Virtual Business Service-Availability User's Guide

Veritas Operations Manager 6.0

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Symantec™

Virtual Business Service-Availability User's Guide

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Chapter 1

Overview of Virtual Business Services

This chapter includes the following topics:

- About Virtual Business Services
- Features of Virtual Business Services
- Sample virtual business service configuration
- Virtualization support in Virtual Business Services
- About the Veritas Operations Manager policy checks for Virtual Business Services
- Supported operating systems for Virtual Business Services

About Virtual Business Services

The Virtual Business Services feature provides visualization, orchestration, and reduced frequency and duration of service disruptions for multi-tier business applications running on heterogeneous operating systems and virtualization technologies. A virtual business service represents the multi-tier application as a consolidated entity that helps you manage operations for a business service. It builds on the high availability and disaster recovery provided for the individual tiers by Symantec products such as Symantec Cluster Server and Symantec ApplicationHA.

Application components that are managed by Symantec Cluster Server, Symantec ApplicationHA, or Microsoft Failover Clustering can be actively managed through a virtual business service.

You can use the Veritas Operations Manager (VOM) Management Server console to create, configure, and manage virtual business services.

Features of Virtual Business Services

The following VBS operations are supported:

- Start Virtual Business Services from the Veritas Operations Manager console: When a virtual business service starts, its associated service groups are brought online.
- Stop Virtual Business Services from the Veritas Operations Manager console: When a virtual business service stops, its associated service groups are taken offline.
- Applications that are under the control of Symantec ApplicationHA can be part of a virtual business service. Symantec ApplicationHA enables starting, stopping, and monitoring of an application within a virtual machine.If applications are hosted on VMware virtual machines, you can configure the virtual machines to automatically start or stop when you start or stop the virtual business service, provided the vCenter for those virtual machines has been configured in Veritas Operations Manager.
- Define dependencies between service groups within a virtual business service: The dependencies define the order in which service groups are brought online and taken offline. Setting the correct order of service group dependency is critical to achieve business continuity and high availability. You can define the dependency types to control how a tier reacts to high availability events in the underlying tier. The configured reaction could be execution of a predefined policy or a custom script.
- Manage the virtual business service from Veritas Operations Manager or from the clusters participating in the virtual business service.
- Recover the entire virtual business service to a remote site when a disaster occurs.

About support for new features in VBS 6.1

Some of the Virtual Business Services features described in this document are only available in VBS 6.1. If you are still running VBS 6.0.1 or an older release, you will not be able to use these features as described in this document. Here is a short list of those features:

- VBS can remain operational in spite of a tier failure
- Ability to run custom scripts on service groups configured with soft dependency

- Virtual Business Services status tracking
- Ability to manage applications from Microsoft Failover Clustering as one or more tiers
- Application recovery point and startup time in VBS

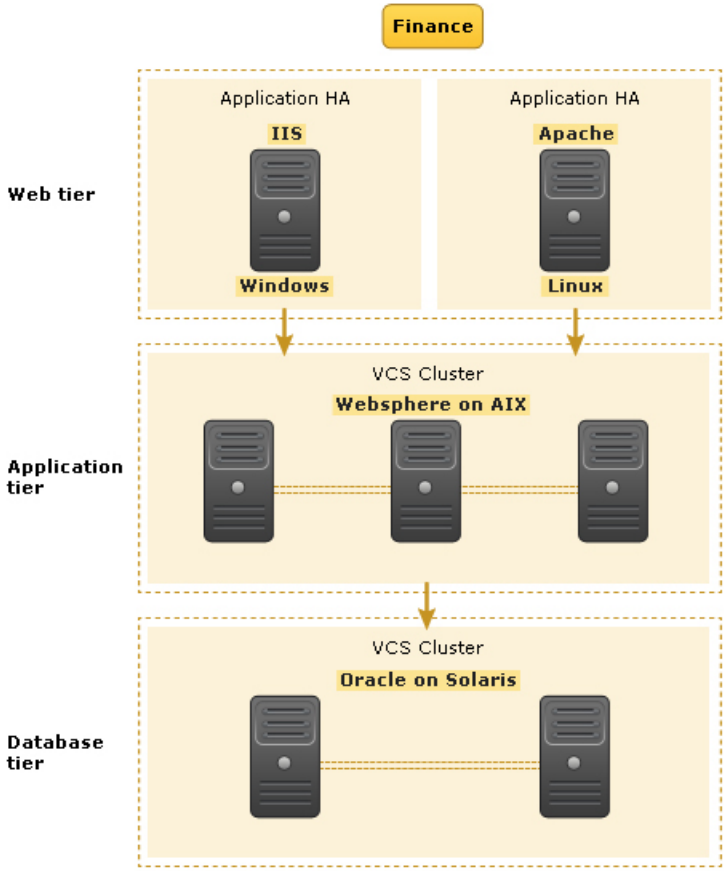
Sample virtual business service configuration

This section provides a sample virtual business service configuration comprising a multi-tier application. Figure 1-1 shows a Finance application that is dependent on components that run on three different operating systems and on three different clusters.

- Databases such as Oracle running on Solaris operating systems form the database tier.
- Middleware applications such as WebSphere running on AIX operating systems form the middle tier.
- Web applications such as Apache and IIS running on Windows and Linux virtual machines form the Web tier. This tier is composed of ApplicationHA nodes.

  Each tier can have its own high availability mechanism. For example, you can use Symantec Cluster Server for the databases and middleware applications, and Symantec ApplicationHA for the Web servers.

Figure 1-1 Sample virtual business service configuration



Each time you start the Finance business application, typically you need to bring the components online in the following order – Oracle database, WebSphere, Apache and IIS. In addition, you must bring the virtual machines online before you start the Web tier. To stop the Finance application, you must take the components offline in the reverse order. From the business perspective, the Finance service is unavailable if any of the tiers becomes unavailable.

When you configure the Finance application as a virtual business service, you can specify that the Oracle database must start first, followed by WebSphere and the Web servers. The reverse order automatically applies when you stop the virtual business service. When you start or stop the virtual business service, the components of the service are started or stopped in the defined order.

Virtualization support in Virtual Business Services

Applications that are under the control of Symantec ApplicationHA can be part of a virtual business service. ApplicationHA architecture uses the agent framework to monitor the state of the applications and their dependent components running on the virtual machines. It supports virtualization technologies such as VMware, LPAR, OracleVM Server for SPARC (formerly LDOM), and KVM.

When an application running on a VMware virtual machine is part of a virtual business service, you can:

- Configure the virtual machine to start or stop when you start or stop the virtual business service, provided the vCenter for those virtual machines has been configured in Veritas Operations Manager.

For more information on ApplicationHA , see the *Symantec ApplicationHA User's Guide*.

VMware virtualization support prerequisites for Veritas Operations Manager Virtual Business Services

Ensure that you meet the following prerequisites before configuring the VMware virtualization support in VBS:

- The virtual systems in the service group's system list are already added to Veritas Operations Manager as managed hosts.
- The virtual machine must already be registered on a host where it can be online when viewed from the VMware vCenter Server. The vCenter Server for the virtual machine is already added to Veritas Operations Manager.
  To know more about the VMware vCenter Server configuration in the Veritas Operations Manager, refer to the *Veritas Operations Manager Management Server User Guide*.

See “VMware virtualization support in VBS” on page 16.

VMware virtualization support in VBS

With managed hosts virtualization support, Veritas Operations Manager users can manage Virtual Business Services' service groups that are configured on virtual machines (VMs). If the host is turned off, Veritas Operations Manager starts the VMs using the VMware vCenter Server that is specified for the VM. The ability to automatically start the managed VMs ensures the availability of configured service groups.

You can use the virtualization management feature of Veritas Operations Manager to add VMware vCenter Server.

About the Veritas Operations Manager policy checks for Virtual Business Services

In Veritas Operations Manager, policy checks use individual rules to validate whether the data center configuration conforms to a predefined standard. These individual rules are referred to as signatures.

The VBS Availability Configuration signature checks for the following parameters:

- VBS package installation status
- Presence of service group in a virtual business service
- Cluster service group availability and state

The Management Server console lets you select the policy signatures to be scanned and optionally specify a schedule for when to run the scan. This process is called signature registration.

You determine the scope of the signature scan, that is, which hosts are scheduled to be scanned for the selected signatures, depending on where you register the signatures, as follows:

- From the **Server** perspective, you can register signatures by Organization and by individual host.
- From the **Availability** perspective, you can register signatures by Organization and by individual cluster.

You can also view the VBS-specific signature under **Settings** > **Policy Signatures** on the Management Server console.

After running a policy signature scan, you can view the information about violations that are discovered. You can view the policy violations for a selected host on the Server perspective or for a selected cluster on the Availability perspective. You can also view policy violations for an Organization.

For more information on policy signatures, refer to the *Veritas Operations Manager Management Server 6.0 User Guide*.

Supported operating systems for Virtual Business Services

Table 1-1 lists the software supported for Virtual Business Services.

Table 1-1 Supported software

Category	Platform	Version
Operating system	Solaris on SPARC	10 U9, U10, U11 11 U1
	Red Hat Enterprise Linux	5 Update 5, 6, 7, 8, 9 6 Update 3, 4
	SUSE Linux Enterprise Server (SLES)	11 SP2
	OL5	OL5 U5, U6, U7, U8, U9
	OL6	OL6 U3, U4
	AIX on Power6, and AIX on Power7	6.1 TL6, TL7, TL8 7.1 TL0, TL1, TL2
	Windows	Windows Server 2008 R2 SP1 Windows Server 2012
Storage Foundation and High Availability for UNIX	Linux, Solaris, AIX	5.1 5.1SP1 with latest PR or RP 6.0 6.0.1 6.1
Storage Foundation and High Availability for Windows	Windows	5.1SP1, 5.1SP2 6.0 6.0.1 6.1
Symantec ApplicationHA	Supported Windows and Linux guest operating systems on VMware	5.1 SP2
	Supported Windows and Linux guest operating systems on VMware Supported KVM, LPAR, and Oracle VM Server for SPARC (formerly LDOM) guest operating systems	6.0 6.1

Internationalization (I18N) support

Internationalization support for Virtual Business Services is available in Level 0.

Level 0 denotes that the base product (the English version) functions correctly on the local operating system. However, you cannot use non-English characters to specify object or path names.

Chapter 2

Installing and configuring Virtual Business Services

This chapter includes the following topics:

- About Virtual Business Services components
- Virtual Business Services workflow
- Support matrix for VBS
- Prerequisites for configuring VBS
- Installing the Virtual Business Services package using Veritas Operations Manager
- Configuring a virtual business service
- Configuring dependencies for a virtual business service
- Managing Microsoft Failover Clustering from VBS
- Uninstalling the VRTSvbs package
- Uninstalling VBS from Microsoft Failover Clusters

About Virtual Business Services components

Table 2-1 lists the components that enable the virtual business service functionality.

Table 2-1 Virtual Business Services components

Components	Role
Symantec Cluster Server, Symantec ApplicationHA and Microsoft Failover Clustering	Provide high availability for individual components of Virtual Business Services.
Veritas Operations Manager	Provides the ability to configure and manage virtual business services. You can create a virtual business service and configure it only by using Management Server.
Managed Host (VRTSsfmh)	Installed on all the nodes of a cluster that can form a part of virtual business service.
The Virtual Business Services (VRTSvbs) package	The package is installed on the nodes participating in the virtual business service to enable inter-cluster fault management and command line operations for Virtual Business Services. From Symantec Cluster Server 6.0 onwards it is installed by default.

Note: You can use multiple Management Servers to manage the nodes in a cluster. However, you must create and operate the virtual business services from only one Management Server.

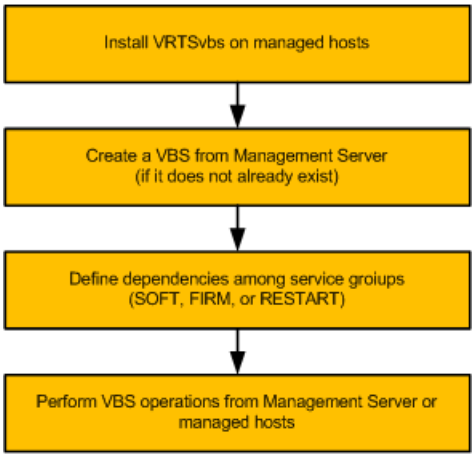
See "About Virtual Business Services" on page 12.

See "Installing the Virtual Business Services package using Veritas Operations Manager" on page 23.

Virtual Business Services workflow

Figure 2-1 illustrates the Virtual Business Services workflow.

Figure 2-1 Virtual Business Services workflow



Support matrix for VBS

The following matrix lists the supported VBS versions on a tier depending on the versions of Management Server, VBS and Managed Hosts (MH) on the Veritas Operations Manager server.

Considerations for functionality introduced in VBS 6.1:

- For VBS 6.1 features to be available, the Management Server (MS) and MH versions must all be 6.0 on the Veritas Operations Manager server.
- If a VBS comprises of tiers with VRTSvbs 6.0, 6.0.1, and 6.1 versions, then the new features introduced in VBS 6.1 are not supported for that VBS.
- If you are upgrading from VBS 6.0 or 6.0.1 to 6.1, you must upgrade MH to 6.0 before upgrading VBS.

