this field guide.

Specifically in the context of the vCloud Director software solution, the following caveats are discussed in this field guide:

- Understanding how virtual machines created in vCloud Director map to the underlying vSphere infrastructure and how they are named in the context of Tivoli Storage Manager
- Understanding how to recover a virtual machine into the vCloud Director infrastructure by restoring the virtual machine with Tivoli Storage Manager and then importing it into vCloud Director
- Understanding restrictions for backup and restore of fast provisioned clones (linked clones)
- Understanding how to reconfigure the virtual machine network configuration after recovery

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Backups and Scheduling

Before we discuss how to configure Tivoli Storage Manager for protecting vCloud Director, it is required to understand how virtual machines created in vCloud Director are represented in the underlying VMware vSphere infrastructure.

In vCloud Director, virtual machines are organized into vApps which are virtual applications comprised of one or more virtual machines. These vApps are managed as an entity by vCloud Director. When a vApp is deployed, the individual virtual machines are created and configured in vSphere.

The hierarchy in vCloud Director, i.e. organization, organization virtual data center and vApps are mapped into vSphere as folders. You can view the folder hierarchy when looking in vSphere under “Home” > “Inventory” > “VMs and Templates”. The hierarchy may look like:

```
myvcenter.us.ibm.com [vCenter]
> vCloud_Datacenter [Datacenter]
  > vCloud_1 [folder for vCloud Director system name]
    > Test_ORG (4bac1dfd-a23f-4089-9768-f22609e5f631) [folder for organization]
      > Test_vDC (29797f51-7d1a-47c1-b62b-3aeaaf02ea90) [folder for org. virtual datacenter]
        > vApp_2VM (b7977726-76ac-4b8e-b461-8772ae24330f) [folder for vApp]
          > VM_1 (44c23045-5e2d-46aa-9929-2261676edb56) [VM in vApp]
          > VM_2 (66c230b5-54af-48ab-1111-1723456abc32) [VM in vApp]
```

Because each vApp might be deployed several times vCloud Director makes the names of the folders and virtual machines unique by appending a global unique identifier (GUID) to the name of each entity. For example, a virtual machine named “Test1” in a vApp in vCloud Director will have a name in vSphere like “Test1 (9abc621a-929a-484b-4711-77e0815d25ef)”, i.e. with the unique identifier appended in parentheses. You may look up the virtual machine with the unique names generated in vSphere from vCloud Director; the name is listed as „name in vSphere“ at the bottom of the „General“ tab of the virtual machine properties in vCloud Director.

Technical note: The term „vApp“ as used in vCloud Director is different from the term „vApp“ in the context of vSphere. This document describes how to protect virtual machines which are - by definition - contained within vApps in the context of vCloud Director vApps. Backup and recovery of traditional vApps (i.e., in the context of vSphere) are outside of the scope of this document.

Tivoli Storage Manager Data Protection for VMware is operating on vSphere and not currently aware of the vCloud Director software solution. Tivoli Storage Manager is backing up and restoring virtual machines based on the information available in vSphere, grouping virtual machines by the hosting ESX server and identifying the virtual machines by name. In order to backup a virtual machine created by vCloud Director you have to specify its complete name including the unique identifier. This becomes cumbersome if vApps are frequently deployed. Thus it is recommended to perform backups at the ESX host level by using the *domain.vmfull* option (for full virtual machine backup) with the parameter *vmhost*. You should include all hosts that are managed by vCloud Director to ensure that all deployed virtual machines are automatically protected. This will backup all virtual machines from deployed vApps as well as virtual machines of vCloud Director vApps templates in your catalog.

Alternatively you may use the *domain.vmfull* option with the *vmfolder* parameter. In this case it is required to add the folder name of each vApp that should be protected to the *vmfolder* parameter.

The folder name is the name of each vApp including its unique identifier. For example, if you wish to backup the vApps *Test_small* and *Test_default*, the option has to look like:

```
domain.vmfull "vmfolder=Test_small (6fc71a8c-3ee4-4711-ba45-518015c28eba), Test_default (55dee5ea-0815-4ef2-1174-428d0b178fbf)"
```

Tivoli Storage Manager is only able to backup the virtual machine. It does not backup the folder structure nor is it able to backup any of the vCloud Director properties.

As the name of multiple virtual machines might be similar, consider to take some records about the grouping of virtual machines into vApps and organizations. This will simplify the identification of the right virtual machine at the time of recovery.

Refer to the Tivoli Storage Manager documentation for more information about protecting VMware virtual machines (see [product documentation](#)).

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Recovery

The sections in this chapter describe the steps required to recover a virtual machine by restoring it from Tivoli Storage Manager and then import it back to vCloud Director.

As mentioned above, Tivoli Storage Manager is operating in the vSphere infrastructure and is not explicitly aware of the vCloud Director software solution. Tivoli Storage Manager restores virtual machines into the vSphere infrastructure. vCloud Director does not recognize these virtual machines as being managed by vCloud Director or as a part of a vCloud Director vApp. For proper recovery and re-integration of a virtual machine into vCloud Director

- identify the virtual machine and restore it using Tivoli Storage Manager,
- import the virtual machine into vCloud Director and
- configure any additional, necessary settings of the virtual machine.

The steps are described in the following sections.