Table 2-2 Support matrix for VBS

MS version	MH version	VRTSvbs version on first tier	VRTSvbs version on second tier	Supported VBS feature set
6.0	4.1	6.0/6.0.1	6.0/6.0.1	6.0
6.0	5.0	6.0.1	6.0.1	6.0.1
6.0	5.0	6.0	6.0.1/6.0	6.0

Table 2-2 Support matrix for VBS *(continued)*

MS version	MH version	VRTSvbs version on first tier	VRTSvbs version on second tier	Supported VBS feature set
6.0	6.0	6.0	6.0/6.0.1/6.1	6.0
6.0	6.0	6.0.1	6.0.1/6.1	6.0.1
6.0	6.0	6.1	6.1	6.0

Prerequisites for configuring VBS

Ensure that the following prerequisites are met before you start using VBS:

- You have configured high availability for the application components that are part of the virtual business service either with Symantec Cluster Server, Symantec ApplicationHA or Microsoft Failover Clustering.
  For more information on the supported versions of Symantec Cluster Server, ApplicationHA, and Microsoft Failover Clustering:
  See "Supported operating systems for Virtual Business Services" on page 17.
- You have installed Veritas Operations Manager Management Server version 6.0, or later. The managed host version should also be 4.1 or later. To use the features introduced in VBS 6.1, the Management Host version must be 6.0 and VOM version must be 6.0 along with VBS 6.1.
- You are logged on as the Domain Administrator or the administrator on all tiers (clusters) of the virtual business service.
- Port 2410 is open for Virtual Business Services daemon communication.

Installing the Virtual Business Services package using Veritas Operations Manager

To upload the VRTSvbs package using Veritas Operations Manager

Skip this section if you have installed or upgraded to VCS 6.1 or SFHA 6.1. VRTSvbs is automatically installed with these products.

Perform these steps if you installed an earlier supported version of VCS or SFHA. You must install the VRTSvbs package on each host of each cluster that you want to manage.

Note: Before you install the VRTSvbs package on a managed host, ensure that the VRTSsfmh package version 6.0 is installed on the host. If VRTSsfmh 6.0 is not installed, installation of VRTSvbs fails.

---

1. Download the VRTSvbs package to a temporary directory on your computer from the following location:

   https://sort.symantec.com/vom

   The package is also available for download from Symantec FileConnect and Trialware.

2. In the Home page on the Management Server console, click **Settings**.
3. Do one of the following:
   - Click **Upload Solutions**.
   - Click **Deployment**, and then click **Upload Solutions**.
4. In the **Upload Solutions to Repository** wizard panel, click **Browse** to select the VRTSvbs package that you want to upload.

   You need to upload the VRTSvbs package for each platform that you want to deploy VBS on.
5. Click **Upload** to upload the package to the repository.
6. Click **Close**.

To install the VRTSvbs package using Veritas Operations Manager

1. In the Home page on the Management Server console, click **Settings**.
2. Click **Deployment**.
3. Expand **Base Release** to select the VRTSvbs package.
4. Right-click the VRTSvbs package and click **Install**.
5. In the **Install -Download Add-on** wizard panel, select a download option and click **Next**.
6. In the **Install Select hosts** wizard panel, select the managed hosts on which you want to install the hot fix, package, or patch, and click **Finish**.
7. In the **Result** panel, click **OK**

Note: You cannot uninstall VRTSvbs package using Veritas Operations Manager. Use native OS commands to uninstall the VRTSvbs package. On Windows systems, you can uninstall VRTSvbs also by using the **Programs and Features** (Windows 2008 or later) or **Add or Remove Programs**(Windows 2003) option from the Control Panel.

See "Uninstalling the VRTSvbs package" on page 42.

Configuring a virtual business service

After configuring a VBS in Veritas Operations Manager, you can administer the VBS by using the Management Server or by using the command line interface on managed hosts. The VBS can have Microsoft Failover Clustering tiers in addition to the VCS and ApplicationHA tiers. You can also create a VBS entirely of Microsoft Failover Clustering or VCS tiers.

Virtual Business Services operations treat the Microsoft Failover Clustering tiers in the same way as VCS and Application HA tiers. Microsoft Failover Clustering tiers are brought online and taken offline in the same way as VCS or ApplicationHA tiers. However, the Microsoft Failover Clustering tiers are allowed to participate only in soft dependencies. Thus a fault or recovery in a Microsoft Failover Clustering tier does not trigger any action on its parent tiers. Moreover, no action will be taken on a failover clustering tier upon fault or recovery of its child tiers. VBS does not propagate fault or recovery actions beyond a Microsoft Failover Clustering tier.

Note: Microsoft Failover Clustering roles or resource groups called Cluster Group and Available Storage must not be added in the VBS.

See "Ability to manage applications from Microsoft Failover Clustering as one or more tiers" on page 85.

Considerations for creating a virtual business service

Before you create a virtual business service, ensure that you consider the following factors:

- Service groups with names such as ClusterService, VBSHAService, or VCSInfraSG are internal and will not be added to a virtual business service.
- At least one of the tiers in the virtual business service is recommended to be a multi-node cluster.
- The names of clusters in the virtual business service must be unique.

- No two virtual business services can have the same name, irrespective of the case.
- The name of a virtual business service must not contain only numbers.
- The constituent tiers can be VCS or ApplicationHA service groups as well as Microsoft Failover Clustering roles or resource groups.

See "About Virtual Business Services" on page 12.

See "Managing Microsoft Failover Clustering from VBS" on page 38.

Creating virtual business services

You can create a virtual business service in the Management Server console.

To perform this task, your user group must be assigned the Admin role on the cluster or the Availability perspective. The permission on the cluster may be explicitly assigned or inherited from a parent Organization or cluster.

Virtual Business Services allow Microsoft Failover Clustering groups to be added to a virtual business service. You can also start and stop the Microsoft Failover Clustering clusters by invoking the virtual business service command line interface.

To create a virtual business service

1. In the Management Server console, go to the **Availability** perspective and expand **Manage** in the left pane.
2. Select **Data Center** in the navigation tree.
3. Select the **Virtual Business Services** node.
4. Right-click on the **Virtual Business Services** tab and select **Create**.
5. In the **Create Virtual Business Service** wizard panel, enter the name and description of the virtual business service. Select the service group from the **Available** column, and drag and drop it under the **Selected** column. You can select multiple service groups from different clusters.

   Along with VCS service groups, you may also see Microsoft Failover Clustering roles (resource groups) in the list of service groups and you can select them as a part of the virtual business service.

   See "Create Virtual Business Service panel options" on page 27.
6. Click **Finish**.

See "Editing virtual business services" on page 27.

See "Deleting virtual business services" on page 28.

Create Virtual Business Service panel options

Use this panel to create a virtual business service.

Table 2-3 Virtual Business Service attributes options

Field	Description
Name	Enter the name of the virtual business service. In this field, you can enter up to 255 characters. Example: Accounts Receivable
Description	Enter a description for this virtual business service. In this field, you can enter up to 255 characters. This field is optional. Example: All servers and storage that are associated with the Accounts Receivable billing system.
Available	List of all the Service Groups available to create a virtual business service.
Selected	List of all the Service Groups selected to create a virtual business service.

See "Creating virtual business services" on page 26.

Editing virtual business services

In the Management Server console, the administrator of all tiers of a virtual business service can edit the content of the virtual business service by modifying the service groups on the virtual business service.

To perform this task, your user group must be assigned the Admin role on the cluster or the Availability perspective. The permission on the cluster may be explicitly assigned or inherited from a parent Organization or cluster.

To edit a virtual business service

1. In the Management Server console, go to the **Availability** perspective and expand **Manage** in the left pane.
2. Select **Data Center** in the navigation tree.
3. Select **Virtual Business Services** node.
4. In the virtual business services list, right-click on the required virtual business service and select **Edit**.

5 In the **Edit Virtual Business Services** wizard panel, enter the information to be modified for the virtual business service. Select the service group and cluster from the **Available** column, and drag and drop it under the **Selected** column. You can select multiple service groups from different clusters also.

See "Edit Virtual Business Service panel options" on page 28.

6 Click **Finish**.

See "Creating virtual business services" on page 26.

See "Deleting virtual business services" on page 28.

Edit Virtual Business Service panel options

Use this panel to edit a virtual business service.

Table 2-4 Virtual Business Service attributes options

Field	Description
Name	Enter the name of the virtual business service. In this field, you can enter up to 255 characters. Example: Accounts Receivable
Description	Enter a description for this virtual business service. In this field, you can enter up to 255 characters. Example: All servers and storage that are associated with the Accounts Receivable billing system.
Available	List of all the Service Groups available to edit a virtual business service.
Selected	List of all the Service Groups selected to edit a virtual business service.

See "Editing virtual business services" on page 27.

Deleting virtual business services

In the Management Server console, the administrator can delete an existing virtual business service.

To perform this task, your user group must be assigned the Admin role on the cluster or the Availability perspective. The permission on the cluster may be explicitly assigned or inherited from a parent Organization or cluster.

To delete a virtual business service

1. In the Management Server console, go to the **Availability** perspective and expand **Manage** in the left pane.
2. Select **Data Center** in the navigation tree.
3. Select **Virtual Business Services** node.
4. In the virtual business services list, right-click on the required virtual business service and select **Delete**.
5. On the **Delete Virtual Business Services** wizard panel, click **OK** to confirm.

See "Creating virtual business services" on page 26.

See "Editing virtual business services" on page 27.

Virtual Business Services daemon

An instance of the Virtual Business Services daemon runs on each cluster over which a VBS is configured. This daemon is made highly available using the local high availability solution deployed on that cluster. For VCS clusters and ApplicationHA nodes, the VBS daemon is configured as a resource called vbsapp inside a service group called ClusterService. For such clusters that are already running a GCO configuration, ClusterService would already be present and is reused.

On non-Symantec clusters (Microsoft Failover Clustering in VBS 6.1), the VBS daemon is made highly available and failover-capable by making it a resource (called vbsapp) inside a resource group or application role called VBSHAService.

You must ensure that the ClusterService or VBSHAService group is not in FAULTED or FAILED state across all nodes of the cluster. Otherwise, VBS does not function correctly.

Communication among VBS daemons

You can choose to configure a virtual IP address for every VBS daemon in a multi-node cluster. Alternatively, you can allow VBS to auto discover the IP address of every VBS daemon. VBS daemons communicate across clusters over IP addresses. You can choose to configure a virtual IP address for every VBS daemon in a multi-node cluster. Alternatively, you can allow VBS to auto discover the IP address of every VBS daemon.

The three methods for VBS daemon communication are:

- Auto discovery of IP addresses for every VBS daemon in the cluster
  See "Auto discovery of VBS Daemon on each cluster" on page 30.
- Manually configuring a virtual IP address for every VBS daemon in the cluster
- Configure virtual IP for a few tiers and allow auto discovery of the remaining IPs.

Consider a VBS consisting of multi-node clusters on three-tiers. One tier is configured to use a virtual IP address and the remaining tiers are configured to automatically discover the IP address. Every cluster updates the IP addresses of the VBS Daemons running on other clusters. This ensures communication among VBS Daemons.

Note: In a VBS that has one of the tier configured for GCO, VBS daemons across tiers communicate using the virtual IP address set in the ClusterAddress attribute of the GCO tier.

Auto discovery of VBS Daemon on each cluster

VBS daemons auto-discover the IP addresses of other VBS daemons within the VBS using HTTPS ping messages and handshakes.

Configuring auto discovery for each cluster in VBS

Auto discovery is supported only for tiers that do not have GCO configured. For any tier with GCO configured, virtual IP is the only supported communication mechanism.

Auto discovery is configured in following scenarios:

- Configuring auto discovery for fresh installations: This is automatic and no user intervention is required.
- Configuring auto discovery for upgrades: The procedure for this is described below.

Caution: Do not set auto discovery on a tier that has GCO configured.

Before configuring auto discovery, ensure that vbsapp resource is brought offline.

To configure auto discovery of IP address of VBS daemon on a cluster:

1. Log on to any node of a cluster that is a part of your VBS.
2. Make the configuration read-writable.

```
# haconf -makerw
```

3. Delete the IP resource configured for virtual IP of the VBS daemon.

```
# hares -delete csgip
```

4. Delete the NIC resource configured for virtual IP of the VBS daemon.

```
# hares -delete csgnic
```

5. Delete the cluster IP address.

```
# haclus -modify ClusterAddress ""
```

6. Make the configuration read-only.

```
# haconf -dump -makero
```

Configuring dependencies for a virtual business service

For a selected virtual business service, you can configure the order in which its constituent service groups are brought online (during virtual business service start operation) and taken offline (during virtual business service stop operation).

You can establish a service group's relationships with its child service groups. For the service groups that are configured on virtual machines, you can also enable virtual machine auto-start and auto-stop options. It ensures that if the virtual machine is detected as turned off during virtual business service start operation, Veritas Operations Manager turns it on, and brings the service group online on that virtual machine. Similarly, if you have selected virtual machine auto-stop option, after the service group is taken offline, Veritas Operations Manager turns off that virtual machine. The start and stop operations apply only to the single node clusters that are part of the selected virtual business service.

Note: Virtual business service does not alter the dependencies that are set through Symantec Cluster Server.

To perform this task, your user group must be assigned the Admin role on the service group or the Availability perspective. The permission on the service group may be explicitly assigned or inherited from a parent Organization or cluster.

Caution: Do not create cyclic dependencies across clusters in a virtual business service, as it is not supported in VBS.

To configure dependencies in a virtual business service

1. In the Management Server console, go to the **Availability** perspective and expand **Manage** in the left pane.
2. Select **Data Center** in the navigation tree.
3. Select the **Virtual Business Services** node.
4. In the virtual business services list, right-click on the required virtual business service and select **Configure dependencies**.
5. In the **Configure Virtual Business Service dependencies - Specify service group dependencies panel options** wizard panel, under **Parent**, select the parent service group from the drop-down list. Under **Child**, select the child service group that you want to associate with the selected parent service group. Select the type of dependency from the drop-down list and click **Link**. Click **OK**. By default, the type of dependency is set to soft.

   See "Configure Virtual Business Service dependencies - Specify service group dependencies panel options" on page 33.
6. In the **Configure Virtual Business Service dependencies - Specify VMs start or stop** wizard panel, select the service group for which you want to enable virtual machine auto-start and auto-stop option.

   See "Configure Virtual Business Service dependencies - Specify VMs start or stop panel options" on page 37.
7. Use the **Specify Script Execution details** wizard panel to define and execute custom scripts. Custom scripts can be defined only if the dependency type is Soft.

8 In the **Result** wizard panel, verify the configuration that you have made for selected virtual business service.

Note: In a VBS that has one of the tier configured for a global service group, VBS daemons across tiers communicate using the virtual IP address set in the ClusterAddress attribute of the global service group tier.

9 Click **Finish**.

Note: If the virtual business service contains a mix of local and global service groups, and one or more global service groups are in online or partial state on a remote reachable cluster (which is in running state), then virtual business service start operation is rejected. For such a virtual business service, you need to manually take all the global service groups on the remote clusters offline, and then bring virtual business service at the local site online.

See "Stopping a virtual business service " on page 48.

See "Starting a virtual business service " on page 45.

Configure Virtual Business Service dependencies - Specify service group dependencies panel options

Use this wizard panel to establish parent-child service groups relationships, and set the order in which the service groups must be brought online during virtual business service start operation.

Table 2-5 Configure Virtual Business Service dependencies - Specify service group dependencies panel options

Fields	Description
Link	Click to establish the relationship between the selected parent and child service group. Multiple child service groups can be selected. After you have established the dependency, corresponding child and parent service groups are listed in the adjacent table with the default dependency type as soft. See "Link Service Groups panel options" on page 34.

Table 2-5 Configure Virtual Business Service dependencies - Specify service group dependencies panel options *(continued)*

Fields	Description
Unlink	Click to break the relationship between the selected parent and child service group. See "Unlink Service Groups panel options" on page 35.

See "Configuring dependencies for a virtual business service " on page 31.

Link Service Groups panel options

Use this wizard panel to establish a relationship between the selected parent and child service group.

Table 2-6 Link Service Group panel options

Fields	Description
Parent	Select the parent service group for which you want to set the order.
Select child service group	Select the child service group to be associated with the selected parent service group.
Name	Displays the name of the child service group that is to be linked with the parent service group.
Cluster	Displays the cluster the child service group belongs to.
HA Provider	Displays the name of HA provider.

Table 2-6 Link Service Group panel options *(continued)*

Fields	Description
Type	Select the type of dependency for the parent-child service group pair. By default, it is set to soft. You can also use other two types of dependencies, namely, firm and restart. The fault propagation behavior of three policies is listed below: ■ Soft: When the child faults or recovers from the fault, the parent ignores the events. The parent does not take any action. This type of dependency is used when only start or stop ordering is required, and no fault policy action is needed. In addition , Soft dependency also allows you to configure script execution. If script execution is configured, the script is executed on the parent tier when the child recovers from a fault. See "Custom script execution" on page 74. ■ Firm: When the child faults, the parent is taken offline. When the child recovers, the parent is brought online. ■ Restart: When the child faults, the parent ignores the event. When the child recovers, the parent is taken offline, and then brought online.

See "Configure Virtual Business Service dependencies - Specify service group dependencies panel options" on page 33.

See "Configuring dependencies for a virtual business service " on page 31.

Unlink Service Groups panel options

Use this wizard panel to establish a relationship between the selected parent and child service group.

Table 2-7 Unlink Service Group panel options

Fields	Description
Parent	Select the parent service group for which you want to set the order.
Select child service group	Select the child service group to be unlinked from the selected parent service group.
Name	Displays the name of the child service group that is to be unlinked from the parent service group.
Cluster	Displays the cluster the child service group belongs to.
HA Provider	Displays the name of HA provider.
Type	Displays the type of dependency for the parent-child service group pair.

See "Configure Virtual Business Service dependencies - Specify service group dependencies panel options" on page 33.

See "Configuring dependencies for a virtual business service " on page 31.

Specify Script Execution details panel options

In Virtual Business Services 6.1, use this wizard panel to specify the script execution details for configuring dependencies

Table 2-8 Specify Script Execution details panel options

Fields	Description
Service Group	Displays the parent service group name for which script execution has to be configured.
Cluster	Displays the cluster name in which the parent service group is configured.
Script Path with arguments	Enter the fully qualified script/ binary name. For Windows tiers, if the script path contains spaces, then the script name and arguments must be enclosed in single quotes. For example, "C:\Program Files\Veritas\VRTSsfmh\bin\perl.exe" "c:\myapp\reconnect.pl" 'arg1' 'arg2'.

Table 2-8 Specify Script Execution details panel options *(continued)*

Fields	Description
User Name	On UNIX, enter the local user name in whose context the script must be executed (root by default). On Windows, the custom script is always executed in the context of 'SYSTEM' user.
Dependent service group details:	
Service Group	Displays the name of the service group having soft dependencies with the selected parent service group.
Cluster	Displays the cluster name in which the child service group is configured.
VBS Names	Displays the name of the virtual business services containing the parent and child service groups.

See "Configuring dependencies for a virtual business service " on page 31.

Configure Virtual Business Service dependencies - Specify VMs start or stop panel options

Use this panel to configure the start or the stop operations for the virtual machine, which has the service group configured on it. This configuration is supported only for VMware.

Table 2-9 Service Group dependencies

Fields	Description
Service Group	The name of the configured service group.
Cluster	The name of the cluster the service group belongs to.
Virtual Machine	The name of virtual machine that is turned on or off as per your selection in VM start and VM stop check boxes.

Table 2-9 Service Group dependencies *(continued)*

Fields	Description
VM start	Select this check box to switch on the virtual machine if it is off when the virtual business service starts. After the virtual machine is switched on, the service group is brought online on that virtual machine. If you do not select the check box, during the virtual business service start operation, Veritas Operations Manager searches for other available systems in the service group's system list, and selects the system on which the service group can be brought online.
VM stop	Select this check box to take the service group (configured on the virtual machine) offline before turning off the virtual machine during virtual business service stop operation. The virtual machine stop operation is ignored if other service groups are running on that virtual machine. If you do not select this check box, during the virtual business service stop operation, only the service group is taken offline; the virtual machine remains on.

See "Configuring dependencies for a virtual business service " on page 31.

Managing Microsoft Failover Clustering from VBS

VBS can manage multi-tier applications in which one or more tiers are managed by Microsoft Failover Clustering. You can create a VBS with Microsoft Failover Clustering tiers, VCS and Application HA tiers, or a mix of these different kinds.

Operations treat Microsoft Failover Clustering tiers in the same way as VCS and ApplicationHA tiers. Microsoft Failover Clustering tiers are brought online and taken offline in the same way as VCS or ApplicationHA tiers. However, Microsoft Failover Clustering tiers are allowed to participate only in soft dependencies. Thus, a fault or recovery in a Microsoft Failover Clustering tier will not trigger any action on its parent tiers. VBS does not propagate fault or recovery actions beyond a Microsoft Failover Clustering tier.

Prerequisites:

On Windows 2012, cluster.exe (which is not installed by default) must be installed

Provided the failover cluster role is already enabled for the server, you can install cluster.exe from the Powershell console with the `Add WindowsFeature RSAT -Clustering -CmdInterface` command.

On each Microsoft Failover Clustering that manages applications that are part of a VBS, VOM creates a Microsoft Failover Clustering role called VBSHAService with a single Generic Application resource called vbsapp. The vbsapp resource monitors the VBS daemon running on the Microsoft Failover Clustering and makes it highly available and capable of failing over to other nodes of the cluster.

VOM creates the vbsapp resource with the following properties set to their default values as shown in the table below.

Table 2-10 Assigned property values

Property	Value
RestartThreshold	3
RestartPeriod	900000
RestartAction	ClusterResourceRestartNotify

Thus if VBS daemon fails to start properly, then Microsoft Failover Clustering tries to restart the vbsapp resource up to a maximum of three times (RestartThreshold) within the 15 minute (900000 ms) interval (RestartPeriod). Subsequently, it tries to fail over the VBSHAService to another node (RestartAction).

About installing VBS on Microsoft Failover Clustering nodes

You can install Virtual Business Services for Third Party Support on multiple Microsoft Failover Clustering nodes using the Symantec product installer shipped with the Symantec ApplicationHA product DVD or the Symantec Storage and Application Availability Management Solutions 6.1 for Windows product DVD. When you start the `setup.exe` program to start the installer, you must be logged on as a user having administrative privileges on all the nodes where you want to perform the installation. If your user credentials are local to the system and have local administrator rights, then there must be local users with the same credentials having similar local administrator rights and same password on all the target nodes.

Prerequisites for installing VBS on VBS on Microsoft Failover Clustering nodes

You must have one ApplicationHA license for each Microsoft Failover Clustering node on which you plan to install the component.

Installing VBS on Microsoft Failover Clustering nodes

To Install VBS on Microsoft Failover Clustering nodes:

1. Log on as a user that has administrative rights on the Microsoft Failover Clustering nodes where you want to install the VBS package.
2. Run the `setup.exe` program from the DVD to launch the Symantec product installer.
3. From the list of packages, select **Virtual Business Services Third Party Support** and click the **"Install Virtual Business Services"** link below it. Run the installer from the pop-up window.
4. On the installer window, enter the system name or IP address of each node on which you want to install the package. To install on the local system, enter **LOCALHOST** in the text-box and click **Add**.
5. Keep the Licensing option as **Keyless** unless Symantec has issued you a custom key. If you have a custom key, select **User entered license key** and enter the required details in the pop-up window.
6. Click to start the installation.

Upgrading VBS on the Microsoft Failover Clustering nodes

You can use the Symantec product installer to perform a cross-upgrade from SFW 6.1 and also from a standalone installation of Veritas Operations Manager (Host Component). You can also use the SFW 6.1 installer to perform a cross-upgrade on a node which has VBS Third Party Support installed.

The upgrade procedure is same as the installation described under *Installing VBS on Microsoft Failover Clustering nodes*.

See "Installing VBS on Microsoft Failover Clustering nodes" on page 40.

Uninstalling VBS from Microsoft Failover Clustering nodes

To uninstall Virtual Business Services for Third Party Support from Microsoft Failover Clustering nodes:

1. Launch the Programs and Features wizard from the Control Panel.
2. Right-click on **Virtual Business Services Third Party Support** from the listed programs and select **Uninstall**.

   Note: Do not uninstall the VRTSvbs and Veritas Operations Manager (Host Component) individually.

3. The Symantec product installer interface is displayed and you can follow the instructions on the interface to uninstall the package. This does not uninstall the Veritas Operations Manager (Host Component) installed on the node.

Viewing the ApplicationHA deployment report

To view the ApplicationHA deployment reports:

1. On the Veritas Operations Manager home page, select **SFHA Licensing**. All the licensed products installed on your hosts are displayed on the **Deployment Detail**s tab.
2. To see which licenses are installed, select the option **Host** from the **Group By** drop-down list.
3. On the Veritas Operations Manager home page, select **SFHA Licensing**. To view the list of nodes where ApplicationHA licenses are deployed, go to the **Deployments** tab and select **ApplicationHA Deployments report**. This report will include all the nodes where VBS Third Party Support is installed alongside those where Symantec ApplicationHA is installed.

Uninstalling the VRTSvbs package

To uninstall VRTSvbs

1. Ensure that the service groups from the cluster on which you are uninstalling VRTSvbs package are not a part of any virtual business service.

   For example, if you uninstall the VRTSvbs package from cluster C2 and C2:g2 is part of virtual business services *v1* and *v2*, you must remove C2:g2 from *v1* and *v2*.

2. On the node on which you need to uninstall VRTSvbs, take the vbsapp resource offline.

   ```
   # hares -offline vbsapp -sys local_node
   ```

3. Delete the vbsapp resource from the ClusterService group.

   ```
   # hares -delete vbsapp
   ```

4. On each node of the cluster, uninstall the VRTSvbs package.

   On UNIX systems, you can uninstall the VRTSvbs package on a managed host only from the command line interface on the host. On Windows systems, you must uninstall VRTSvbs from the Control Panel.

AIX	`# installp -u VRTSvbs`
Linux	`# rpm -e VRTSvbs`
Solaris	`# pkgrm VRTSvbs`
Solaris 11	`# pkg uninstall VRTSvbs`
Windows	When you uninstall SFHA or VCS, VRTSvbs does not get uninstalled. You must remove the VRTSvbs package by using **Programs and Features** (Windows 2008) or **Add or Remove Programs** (Windows 2003) from the Windows Control Panel.

5. If the ClusterService group is configured as a part of Virtual Business Services configuration and is not currently used by GCO, delete the ClusterService group.

Uninstalling VBS from Microsoft Failover Clusters

This content and topic is a place holder. Content yet to be finalized.

To uninstall VBS from Microsoft Failover clusters:

- From the Add/Remove Programs list, uninstall the **Virtual Business Services Third Party Support**.

  This removes the VRTSvbs and VRTSperl packages and the license keys but retains the VRTSsfmh package.

Caution: Do not uninstall the VRTSvbs package manually.

Chapter 3

Virtual Business Services operations

This chapter includes the following topics:

- Starting and stopping Virtual Business Services
- Viewing the information on a Virtual Business Service
- Viewing Virtual Business Services in the data center
- Viewing the service groups associated with Virtual Business Services
- Viewing the clusters associated with virtual business services
- Viewing the virtual business services status from the command line
- Viewing the information on a virtual business service in the Server perspective
- Viewing the dependency associated with Virtual Business Services in the Server perspective
- Viewing the dependency associated with Virtual Business Services
- Viewing the properties of a virtual business service
- Viewing application recovery point and startup time of a VBS
- Tracking VBS operations
- Logs of a virtual business service
- Fault management for a virtual business service

Starting and stopping Virtual Business Services

After you create a virtual business service and define the dependencies among its components in Veritas Operations Manager, you can start or stop the virtual business service from Veritas Operations Manager or from the command line on a host.