Restoring

There are many reasons why a virtual machine might need to be recovered. For example, the virtual machine might have been deleted by mistake, the data store on which the virtual machine was placed is damaged or the operating system has crashed. In these cases you can use Tivoli Storage Manager to restore the virtual machine. Please refer to the product documentation for the individual steps of restoring the machine, ensuring to restore the correct virtual machine as identified by the virtual machine name including the vCloud Director unique identifier.

Before you restore the virtual machine you must ensure that either the original virtual machine is deleted in vCloud Director, or that you restore the virtual machine with a new name. Restoring a virtual machine over an existing virtual machine will make the machine unusable for vCloud Director. You will not be able to import the virtual machine correctly and the virtual machine must be restored from Tivoli Storage Manager again ensuring no virtual machines with the same name exist.

The restore using Tivoli Storage Manager does not preserve the folder structure inside vSphere. The virtual machine is restored to the same level as the organizations (as displayed in “Home” > “Inventory” > “VMs and Templates”) or virtual data center resource pools (as displayed in “Home” > “Inventory” > “Host and Clusters”).

In an example a restore command looks like:

```
dsmc restore VM "Test_VM (d2ac8508-a696-4711-8493-d360815c8d8b) "  
-vmname="Test_VM-restored"
```

In this example a new name is assigned to the new virtual machine. For all other options the defaults are used.

For details about restoring virtual machines using Tivoli Storage Manager see the [product documentation](#).

Once the virtual machine is restored it has to be imported as described in the next section.

Placement and Import to vCloud Director

After the virtual machine is restored into vSphere the next step is to import it back to the vCloud Director vApp by performing the following sequence of steps in vCloud Director:

- On the "My Cloud" tab of your organization, click on "vApps" in the navigation pane on the left.
- Open the vApp to which you want to import the restored virtual machine.
- Go to the "Virtual Machines" tab of the vApp.
- Click on the icon to "Import from vSphere..." or right click into an empty row and select "Import from vSphere..." from the popup menu.
- In the new dialog, select the desired vCenter.
- Select the restored virtual machine. Specify a new name for the virtual machine.
- Choose either "Copy VM" or "Move VM".
- Click "OK".

Cloud Director will now complete the import. A new unique identifier will be assigned and the virtual machine will be moved to the correct folder.

Note that this operation does not rename files in the data store. If you browse the data store you will find all the virtual machine files in the same directory and with the same name as they have been restored.

In order to reconfigure the network settings of your imported virtual machine see section "[Network Configuration after Restore](#)".

Recreation of a vApp Template

When restoring a template machine it is possible to recreate a vCloud Director vApp in a similar way as individual virtual machines can be restored with Tivoli Storage Manager. You can recreate a vCloud Director vApp template, if the virtual machines of the lost template have been previously backed up. In order to recreate a vApp template follow these steps:

- Restore all required virtual machines as described in section "[Restoring](#)".
- After that open the "My Cloud" tab of your organization in vCloud Director, then go to the "vApps" tab.
- Click on the icon to "Build New vApp..." or right click into an empty row and select "Build New vApp..." from the popup menu.
- Complete the wizard without adding a virtual machine to the vApp.
- Select the new vApp and switch to the "vApp Diagram" tab. Click the icon to "Add Network..." or right click into the field and select "Add Network..." from the menu. Follow the wizard to recreate the original network settings.
- After that follow the description in the "[Placement and Import to vCloud Director](#)" section to import the restored virtual machines to the new vApp.
- Follow the description in the section "[Network Configuration after Restore](#)" to reconfigure the network settings of the virtual machines.
- Finally on the "Home" tab of your organization in vCloud Director, right click on the restored vApp and select "Add to Catalog..." from the menu and fill in the fields in the dialog.

Your vApp template is now recreated.

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Other Considerations

This chapter describes additional considerations as well as known problems and limitations.

Limitations for Fast Provisioned Virtual Machines (so called “Linked Clones”)

Backup and Changed Block Tracking

In case of virtual machines that are fast provisioned (so called linked clones), VMware’s Change Block Tracking (CBT) mechanism is not able to determine the used blocks. During the initial and each subsequent full backup operation, the Data Protection for VMware client will send the complete allocated disk size to the Tivoli Storage Manager server. If CBT is activated, the subsequent incremental backups can still be used to only send changed blocks.

Restored virtual machines are not linked

The restore of a virtual machine that was fast provisioned will re-create a stand-alone, virtual machine, i.e., the virtual machine will no longer be linked to the original virtual machine of the vApp template. It requires more space compared to the original linked virtual machine.

Network Configuration after Restore

If a virtual machine is restored and imported, it will lose its network configuration. The NIC settings are restored, but reset during import. In order to get back to the original configuration, perform the following after restore and import and before the virtual machine is powered on:

- On the "My Cloud" tab of your organization in vCloud Director, go to the "Virtual Machines" tab of the vApp.
- Right click on the virtual machine that you imported.
- Select "Properties" from the menu.
- Select the "Hardware" tab in the new dialog.
- In the "NICs" section, modify the configuration of the individual NICs to match the original configuration. If the original virtual machine still exists in your environment, reset the MAC address to avoid conflicts.

Restored Virtual Machines Require Full Backups

Because the vCloud Director is assigning a new unique identifier to a restored virtual machine during import, Tivoli Storage Manager will treat recovered virtual machines as if they were completely new. A full backup is required to continue protecting the virtual machine and re-enabling the Change Block Tracking feature.