It is not mandatory for Veritas Operations Manager to be online for starting or stopping the virtual business service because all inter-cluster communication is handled by the Virtual Business Services components. Any failure or downtime of Veritas Operations Manager Management Server does not affect the Virtual Business Services start or stop operations and these operations can continue through the command line.

See "Starting a virtual business service from the command line" on page 46.

See "Stopping a virtual business service from the command line" on page 50.

Starting a virtual business service

When the administrator starts a virtual business service, its associated service groups are brought online in a specified order. The order in which the service groups in a virtual business service come online is determined by the start order defined in Veritas Operations Manager. You can define the start order of service groups using the **Configure Dependencies** option. You can specify one or more service groups as the child of another service group. Veritas Operations Manager ensures that all child service groups are brought online before the parent service group. If two service groups are not related by the start order, they may come online at the same time. If a service group is configured on a VMware virtual machine, you can also set auto-start for that virtual machine.

The Start virtual business service operation does a quick pre-validation to verify if all tiers are reachable. This detects any unreachable tiers and prevents the operation from hanging. If the pre-validation check determines that any tier is unreachable, the operation fails and the tier state is correctly marked as UNKNOWN. This is useful in a disaster event in one tier, where you can continue to operate on the remaining tiers with a single click operation. If one or more tiers are not reachable and in UNKNOWN state, you can either stop the virtual business service or continue ignoring the unknown tiers

To perform this task your user group must be assigned:

- Admin or Operator role on the service group or the Availability perspective.
- Admin role on all tiers of the virtual business service in the Server perspective.

The permission on host of the tier may be explicitly assigned or inherited from a parent organization.

To start a virtual business service

1. In the Management Server console, go to the **Availability** or **Server** perspective and expand **Manage** in the left pane.
2. Do one of the following:
   - In the **Availability** perspective, select **Data Center** > **Virtual Business Services** in the navigation tree.
   - In the **Server** perspective, select **Data Center**. Expand **Applications** > **Virtual Business Services** to locate the required virtual business service.
3. Right-click on the required virtual business service and select **Start**.
4. On the **Start Virtual Business Service** wizard panel, click **OK** to confirm.

   See "Start Virtual Business Service panel options" on page 48.

   The progress of this operation can be viewed on the **Dependency Graph**.

See "Stopping a virtual business service " on page 48.

See "Configuring dependencies for a virtual business service " on page 31.

Virtualization workflow for virtual business service start operation

During the virtual business service start operation, Veritas Operations Manager discovers any service group which contains only one system in its system list and it is a VMware virtual machine.

One example is Symantec ApplicationHA (single node cluster) service group where the service group's system list has only one virtual machine.

For the above-mentioned scenario, Veritas Operations Manager selects a virtual machine from the service group's system list, and then starts the virtual machine using the VMware vCenter Server that is specified for that virtual machine. Make sure that vCenter and Veritas Operations Manager is running for the VM to autostart. When this service group is successfully set to online, Veritas Operations Manager starts to online other service groups in the virtual business service.

See "Virtualization workflow for virtual business service stop operation" on page 49.

Starting a virtual business service from the command line

To start a virtual business service, use the following command from a host on any of the clusters that are part of the virtual business service. The command brings the service groups online in the required order.

UNIX systems:

```
# /opt/VRTSvbs/bin/vbssvc -start vbs_name
```

Windows systems:

```
"C:\Program Files\VERITAS\VRTSvbs\bin\vbssvc.exe" -start vbs_name
```

The start operation on a VBS brings online all the children of a service group present in the same VBS before bringing online the service group itself. It does not take into account child service groups that are outside the VBS in question. Any local VCS dependencies of a service group are still honored, whether or not they are a part of the same VBS.

If any tier is in UNKNOWN state, the CLI prompts you to choose whether the start operation must proceed after ignoring the tiers in UNKNOWN state. If you enter **Y**, the tiers in UNKNOWN state are ignored from the VBS. This is useful when you want to start a VBS when some of its tiers are down.

Note that any dependencies associated with the tier in UNKNOWN state are ignored if you choose to continue with the operation ignoring the tiers in UNKNOWN state. The ignored tiers are not considered as members of the VBS for the start operation.

A task ID is displayed when you run the start command. You can optionally associate a user-defined tag name with the operation by specifying it in the `vbssvc -stop` command with the `-tag <tag_name>` option. You can use the tag_name or the task ID to track the progress of the of the operation.

The `vbssvc -start` command supports automatic starting of VMware virtual machines before it brings the service groups on the virtual machines online. However, you must enable the Start VM option on the **Configure Dependencies - Specify VM start/stop** panel in Veritas Operations Manager.

See "Tracking VBS operations" on page 60.

Note: In the case of disaster recovery or planned migration of VBS, you can use the command line to automatically start the VMware machines before the service groups are brought online.

A virtual machine start operation through the `vbssvc -start` command is supported only for ApplicationHA or single node VCS clusters.

To terminate the start operation from the command line (for example, if the command becomes unresponsive), use the `vbssvc -flush` command.

UNIX systems:

```
# /opt/VRTSvbs/bin/vbssvc -flush vbs_name
```

Windows systems:

```
"C:\Program Files\VERITAS\VRTSvbs\bin\vbssvc.exe" -flush vbs_name
```

See “Starting a virtual business service ” on page 45.

See “Starting and stopping Virtual Business Services ” on page 45.

Start Virtual Business Service panel options

Use this wizard panel to start a virtual business service.

Select the checkbox, to ignore the tiers in the UNKNOWN state and proceed with the operation.

See “Starting a virtual business service ” on page 45.

Stopping a virtual business service

When you stop a virtual business service, its associated service groups are taken offline in the specified order. The order in which Veritas Operations Manager takes the service groups offline is the reverse of the start order defined in Veritas Operations Manager for the service groups of the virtual business service.

A parent service group may depend on one or more child service groups. When you stop a virtual business service, the parent service group is taken offline before its child service groups.

The Stop virtual business service operation does a quick pre-validation to verify if all tiers are reachable. This detects the unreachable tiers and prevents the operation from hanging. If the pre-validation check determines that any tier is unreachable, the operation fails and the tier state is correctly marked as UNKNOWN. This is useful in a disaster event in one tier, where you can continue to operate on the remaining tiers with a single click operation.

To perform this task your user group must be assigned:

- Admin or Operator role on the service group or the **Availability** perspective.
- Admin role on all tiers of the virtual business service in the **Server** perspective.

The permission on host of the tier may be explicitly assigned or inherited from a parent organization.

To stop a virtual business service

1. In the Management Server console, go to the **Availability** or **Server** perspective and expand **Manage** in the left pane.
2. Do one of the following:
   - In the **Availability** perspective, select **Data Center** > **Virtual Business Services** in the **Availability** perspective.

- In the **Server** perspective, select **Data Center**. Expand **Applications** > **Virtual Business Services** to locate the required virtual business service.

3 Right-click on the required virtual business service and select **Stop**.

4 On the **Stop Virtual Business Service** wizard panel, click **OK** to confirm.

See "Stop Virtual Business Service panel options" on page 49.

Note: The stop operation does not take the service groups offline, which are shared with other virtual business services and children of such service groups. If you want to override this behavior, and take offline all service groups in the selected virtual business service, select the **Offline shared service groups** option in the **Stop Virtual Business Service** wizard panel.

See "Starting a virtual business service " on page 45.

See "Configuring dependencies for a virtual business service " on page 31.

Virtualization workflow for virtual business service stop operation

During the virtual business service stop operation, when Veritas Operations Manager discovers any service group that is online on a virtual machine, Veritas Operations Manager will offline that service group, and thereafter, if there are no other service groups configured on the VMware virtual machine, Veritas Operations Manager will offline the virtual machine itself.

Note that the virtual machine stop operation is ignored if other service groups are running on that virtual machine. To enable this virtual machine auto-stop feature, make sure that you have already selected the virtual machine stop option in VBS Dependency Configuration Wizard panel. Veritas Operations Manager stops the virtual machine using the specified Virtual Center (vCenter Server). Make sure that VCenter and Veritas Operations Manager is running for the virtual machine to autostop. The option is supported only for the VMware virtual machines.

See "Virtualization workflow for virtual business service start operation " on page 46.

Stop Virtual Business Service panel options

Use this wizard panel to stop a virtual business service.

Select the **Continue ignoring the unknown tiers** checkbox, to ignore the tiers in the UNKNOWN state and proceed with the operation.

If the service groups are shared among other virtual business services, select the **Offline shared service groups** to take the shared service groups offline.

See "Stopping a virtual business service " on page 48.

Stopping a virtual business service from the command line

To stop a virtual business service, use the following command from a node on any of the clusters that are part of the virtual business service. The command takes the service groups offline in the required order.

UNIX systems:

```
# /opt/VRTSvbs/bin/vbssvc -stop myVBS
```

Windows systems:

```
"C:\Program Files\VERITAS\VRTSvbs\bin\vbssvc.exe" -stop myVBS
```

The `vbssvc -stop` command does not take shared service groups or their children offline. If you want to override this behavior and take offline all service groups in the virtual business service including shared service groups, use the `-force` switch as follows:

UNIX systems:

```
# /opt/VRTSvbs/bin/vbssvc -stop -force vbs_name
```

Windows systems:

```
"C:\Program Files\VERITAS\VRTSvbs\bin\vbssvc.exe" -stop -force vbs_name
```

If any tier is in the UNKNOWN state, the CLI prompts whether you want to stop the operation or proceed ignoring the tiers in the UNKNOWN state.

If you enter **Y**, any tiers in UNKNOWN state get ignored from the VBS. This is useful when you want to stop a VBS when some of the tiers are down.

Note that any dependencies associated with the tier in UNKNOWN state are ignored if you choose to continue with the operation ignoring the tiers in UNKNOWN state. The ignored tiers are not considered as members of the VBS for that stop operation.

A task ID is displayed when you run the stop command. You can optionally associate a user-defined tag name with the operation by specifying it in the `vbssvc -stop` command with the `-tag <tag_name>` option. You can use the *tag_name* or the task ID to track the progress of the of the operation.

The `vbssvc -stop` command automatically stops VMware virtual machines that host online service groups after taking the service groups offline. However, you must enable the Stop VM option on the Virtualization configuration options panel in Veritas Operations Manager.

See "Tracking VBS operations" on page 60.

Note: In the case of disaster recovery or planned migration of VBS, you can use the command line to automatically stop the VMware machines after the service groups are taken offline

---

Note: Consider a virtual machine running a service group that is part of a VBS and other service groups that are not part of the VBS. When you run the stop command, VBS does not stop the virtual machine as there are other service groups running on the virtual machine. However, VBS does not consider VCS internal service groups such as ClusterService, VBSHAService, VCSAppMonHBSG, and VCSInfraSG that may not be part of the VBS while stopping the virtual machine.

Also, if a service group that is part of a virtual machine is already offline, the stop command does not stop the Virtual Machine.

A virtual machine stop operation through the stop command is supported only for Symantec ApplicationHA or single node VCS clusters.

To terminate the stop operation from the command line (for example, if the command becomes unresponsive), use the `vbssvc -flush` command.

UNIX systems:

```
# /opt/VRTSvbs/bin/vbssvc -flush vbs_name
```

Windows systems:

```
"C:\Program Files\VERITAS\VRTSvbs\bin\vbssvc.exe" -flush vbs_name
```

Note: From the command line, you can stop a virtual business service whose service groups are faulted. However, stopping a virtual business service whose service groups are faulted is not possible from Veritas Operations Manager. However, if Veritas Operations Manager is not reachable, the automatic start of virtual machines will not work through the command line.

See "Stopping a virtual business service " on page 48.

See "Starting and stopping Virtual Business Services " on page 45.

About propagation behavior for start and stop operations

- The Virtual Business Services start operation does not propagate the online operation on constituent service groups to the child service groups that are in

the local cluster but outside the virtual business service. If the child service groups are not online when you start the virtual business service, the parent service group inside the virtual business service is not brought online.

- The Virtual Business Services stop operation does not propagate the offline operation on constituent service groups to their parent service groups (with FIRM or HARD VCS-level dependencies) that are in the local cluster but outside the virtual business service. If the parent service groups are not offline when you stop the virtual business service, the child service group inside the virtual business service is not taken offline.

Viewing the information on a Virtual Business Service

You can use the Management Server console to view the **Service Group State** and the **Faults and Risks** of all the Virtual Business Services selected.

You can view this information related to the service groups for which your user group has at least guest role explicitly assigned or inherited from a parent Organization or cluster. You can also view information if your user group has at least guest role assigned on the Availability perspective.

To view the overview of a Virtual Business Service

1. In the Management Server console, go to the **Availability** perspective and expand **Manage** in the left pane.
2. Under **Data Center**, expand **Virtual Business Services** and select the required Virtual Business Service.
3. Click on the **Overview** tab to view the service group state and state of the selected Virtual Business Service.

See "Creating virtual business services" on page 26.

Viewing Virtual Business Services in the data center

In the Management Server console, you can view all the Virtual Business Services currently present in the data center.

You can view the following details of the Virtual Business Services in the table:

- **Name**: Name of the Virtual Business Service.
- **Description**: Information that you had entered when you created the Virtual Business Service.
- **Availability status**: Displays the availability of the Virtual Business Service based upon the state of service groups in a Virtual Business Service.

VBS Availability Status	Service Group State
Offline	All service groups are in Offline state.
Online	All service groups are in Online state.
Partial	At least one of the service groups is in Offline or Partial state and other service groups are in Online or Partial state.
Offline (Attention)	All service groups are in Offline state and at least one of the service groups is in Faulted state on some system(s).
Online (Attention)	All service groups are in Online state and at least one of the service groups is in Faulted state on some system(s).
Partial (Attention)	At least one of the service groups is Faulted on some system(s) and all the service groups form a Partial state(see Partial).

- **Health**: For Virtual Business Service, the state of the base objects and their dependencies is displayed. This state is based on the faults and the risks on the base objects and their associated objects. If these objects have faults, the state of the Virtual Business Service is displayed as **Faulted**. If the base objects and their associated objects are at risks, the state of the Virtual Business Service is displayed as **At Risk**.
- **Updated By**: Indicates the name of the owner who last updated the Virtual Business Service configuration.
- **Last Updated**: Date when the owner of the Virtual Business Service made a configuration change to the VBS.
- **Fault Count**: Indicates the fault count for the Virtual Business Service.
- **Risk count**: Indicates the risk count for the Virtual Business Service.

In this view, you can perform the following operations on a Virtual Business Service:

- Start a Virtual Business Service
- Stop a Virtual Business Service
- Configure dependencies of a Virtual Business Service.
- Edit a Virtual Business Service.
- Delete a Virtual Business Service.
- View the logs of a Virtual Business Service
- Vies properties of the Virtual Business Service

You can view this information related to the service groups for which your user group has at least guest role explicitly assigned or inherited from a parent Organization or cluster. You can also view information if your user group has at least guest role assigned on the Availability perspective.

Viewing the service groups associated with Virtual Business Services

You can use the Management Server console to view the service groups associated with the Virtual Business Service.

Some of the information that you can obtain from this view is:

- **Name**: Name of the service group.
- **State**: State of the service group.
- **Type**: Type of the service group.
- **Scope**: Scope of the service group.
- **Frozen**: Indicates whether the service group is in Frozen state.
- **Cluster**: Name of the cluster.

You can view this information related to the service groups for which your user group has at least guest role explicitly assigned or inherited from a parent Organization or cluster. You can also view information if your user group has at least guest role assigned on the Availability perspective.

To view the service groups associated with a Virtual Business Service

1. In the Management Server console, go to the **Availability** perspective and expand **Manage** in the left pane.
2. Select **Data Center** > **Virtual Business Services** in the navigation tree .
3. Expand **Virtual Business Services** and select the required Virtual Business Service.
4. Click on the **Service Groups** tab to view the details of the service groups associated with the Virtual Business Service.

See “Creating virtual business services” on page 26.

Viewing the clusters associated with virtual business services

In the Management Server console, you can view the clusters that are associated with a virtual business service.

Some of the information that you can obtain from this view is:

- **Name**: Name of the cluster.
- **State**: State of the cluster.
- **Type**: Type of the cluster.
- **HA Provider**: The HA provider of the cluster. For example: VCS.
- **# Nodes**: The number of nodes associated with the cluster.
- **# Service Groups**: The number of service groups associated with the cluster.
- **Version**: The version of the cluster.
- **Platform**: The platform of the cluster.

You can view this information related to the service groups for which your user group has at least guest role explicitly assigned or inherited from a parent Organization or cluster. You can also view information if your user group has at least guest role assigned on the Availability perspective.

To view the clusters associated with a virtual business service

1. In the Management Server console, go to the **Availability** perspective and expand **Manage** in the left pane.
2. Select **Data Center** > **Virtual Business Services** in the navigation tree .
3. Expand **Virtual Business Services** and select the required virtual business service.
4. Select the **Clusters** tab to view the details of the clusters associated with the virtual business service.

See "Creating virtual business services" on page 26.

Viewing the virtual business services status from the command line

Use the `vbssvc -state` command to list the availability status of all virtual business services visible to the local cluster. You can run the command from any system in any cluster that is part of a virtual business service. You can list the availability

status of a specific virtual business service by running the `vbssvc -state vbs_name` command.

UNIX systems:

```
# /opt/VRTSvbs/bin/vbssvc -state vbs_name
```

Windows systems:

```
"C:\Program Files\VERITAS\VRTSvbs\bin\vbssvc.exe" -state vbs_name
```

Viewing the information on a virtual business service in the Server perspective

You can use the Management Server console to view the following data of a virtual business service in the Server perspective. Click on each table to view its details.

- Service Availability
- Data Availability
- SAN Connectivity
- Service Readiness
- Enclosure Storage Distribution
- Storage Usage
- Activity Log

You can view this information related to the service groups for which your user group has at least guest role explicitly assigned or inherited from a parent Organization or host participating in the VBS. You can also view information if your user group has at least guest role assigned on the Server perspective.

To view the information of a virtual business service in the Server perspective

1. In the Management Server console, go to the **Server** perspective and expand **Manage** in the left pane.
2. Under **Data Center**, expand **Applications** > **Virtual Business Services** and select the required virtual business service.
3. Click on the **Overview** tab to view the overview of the selected virtual business service.

See "Creating virtual business services" on page 26.

Viewing the dependency associated with Virtual Business Services in the Server perspective

In the Management Server console, you can view the dependency associated with a virtual business service in the Server perspective.

You can view this information related to the service groups for which your user group has at least guest role explicitly assigned or inherited from a parent Organization or cluster. You can also view information if your user group has at least guest role assigned on the Server perspective.

To view the overview of a virtual business service in the Server perspective

1. In the Management Server console, go to the **Server** perspective and expand **Manage** in the left pane.
2. Under **Data Center**, expand **Applications** > **Virtual Business Services** and select the required virtual business service.
3. Click on the **Dependency** tab to view the dependency details of the selected virtual business service.

See "Creating virtual business services" on page 26.

Viewing the dependency associated with Virtual Business Services

In the Management Server console, you can view the dependency associated with a virtual business service.

You can view this information related to the service groups for which your user group has at least guest role explicitly assigned or inherited from a parent Organization or a Host participating in VBS. You can also view information if your user group has at least guest role assigned on the Availability perspective.

To view the dependency associated with a virtual business service

1. In the Management Server console, go to the **Availability** perspective and expand **Manage** in the left pane.
2. Select **Data Center** > **Virtual Business Services** in the navigation tree .
3. Expand **Virtual Business Services** and select the required virtual business service.
4. Select **Dependency** to view the details.

See "Creating virtual business services" on page 26.

Viewing the properties of a virtual business service

You can use the Management Server console to view the properties of a virtual business service. Select the required virtual business service, right-click, and select **Properties**. Click on the **General** tab to view the general properties of the virtual business service. Click on the **Service Group properties** tab, to view the properties of each service group listed.

Under the **General** tab, you can view the following properties:

Fault management	Indicates the fault management status (enabled or disabled) of the virtual business service.
Fault management configuration status	Indicates the fault management status of the host. The status can be one of the following: ■ Enabled: Fault management is enabled for virtual business services on the specified host. This implies that the credentials for fault management configuration are deployed and the vbsapp resource is present on the specified host and VRTSvbs package is installed. ■ Not Enabled: Fault management is not enabled for virtual business services on the specified host. This means that the credentials for fault management configuration are not deployed. ■ Enabled by another VOM: Virtual business services configured on this host are managed by another management server. ■ Partially Enabled: Fault management configuration has not been completed for the virtual business service on the specified host. This implies that credentials for fault management configuration are deployed, but the vbsapp resource is not present on the specified host.
System	The system name.
Cluster	The name of the cluster participating in the VBS.

Status	Displays the fault management status of the virtual business service.
VBS Package version	Displays the VRTSvbs package version in use.

Under the **Service Groups properties** tab, you can view the following properties:

Service Group	The name of the configured service group.
Cluster	The name of the cluster the service group belongs to..
Start VM	Indicates if the virtual machine will be switched on and the service group on that virtual machine is brought online.
Stop VM	Indicates if the virtual machine will be powered off as part of the VBS stop operation..
Script Path	The path of the custom script that is configured to run on this tier.
User Name	The user in whose context the script will be executed.

Viewing application recovery point and startup time of a VBS

Prerequisites:

To measure the application recovery point (AppRecoveryPoint) or startup time, VBS must contain a global service group with replication agent configured to compute the recovery point.

To view the current application recovery point and startup time of the VBS, run:

```
# vbssvc -showsla <vbs_name>
```

The command output resembles the following:

```
Name             StartUpTime      AppRecoveryPoint ReplicationLagInfo
```

```
Primary1:RepSg1  15              00:15:00        Currently we
                                                 compute
                                                 Replication Lag
                                                 only if all the
                                                 devices are in
                                                 COPY or PAIR
                                                 state.

Primary2:RepSg2  25              00:30:00        R2 is behind R1
                                                 by 30:42:20
                                                 [hh:mm:ss] time
                                                 as reported by
                                                 Symmetrix.

VCS NOTICE V-16-25-30308 Effective Recovery Point
for the virtual business service PrimVBS = 00:30:00
VCS NOTICE V-16-25-30309 Effective Service StartUpTime
for the virtual business service PrimVBS = 40 secs
```

See “Application recovery point and startup time in VBS” on page 86.

Tracking VBS operations

Each VBS start or stop operation is represented as a task consisting of one or more sub-tasks. A sub-task represents an action performed on an individual tier. You can track the progress of the tasks using vbstask CLI. You can view up to last five tasks executed on each VBS.

- Tracking information about each task performed on VBS includes attributes such as:
  - Unique task ID of the opration.
  - State of task
  - Start and stop time of the task
  - Total number of subtasks
  - Number of subtasks completed
  - The VBS on which the task was executed
- Tracking information about each subtask performed as a part of a VBS task includes attributes such as:
  - Tier-level command
  - Output of the command (if any)

  - Error messages from the command (if any)
  - Exit code of the command
  - State of the subtask
- Tracking step-by-step progress of VBS task: This sequentially displays the details of tier-level actions executed as a part of the VBS task..

Tracking information about tasks performed on a VBS

You can use any of the following commands to track operations performed on a VBS:

- To view information about tasks performed on all virtual business services in the cluster:
  UNIX systems:

  ```
  # /opt/VRTSvbs/bin/vbstask -display
  ```

  Windows systems:

  ```
  "C:\Program Files\VERITAS\VRTSvbs\bin\vbstask" -display
  ```

- To view information about individual tasks using task IDs:
  UNIX systems:

  ```
  # /opt/VRTSvbs/bin/vbstask -display <task ID>
  ```

  For example:

  ```
  # /opt/VRTSvbs/bin/vbstask -display
  {41920582-1dd2-11b2-8d2b-b518e666c59d}
  ```

  where *{41920582-1dd2-11b2-8d2b-b518e666c59d}* is the task ID.
  Windows systems:

  ```
  "C:\Program Files\VERITAS\VRTSvbs\bin\vbstask" -display <task ID>
  ```

- To view information about tasks performed on specific virtual business service using VBS names:
  UNIX systems:

  ```
  # /opt/VRTSvbs/bin/vbstask -display -vbs <vbs1> <vbs2>
  ```

  Windows systems:

```
"C:\Program Files\VERITAS\VRTSvbs\bin\vbstask" -display
-vbs <vbs1> <vbs2>
```

- To view information about the tasks using tag name:
  UNIX systems:

  ```
  # /opt/VRTSvbs/bin/vbstask -display -tag <tag_name>
  ```

  For example:

  ```
  # /opt/VRTSvbs/bin/vbstask -display -tag mytag
  ```

  where *mytag* is the tag name that you specify, which is associated with the task while initiating the operation.
  Windows systems:

  ```
  "C:\Program Files\VERITAS\VRTSvbs\bin\vbstask" -display -tag mytag
  ```

Task states

The task states table explains the possible values of the task state.

Table 3-1 Task states

Value	Description
PRECHECKS IN PROGRESS	Prechecks are in progress and no failure is reported so far. Once the prechecks are successful, the task state changes to IN PROGRESS.
IN PROGRESS	Task execution is in progress and no failure is reported so far.
COMPLETE	All the subtasks have completed successfully. **Note:** The final state of the VBS may not be the intended state due to actions outside VBS control.
ABORTED	Indicates that the operation was flushed and the task execution has halted at this point.
FAILED	One or more sub-tasks could not be completed successfully. The task execution has halted at this point.

Tracking information about tier-level sub-tasks performed as a part of a VBS task

You can view information about tier-level actions or sub-tasks using the following commands:

UNIX systems:

```
# /opt/VRTSvbs/bin/vbstask -subtasks <task ID>
```

For example:

```
# opt/VRTSvbs/bin/vbstask -subtasks {41920582-1dd2-11b2-8d2b-b518e666c59d}
```

Windows systems:

```
C:\Program Files\VERITAS\VRTSvbs\bin\vbstask.exe -subtasks <task ID>
```

Tracking step-by-step progress of a VBS task

- You can view the step-wise progress of an operation with the following command:
  UNIX systems:

  ```
  # /opt/VRTSvbs/bin/vbstask -progress <taskId>
  ```

  For example:

  ```
  # /opt/VRTSvbs/bin/vbstask -progress {41920582-1dd2-11b2-8d2b-b518e666c59d
  ```

  displays step-wise progress of task {41920582-1dd2-11b2-8d2b-b518e666c59d}
  Windows systems:

  ```
  "C:\Program Files\VERITAS\VRTSvbs\bin\vbstask" -progress <taskId>
  ```

- To view information about the step-wise progress of an operation with using tag name:
  UNIX systems:

  # **/opt/VRTSvbs/bin/vbstask -progress -tag *<tag_name>***

  For Example:

  # **/opt/VRTSvbs/bin/vbstask -progress -tag *mytag***

  where *mytag* is the tag name associated with the task you specified while initiating the operation.
  Windows systems:

```
"C:\Program Files\VERITAS\VRTSvbs\bin\vbstask" -progress -tag mytag
```

Logs of a virtual business service

The Virtual Business Services log provides information on the operations that are performed on a virtual business service, and also the errors that may have occurred while the operations are performed. All users can view the log.

To download the log as a text file, click **Download**.

You can view the log information related to the service groups for which your user group has at least guest role explicitly assigned or inherited from a parent Organization or cluster. You can also view information if your user group has at least guest role assigned on the Availability perspective.

You can view the log information in the Server perspective, if your user group has at least guest role assigned on the perspective.

To view the logs for a virtual business service

1. In the Management Server console, go to the **Availability** or **Server** perspective and expand **Manage** in the left pane.
2. Do one of the following:
   - Select **Data Center** > **Virtual Business Services** in the navigation tree.
   - Select **Data Center**. Expand **Applications** > **Virtual Business Services** to locate the required virtual business service.
3. Right-click on the required virtual business service and select **Logs**.

   In the **Logs** wizard panel, view the details of the virtual business service selected.

   You can download the VBS logs by clicking **Download** on the log popup.

   See "Logs of a Virtual Business Service panel options" on page 64.

See "Creating virtual business services" on page 26.

Logs of a Virtual Business Service panel options

In a virtual business service log, you can view the following details for each operation or error that occurs on the selected virtual business service:

Table 3-2 Virtual Business Services Logs

Name	Description
Time	Displays the time when the operation was performed, or when the error occurred.
Severity	Displays the severity of the error as: ■ Critical ■ Error ■ Warning Notice ■ INFO
UMI	Displays the UMI or the message code.
Message	Displays the error message.

See "Logs of a virtual business service " on page 64.

Fault management for a virtual business service

The fault management feature provides fault handling capability in a multi-tier application environment. In a virtual business service, one of the three types of dependencies can exist among the parent and its child service groups. The dependencies are soft, firm, and restart. They determine a tier's configurable reaction to a lower tier event, and control fault propagation.

For example, the virtual business service notifies the middle tier about the fault and recovery that has occurred at the database tier. The reaction of the middle tier to the events at the lower tier can be configured. The middle tier can choose to restart to update its state to reflect the failover at the database tier, or it can choose to ignore the event.

Starting with Veritas Operations Manager 6.0, fault management is enabled by default for all configured virtual business services. If you are upgrading VCS or performing other maintenance activities on individual tiers that involve stopping the VCS high availability daemon, you must disable the fault management for the VBS involving this tier in order to prevent triggering any fault or recovery policy actions.

Note: VBS daemon must be running on all tiers while a VBS fault propagation or operation is in progress. If VBS daemon faults or fails over during the fault propagation or the operation, the same may not complete.

Disabling fault management for a virtual business service

When you disable fault management for a virtual business service, you will no longer be able to use firm and restart type of dependencies. You will also not be able to operate the virtual business service.

Run the following command on the central server to disable fault management for a particular virtual business service:

```
# /opt/VRTSsfmh/bin/vbsadm -disable <VBS_NAME>
```

Re-enabling the fault management for a virtual business service

Run the following command on the Veritas Operations Manager Management Server to enable fault management for a virtual business service

```
# /opt/VRTSsfmh/bin/vbsadm -enable <VBS_NAME>
```

See “Fault management for a virtual business service” on page 65.

Chapter 4

Virtual Business Services security

This chapter includes the following topics:

- About the Virtual Business Services security model

About the Virtual Business Services security model

This topic describes the Virtual Business Services' security model as applied to the managed hosts.

For information about the security model for Veritas Operations Manager, see the *Veritas Operations Manager Management Server User Guide*.

Only root users of UNIX systems and users with administrative privileges on Windows systems can perform virtual business service operations from the managed hosts using the VBS CLI. Other users cannot perform any virtual business service operations. However, Virtual Business Services provide a security mechanism to prevent hosts that are outside the virtual business service boundary from performing valid operations or from breaching security.

The security mechanism is based on using an embedded Web server inside the VBS daemon. The embedded web server makes use of VxAT. The communication among different VBS daemons happen over a secure channel based on the https protocol.

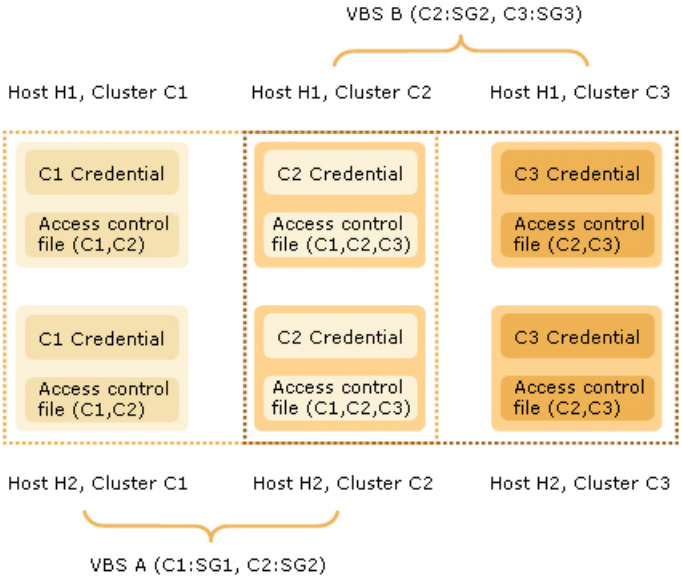
Note: VBS daemon communicates through port 2410. Ensure that firewall filters do not block this port on all hosts participating in the virtual business service.

Virtual Business Services security model example

Consider two virtual business services:

- *VBS A* that consists of cluster C1 and cluster C2
- *VBS B* that consists of cluster C2 and cluster C3

Figure 4-1 Virtual Business Services security model



Assume the following service groups for each cluster:

- Service group SG1 for cluster C1
- Service group SG2 for cluster C2
- Service group SG3 for cluster C3

When you create a virtual business service from the Veritas Operations Manager interface, Veritas Operations Manager deploys a per-cluster credential (digital certificate) to each cluster. All hosts on the cluster get a credential that identifies them as belonging to that cluster. The cluster credential contains the cluster ID. Likewise, hosts on another cluster also get credentials that identify them as belonging to their respective cluster.

Additionally, the credential also has information about the Management Server that sent the credential. This information is required when one host is managed by multiple Management Servers.

Security mechanism for cluster C1

When the VBS daemon on C1 is started, it reads the contents of the configuration file on the host to determine the clusters that are allowed to communicate with C1. In this case, *VBS A* consists of C1 and C2. The VBS daemon determines that C2 can communicate with C1. Hence, it adds the cluster IDs of C1 and C2 to the access control file, `$VBS_HOME/web/admin/.xprtlaccess`.

```
# cat /opt/VRTSvbs/web/admin/.xprtlaccess

<ClusterId of C1>@vbs_domain@<Name of VOM CMS>.vx:user

<ClusterId of C2>@vbs_domain@<Name of VOM CMS>.vx:user
```

If cluster C3 tries to communicate with C1, the VBS daemon on C1 looks up the access control file and disallows C3 from communicating with C1. Also, no external hosts or clusters can pretend to be one of C1 or C2 because they do not have the credential.

Assume that there is a reconfiguration of *VBS A* such that a service group which belongs to an outside cluster is now part of *VBS A*. The new configuration is deployed to cluster C1 and the VBS daemon updates the access control file to include the cluster ID of the outside cluster.

Security mechanism for cluster C2

When the VBS daemon on C2 is started, it reads the contents of the configuration file on the host to determine the clusters that are allowed to communicate with C2. As *VBS B* consists of C2 and C3, the VBS daemon determines that C3 can communicate with C2. However, C2 is part of both *VBS A* and *VBS B*. So, it can also communicate with C1, which is part of *VBS A*.

Hence, the VBS daemon adds the Cluster IDs of C1, C2, and C3 to the access control file, `$VBS_HOME/web/admin/.xprtlaccess`.

```
# cat /opt/VRTSvbs/web/admin/.xprtlaccess

<ClusterId of C1>@vbs_domain@<Name of VOM CMS>.vx:user

<ClusterId of C2>@vbs_domain@<Name of VOM CMS>.vx:user

<ClusterId of C3>@vbs_domain@<Name of VOM CMS>.vx:user
```

No external hosts or clusters can pretend to be one of C1, C2, or C3 because they do not have the credential.

Security mechanism for cluster C3

When the VBS daemon on C3 is started, it reads the contents of the configuration file to determine the clusters that are allowed to communicate with C3. As *VBS B* consists of C2 and C3, the VBS daemon determines that C2 can communicate with C3.

Hence, the VBS daemon adds the Cluster IDs of C2 and C3 to the access control file, `$VBS_HOME/web/admin/.xprtlaccess`.

```
# cat /opt/VRTSvbs/web/admin/.xprtlaccess

<ClusterId of C2>@vbs_domain@<Name of VOM CMS>.vx:user

<ClusterId of C3>@vbs_domain@<Name of VOM CMS>.vx:user
```

No external hosts or clusters can pretend to be one of C2 or C3 because they do not have the credential.

Authentication for start and stop operations

Start or stop operations on a virtual business service can be initiated from Veritas Operations Manager only if you have at least privileges on all the tiers (service groups).

Start or stop operations on a virtual business service on the managed host using VBS CLI can be initiated only by clusters that are part of the virtual business service. When a start operation or stop operation of a virtual business service is initiated, VBS daemon ensures that the start or stop request comes from a cluster that is part of the virtual business service.

Chapter 5

Fault management in Virtual Business Services

This chapter includes the following topics:

- Fault management overview

Fault management overview

A virtual business service allows high availability decisions to be localized at the cluster level, while it propagates the events up the dependency chain. It is not mandatory for Veritas Operations Manager to be online for the fault to be propagated and the configured behavior to be executed. The high availability of a virtual business service is guaranteed even if Veritas Operations Manager Management Server is temporarily down.

See "Sample virtual business service configuration" on page 14.

The following events can occur in response to a failure of the database application.

- Each tier has its own high availability mechanism, such as Symantec Cluster Server or ApplicationHA.
- Inter-cluster fault propagation allows for the high availability events to be propagated up. For example, the virtual business service notifies the middle tier about the fault and any subsequent recovery that occurs in the database tier.
- You can configure how a tier must respond to the fault in the lower tier. Depending on the business need, the upper tier might be configured to stop, restart, or stay online. The event might be propagated upwards based on the fault policy configured.

Table 5-1 lists how a parent behaves in response to a fault or recovery on its child for various dependency types.

Table 5-1 Virtual Business Services fault policy behavior

Fault dependency type	Behavior
SOFT	When the child faults or recovers from the fault, the parent ignores the events. The parent does not take any action. This type of dependency is used when only start or stop ordering is required and no fault policy action is needed.
FIRM	When the child faults, the parent is taken OFFLINE. When the child recovers, the parent is brought ONLINE.
RESTART	When the child faults, the parent takes no immediate action. When the child recovers, the parent is taken OFFLINE and then brought ONLINE.

Table 5-2 list how a parent propagates a fault to its parents in response to a fault or recovery on its child for different dependency types.

Table 5-2 Virtual Business Services fault propagation behavior

Fault dependency type	Fault propagation
SOFT	When a parent gets notification about a child fault or a child recovery, the parent does not propagate this notification to its parents.
FIRM	When a parent goes offline as a result of a child fault, the parent propagates the fault to its parents. When a parent comes online as a result of a child recovery, the parent propagates the recovery to its parents.
RESTART	When a child faults, the parent does not immediately propagate the fault to its parents. When the parent is brought offline as a result of child recovery, the deferred fault is propagated to its parents. When the parent is subsequently brought online as a result of child recovery, the recovery is propagated to its parents.

See "Fault management for a virtual business service" on page 65.

VCS dependencies in Virtual Business Services

If two service groups in a virtual business service have a VCS-level dependency set between them, this dependency is represented as VCS type dependency in the

virtual business service. VCS-level dependencies between two participating service groups are visible in a virtual business service, but there is no action taken on the dependency by the VBS daemon. The dependency is used by the VBS daemon only to determining the start or stop order. Therefore, the behavior for this dependency is identical to that of the SOFT dependency type.

Note that the custom script execution feature is not supported for VCS-level dependency child tiers.

VBS configuration does not allow you to change VCS-level dependencies from Veritas Operations Manager. When VCS-level dependencies exist, they are given higher precedence than VBS-type dependencies.

Parallel and failover service groups

- The VBS daemon considers a failover service group as FAULTED when the online instance of the service group is faulted.
- The VBS daemon considers a parallel service group as FAULTED only when the last online instance of the service group is faulted.

Note: For fault management purposes, hybrid service groups behave like parallel service groups.

Shared service groups

A shared service group is one that is part of multiple virtual business services. Virtual Business Services fault management does not distinguish between shared and non-shared service groups because fault and recovery in service groups are asynchronous events that are not tied to any virtual business service. Any fault or recovery is propagated to the parent and acted upon based on the dependency type.

Types of faults handled

Virtual Business Services fault management handles application failures as well as node failures. When a node crashes, VCS detects the failure, which is propagated to the virtual business service. Fault management treats all service groups that were running on the node as FAULTED. VCS detects faults provided at lease one node is left running in the cluster.

Intentional shutdown of a node or VCS daemon (HAD) is not treated as a node fault. Virtual Business Services fault management takes no action in this case.

When a cluster node goes into EXITED state, Virtual Business Services fault management treats the outage as planned downtime and takes no action.

Fault management considerations in ApplicationHA environments

A fault in an application running on an ApplicationHA node may not be detected depending on the VM.GracefulRebootPolicy attribute of the virtual machine.

If VM.GracefulRebootPolicy is enabled and App.RestartAttempts is set to 0, the VBS daemon does not get sufficient time to notify the update to other VBS daemons. If VM.GracefulRebootPolicy is disabled or if the ApplicationHA node is the top tier, fault propagation works correctly. Ensure that VM.GracefulRebootPolicy is disabled if the ApplicationHA tier has parent service groups in a virtual business service.

For information about ApplicationHA-initiated virtual machine restarts, see the *Symantec ApplicationHA User's Guide*.

Fault propagation for virtual machines

Fault propagation behavior impacts only service groups that are running inside virtual machines and not the virtual machines. The virtual machines do not start or stop as a part of fault policy.

Custom script execution

VBS can execute scripts on parent tiers that have one or more child tiers with soft dependency configured. The custom script is associated with a parent tier and not specific to a given VBS. It is executed whenever any Soft dependency child tier recovers from a fault. The script runs in the background on all nodes where the parent service group is online or partial. There is no time-out on the script execution and the VBS daemon does not wait for the script execution to complete. The exit code is captured in VBS daemon log on the tier where the script is executed. It is the script writer's responsibility to log the information and exit code as required.

You can configure the custom script from the Veritas Operations Manager management console. The script can optionally take arguments. The script must already exist on the nodes before you configure this feature and its path must be same across all the nodes on the tier. On UNIX, you can run the script optionally in the context of a user present on the system. By default, it runs with root privileges. On Windows, the script always runs as SYSTEM user.

The following environment variables are made available to the script:

- *VBS_SCRIPT_PARENT_TIER*: This is the fully qualified parent tier name which is represented as *Cluster name:group name*.
  For example: "DB_cluster1:OracleSG"

- *VBS_SCRIPT_CHILD_TIER*: This is the fully qualified name of the child tier which has recovered from a fault.
  For example: "App_cluster1:CustomAppSG"

Limitations of custom script execution for soft dependencies

Custom script execution for soft dependencies has the following limitations:

1. Script execution is not supported for non-default VRTSvbs package path. This feature assumes that VRTSvbs package is installed in `%ProgramFiles%\Veritas\VRTSvbs`.
2. Double quotes are not supported in the custom script pathname or arguments to the custom script. Use single quotes instead for the same.
3. For Windows tiers, short filenames must be enabled on the cluster nodes and script execution is not supported in parent tiers managed by Microsoft Failover Clustering.
4. On UNIX, spaces are not supported in the path name. The workaround is to create a soft link to the absolute path and specify the soft link in the script name.

Configuring custom script execution for soft dependencies

To configure script execution:

1 Configure VCS HacliUserLevel attribute on the parent tier as this is a prerequisite.

  Custom script execution feature requires the VCS cluster-level attribute HacliUserLevel to be set to COMMANDROOT. This is required even if the tier is a single-node cluster or an ApplicationHA node. Perform the following steps to set HacliUserLevel attribute on the parent tier:

  - Make the VCS configuration writeable if not already writeable.

    ```
    # haconf -makerw
    ```

  - Set the HacliUserLevel attribute value

    ```
    # haclus -modify HacliUserLevel COMMANDROOT
    ```

  - Make the VCS configuration read-only again.

```
# haconf -dump -makero
```

2 Copy the custom script to all nodes of the parent tier.

3 Configure script execution for parent tier:

- In the Management Server console, go to the **Availability** perspective and expand **Manage** in the left pane.
- Select **Data Center** in the navigation tree.
  Select the **Virtual Business Services** node.
- In the virtual business services list, right-click on the required virtual business service and select **Configure dependencies**. Click **Next**.
- In the **Specify Script Execution details** wizard panel, specify the Custom Script name (with absolute path) and any arguments.
  On Windows tiers, you may need to specify the interpreter name followed by the script name.
  For UNIX or Linux tiers, you can specify a system user in whose context the script must be executed on the parent tier.
  See "Configuring dependencies for a virtual business service " on page 31.

Chapter 6

Disaster recovery in Virtual Business Services

This chapter includes the following topics:

- About disaster recovery for Virtual Business Services
- Prerequisites
- Sample disaster recovery configuration
- Disaster recovery alerts
- Disaster recovery limitations
- About the disaster recovery plan
- Bringing up Virtual Business Services at the DR site
- Performing planned migration of virtual business services
- Concurrency violation
- Reconfiguring an ApplicationHA node

About disaster recovery for Virtual Business Services

Disaster recovery (DR) ensures automated recovery of applications by migrating or failing over applications to a remote cluster that is located at any distance from the original cluster.

Virtual Business Services extend the existing DR functionality of Symantec Cluster Server, enabling you to migrate or fail over multi-tier applications running on multiple clusters between two sites.

Prerequisites

The following prerequisites apply:

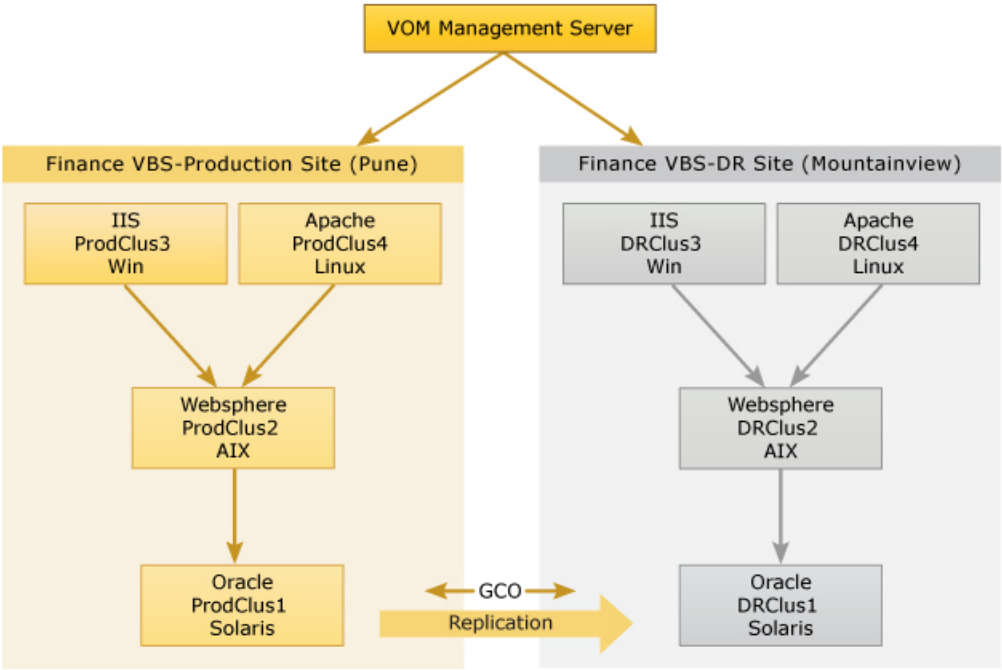
- At least one tier in the virtual business service must be configured for VCS disaster recovery.
- The global service group must not be configured to fail over to another cluster automatically. For information on how to set the ClusterFailOverPolicy attribute, see the *Symantec Cluster Server Administrator's Guide*.
- The global service group and its DR conterpart must not be part of the same virtual business service.

Sample disaster recovery configuration

Figure 6-1 shows a production site and a DR site.

The two virtual business services are shown to be symmetrical but they are not required to be symmetrical. The same Management Server is preferred to manage the production site and DR site but you can use two different Management Servers too.

Figure 6-1 Sample disaster recovery configuration



To enable disaster recovery for the Oracle database, global cluster option (GCO) is configured at the database tier. Traditional VCS global service group failover ensures that the database is online only at one site at a time. If there is a failure of the database tier on the production cluster, a disaster recovery alert is triggered by VCS GCO.

If you start the virtual business service at the DR site in response to the alert, the entire Finance application is brought up in the specified order. At the production site, the inter-cluster fault propagation mechanism propagates the fault at the database tier to the middle tier and so on. Depending on the configured behavior, the applications in other tiers might go down or stay online.

The end-to-end Finance application is now fully available at the DR site, while it is in PARTIAL state or FAULTED state at the production site.

Disaster recovery alerts

The disaster recovery alerts that apply for Virtual Business Services are:

- The CFAULT alert is triggered whenever a cluster where GCO is configured is faulted. A notification is sent to the remote cluster. You can see the alert in the Symantec Cluster Server logs and then take appropriate corrective action.
- The GNOFAIL alert is triggered when the global service group is unable to failover.

For more information about these alerts, see the *Symantec Cluster Server Administrator's Guide*.

Disaster recovery limitations

The following limitations apply:

- Disaster recovery fire drill operations are not supported.
- Configurations that provide disaster recovery for Symantec ApplicationHA through VMware Site Recovery Manager (SRM) are not supported.

About the disaster recovery plan

The disaster recovery plan (DR plan) provides the sequence of operations that will be performed at the DR site, in the event of a disaster. To view the Virtual Business Services DR plan, use the `vbssvc -showplan` command. You can run this command from the production site or from the DR site.

The command output might resemble the following:

```
# vbssvc -showplan FinanceVBS

VCS NOTICE V-16-25-40234 virtual business service FinanceVBS
can not be started.

VCS WARNING V-16-25-40239 service group DBSG_Fin : Online on
remote cluster MtViewVBS. At least one service group in virtual business
service is not global.
```

Note: This prediction is based on the last discovered state of the service groups. The actual start operation can still fail if the underlying high availability technology is not available or due to external factors like network outages.

Table 6-1 lists a few scenarios and possible DR plan command outputs.

Table 6-1 DR plan examples

Scenario	DR plan output
Global service group is faulted.	The plan shows that the global service group at the production site is FAULTED. The `-force` option will be used to bring the global service group online at the DR site.
Global service group is offline.	The plan shows that the global service group is offline at the production site. You can start the virtual business service at the DR site.
Production cluster is faulted.	The plan shows that the service group is global and that the production cluster is FAULTED or DOWN. When you start the virtual business service on the DR site, the `-force` option will be used to bring the global service group online at the DR site.
Global service group is online at the production site and there are one or more non-global service groups in the virtual business service.	The plan shows that the production cluster is up and the global service group is online on the production cluster. You cannot start the virtual business service at the DR site.
Global service group is online at the production site and all service groups are global.	The plan shows the status of each service group on the production site. The `-switch` option will be used to bring the global service groups online at the DR site for the global service groups that are online at the production site.

Bringing up Virtual Business Services at the DR site

To recover a virtual business service after a disaster occurred, perform the following tasks:

1. Check the Symantec Cluster Server logs for the CFAULT alert. CFAULT indicates that the production site cluster failed.
2. View the DR plan for the global service group by running the `vbssvc -showplan` *`vbs_name`* command.

   The command output shows that the global cluster on the production site is faulted.
3. Start the virtual business service on the DR Site by running the `vbssvc -start` *`vbs_name`* command .

   The `vbssvc -start` command brings the global service group online at the DR site by using the `-force` option.

Performing planned migration of virtual business services

You can perform a planned failover of a virtual business service to the DR site to minimize application downtime during planned maintenance of the production site.

1. Verify whether a service group is part of a virtual business service.

   ```
   # vbssvc -display
   ```

2. Stop the virtual business service on the production site.

   ```
   # vbssvc -stop vbs_name
   ```

3. View the status of the global service group on the production site and on the DR site.

   ```
   # vbssvc -showplan
   ```

4. Start the virtual business service at the DR site.

   ```
   # vbssvc -start vbs_name
   ```

Concurrency violation

A paired virtual business service must not be online at the same time on the production site and on the DR site. The GNOFAIL alert is used to prevent concurrency violation. Concurrency violation at virtual business service level is prevented by the VBS daemon if all service groups are global. But in case some service groups are non-global, you must ensure that all groups in the virtual business service at the production are offline or faulted before you start the virtual business service at the DR site.

Reconfiguring an ApplicationHA node

If an ApplicationHA service group is part of a virtual business service and you reconfigure application monitoring for the ApplicationHA node, fault management and command line operations may not work. The ApplicationHA service group dependencies get removed from the virtual business service.

To reconfigure an ApplicationHA node, perform the following steps.

1. Remove ApplicationHA service groups from the virtual business service on which ApplicationHA reconfiguration is planned.
2. Complete the reconfiguration on ApplicationHA.
3. After the reconfiguration, add the ApplicationHA service groups that are created and create any dependencies that are required.

Chapter 7

Enhancements to Virtual Business Service

This chapter includes the following topics:

- VBS can remain operational in spite of a tier failure
- Ability to run custom scripts on service groups configured with soft dependency
- Virtual Business Service status tracking
- Ability to manage applications from Microsoft Failover Clustering as one or more tiers
- Application recovery point and startup time in VBS

VBS can remain operational in spite of a tier failure

VBS start and stop operations now feature two important enhancements:

- The `vbssvc -start` and `vbssvc -stop` commands are interactive and allow you to start or stop the virtual business service even if one of its tiers is in UNKNOWN state.This is useful if a disaster occurs in one of the tiers and you still want to continue operations on the remaining tiers with a single click or a single command.
- The VBS start and stop operations now perform a quick pre-validation to verify if all tiers are reachable. This prevents unreachable tiers from being undetected and causing the operation to hang. If the pre-validation check determines that any tier is unreachable, the operation fails and the tier state is correctly marked as UNKNOWN. If you wish to restart the operation ignoring the unreachable (UNKNOWN state) tiers, you can re-run the start or stop operation.

Note: Since `vbssvc -start` and `vbssvc -stop` are made interactive, any existing custom scripts which use `vbssvc` may require a change.

Ability to run custom scripts on service groups configured with soft dependency

VBS provides the ability to run custom scripts on parent tiers that have one or more child tiers with soft dependency configured. You can run a custom script when the application on the parent tier needs to perform a custom action when the child service group recovers from a fault. This custom action could be to issue a command for the parent tier to reconnect to the child tier.

Currently, VBS fault management provides three dependency types namely, Soft, Firm and Restart, with associated predefined fault policy actions. The Restart dependency is used when a tier can withstand lower tier failures. The upper tier continues to operate even when the lower tier fails. When the lower tier subsequently recovers, the upper tier is restarted so that it can reconnect to the lower tier.

For some applications, performing a restart in response to a lower tier recovery may be expensive and unnecessary. You can instead run a script or execute a command that resolves the problem. Such applications do not need predefined fault policy. They require the ability to detect lower tier recovery event and execute a custom script on the upper tier. The Custom Script Execution feature provides this ability.

Virtual Business Service status tracking

You can track the progress of the VBS start and stop operations. Every start and stop operation has an assocaited task ID which can be used to track the progress of the task.

Status tracking enables you to access various details, status and progress of in-progress and completed operation.

See “Tracking VBS operations” on page 60.

Ability to manage applications from Microsoft Failover Clustering as one or more tiers

VBS can manage multi-tier applications in which one or more tiers are managed by Microsoft Failover Clustering. You can create a virtual business service with Microsoft Failover Clustering tiers, Symantec Cluster Server, Application HA tiers,

or a mix of these different kinds. Only soft dependencies are allowed between Microsoft Failover Clustering tiers and their parent and child tiers. These dependencies specify the start and stop order, but no fault or recovery action is propagated to any parent or child service group of the Microsoft Failover Clustering tier.

See "Configuring a virtual business service " on page 25.

Application recovery point and startup time in VBS

Symantec Virtual Business Services (VBS) support tracking of key metrics related to disaster recovery like application recovery point and startup time. VBS aggregates the values of application recovery point of underlying VCS global service groups and displays the effective recovery point . Internally, action entry points of the replication agents in the VCS global service groups are invoked to obtain the application recovery point. The effective recovery point is the maximum of underlying application recovery point. Similarly, VBS measures the startup time taken by the underlying VCS global service groups to come fully online. The effective startup time is the sum of startup time of all the global service groups for a given VBS.

Note: Currently startup time for non-global service groups in a VBS is not measured and is not part of the start up time metrics. When a VBS which is in a partial state is started it may not reflect the actual startup time of the VBS as some of the tiers are already online.

See "Viewing application recovery point and startup time of a VBS" on page 59.

Chapter 8

Upgrading Virtual Business Services

This chapter includes the following topics:

- Prerequisites for upgrading to VBS version 6.1
- Upgrading the VRTSvbs package using Veritas Operations Manager
- Considerations for renaming a cluster

Prerequisites for upgrading to VBS version 6.1

- You are logged on as the Domain Administrator or the administrator of the Virtual Business Service.
- You installed Veritas Operations Manager Management Server version 6.0.
- The managed host version is 6.0.

Note: As a best practice, before you upgrade a tier, you must disable fault management for all Virtual Business Services that consist of service groups from that tier and then enable fault management after the upgrade is complete.

See "Fault management for a virtual business service" on page 65.

Upgrading the VRTSvbs package using Veritas Operations Manager

Skip this section if you have installed or upgraded to VCS 6.1 or SFHA 6.1. Perform these steps if you have installed an earlier supported version of VCS or SFHA. You

must upgrade the VRTSvbs package on each host of each cluster that you want to manage. VRTSvbs is not supported on the Management Server.

If you are upgrading an earlier supported version of VCS or SFHA (that has VRTSvbs installed) to VCS 6.1 or SFHA 6.1, you can use any of the upgrade procedures that are supported in VCS 6.1 or SFHA 6.1. For more information, see the installation guide for these products. If you want to remove VRTSvbs before upgrading, you must perform the steps in the procedure for uninstalling VRTSvbs.

Before you upgrade the VRTSvbs package to version 6.1 on a managed host, ensure that the VRTSsfmh package version 6.0 is installed on the host. If VRTSsfmh 6.0 is not installed, installation of VRTSvbs fails.

Note: When you upgrade VRTSvbs to 6.1 through Management server, the vbsapp resource that is online on the managed host is brought offline and restarted after the upgrade is successfully completed. However, on Solaris 11 systems, the vbsapp resource is not taken offline and brought online automatically. Before you upgrade VRTSvbs on Solaris 11 systems, you must manually take the vbsapp resource on the managed hosts offline by using `HA` commands or through the Veritas Operations Manager console. After the upgrade is complete, you must manually bring the vbsapp resource online.

To upgrade the VRTSvbs package using Veritas Operations Manager

1. Download the VRTSvbs package to a temporary directory on your computer from the following location:

   https://sort.symantec.com/vom

   The package is available for download from Symantec FileConnect and Trialware too.

2. In the Veritas Operations Manager console, select **Home > Settings > Deployment**.

3. Click **Upload Solutions** on the Deployment Management view and upload the VRTSvbs package to the repository from the **Upload Solutions to Repository** wizard panel. You need to upload the VRTSvbs package for each platform that you want to deploy VBS on.

   The uploaded package appears under **Base Releases**.

4. Click **Base Releases** node and right-click on the VRTSvbs package under the **Base Releases** tab. This displays the **Select hosts** panel.

   On the **Select hosts** panel perform the following steps as applicable:

   - Select **Hosts** or **Platforms** to display list of hosts and platforms respectively.

- Select **Hosts > Show all applicable hosts** to overwrite existing installation on selected hosts.
- Select **Platforms > Force install** to overwrite existing installation on selected platforms.
- To upgrade the package on **Hosts**, select the hosts from the list.
- To upgrade the package on **Platforms**, select the platforms from the list.

5 Click **Finish** on the **Select hosts** panel.

Note: VOM discovers the upgraded package version only via host family discovery, which is scheduled once in a day by default or is done manually. Hence, `vbs -start` and `vbs -stop` will not get invoked until the version upgrade is detected. You must refresh the hosts for which the VRTSvbs package was upgraded so that VOM can detect the upgraded package.

Considerations for renaming a cluster

Veritas Operations Manager does not support renaming of clusters. If you want to rename a cluster that is part of a virtual business service, perform the following tasks:

1. Update the virtual business service definitions to remove the objects from the cluster and then remove the cluster nodes from Veritas Operations Manager Management Server.
2. Rename the cluster.
3. Add the renamed cluster back to the Veritas Operations Manager Management Server.
4. Add the deleted objects from the cluster back to the Virtual Business Services definition.
5. If the host is managed by multiple Management Servers, run the following command to overwrite the credentials on the host.

```
UNIX: # /opt/VRTSsfmh/bin/xprtlc -l \
https://localhost:5634/admin/cgi-bin/vbs_configurator.pl -d \
rescan=cred

Windows: "C:\Program Files\Veritas\VRTSsfmh\bin>xprtlc.exe" -l
https://localhost:5634/admin/cgi-bin/vbs_configurator.pl -d
rescan=cred
```

6. To make the credentials available to all the managed hosts, run the following command.

```
UNIX: # /opt/VRTSsfmh/bin/xprtlc -l \
https://localhost:5634/admin/cgi-bin/vbs_configurator.pl -d \
rescan=all
```

```
Windows: "C:\Program Files\Veritas\VRTSsfmh\bin>xprtlc.exe" -l
https://localhost:5634/admin/cgi-bin/vbs_configurator.pl -d
rescan=all
```

Appendix A

Command reference

This appendix includes the following topics:

- Virtual Business Services commands

Virtual Business Services commands

You can run the Virtual Business Services command line interface from nodes of the clusters that have service groups configured as part of a virtual business service.

Table A-1 lists the Virtual Business Services commands and their usage.

Table A-1 Virtual Business Services commands

Operation	Command syntax and examples

View the information about the Virtual Business Services that are configured.	`vbssvc -display [vbs(s)]`
	Examples
	`# vbssvc -display vbs1 vbs2`
	Displays information about *vbs1* and *vbs2*.
	`# vbssvc -display`
	The command displays information about the virtual business services that consist of service groups from the local cluster.

Table A-1 Virtual Business Services commands *(continued)*

Operation	Command syntax and examples

View the states of the global service groups or remote clusters.
 	
The command output also shows the option that will be used to bring the global service group online when you start the virtual business service.
	`vbssvc -showplan vbs`
	
	Example
	
	`# vbssvc -showplan vbs1`
	
	Displays the state of the global service groups or remote clusters.

View the availability status of virtual business services.	`vbssvc -state [vbs(s)]`
	
	Examples
	
	`# vbssvc -state vbs1`
	
	Displays the availability status of *vbs1*.
	
	`# vbssvc -state`
	
	The command displays availability status of the virtual business services that consist of service groups from the local cluster.

View the parent-child dependencies and fault policies for a virtual business service.	`vbssvc -grpdep [vbs(s)]`
	
	Example
	
	`# vbssvc -grpdep vbs1`
	
	Displays the parent-child relationships and fault policies that are defined for the virtual business service *vbs1*. Clustering platform of each service group is also listed next to the service group.

View states of all the service group for a given virtual business service.	`vbssvc -grpstate vbs`
	
	Example
	
	`# vbssvc -grpstate vbs1`
	
	Displays the states of all the service groups that are part of the virtual business service *vbs1*. Clustering platform of each service group is also listed next to the service group.

Table A-1 Virtual Business Services commands *(continued)*

Operation	Command syntax and examples

View the state of the virtual machine.	`vbssvc -grpstate [-vmstate] <vbs>`
	Example
	`# vbssvc -grpstate -vmstate vbsA`
	Displays information about the state of the service groups on the virtual machine. In addition, displays information about the state of the virtual machine.

Start a virtual business service.	`vbssvc -start vbs [-tag tag_name]`
	Example
	`# vbssvc -start vbs1`
	Starts the virtual business service *vbs1* by bringing its service groups online in the required order. Generates a task ID which can be used by `vbstask` command to check the progress of the operation.
	Example
	`# vbssvc -start vbs1 -tag mytag`
	Starts virtual business service vbs1. Generates a task IT and also associates the tag name *mytag* with the operation.
	The `-tag` option can be optionally specified to associate the operation with a user defined tag name which can be alternately used with the tag ID to track the progress of the operation through `vbstask` command.
	Note: If any of the VBS tiers is in UNKNOWN state, this command provides an option to ignore such tiers and continue to start the remaining VBS tiers.

Table A-1 Virtual Business Services commands *(continued)*

Operation	Command syntax and examples

Stop a virtual business service.	`vbssvc -stop [-force] vbs [-tag tag_name]`
	Example
	`# vbssvc -stop vbs1`
	Stops the business service *vbs1* by taking its service groups offline in the required order. Generates a task ID which can be used by `vbstask` command to check the progress of the operation.
	Example
	`# vbssvc -stop vbs1 -tag mystag`
	Stops the virtual business service *vbs1*. Generates a task ID and also associates the tag name *mytag* with the operation.
	The `-tag` option can be optionally specified to associate the operation with a user-defined tag name which can be alternately used with the task ID to track the progress of the operation through the `vbstask` command.
	The `-force` option lets you stop a virtual business service though one or more of its components might be shared with other virtual business services.
	Note: If any of the VBS tiers is down or in UNKNOWN state, this command provides an option to ignore such tiers and continue to stop the remaining VBS tiers.

Flush a virtual business service.	`vbssvc -flush vbs`
	Example
	`# vbssvc -flush vbs1`
	Flushes the start or stop operation that was initiated on the virtual business service from the command line. The command allows cancellation of the start or stop operation if it becomes unresponsive.

View the `vbssvc` usage list.	`vbssvc [-help]`

Table A-1 Virtual Business Services commands *(continued)*

Operation	Command syntax and examples

View the virtual machine information.	`vbssvc -vminfo [<vbs(s)>]`
	Example
	`# vbssvc -vminfo vbsA`
	Displays information about the service groups on the virtual machine and the virtual machine. Virtual machine information such as name, type of the virtual machine, and the enabled or disabled status of the start and stop option selected in Veritas Operations Manager is displayed. Clustering platform of each service group is also listed next to the service group. The virtualization platform for each VM is also listed.

View the parent-child dependencies and fault policies between service groups.	`vbsgrp -dep <cluster_name:group_name>(s)`
	Example
	`# vbsgrp -dep clus1:sg1 clus2:sg2`
	Displays the parent-child relationships and fault policies that are defined for service group *sg1* from cluster *clus1* and for service group*sg2* from cluster *clus2* as part of any virtual business service that is managed by the Management Server. Clustering platform of each service group is also listed next to the service group.
	Note: All dependencies for given service groups defined in the Management Server might not be visible. The command displays dependencies defined for service groups that are part of virtual business services that involve the local cluster (the cluster from where the command is executed).

View the states of service groups.	`vbsgrp -state [<cluster_name:group_name>(s)]`
	Example
	`# vbsgrp clus1:sg1`
	Displays the state of the service group *sg1* in the cluster *clus1*. Clustering platform of each service group is also listed next to the service group.
	Note: To view the states of service groups belonging to a particular virtual business service, refer to the `vbssvc -grpstate` command.

View the `vbsgrp` usage list.	`vbsgrp [-help]`

Table A-1 Virtual Business Services commands *(continued)*

Operation	Command syntax and examples

View the information about the application recovery point and startup time for a given VBS.	`vbssvc -showsla <vbs_name>`
	Example
	`# vbssvc -showsla vbs1`
	Displas the AppRecoveryPOint, startup time, and ReplicationLagInfo for each of he global service group. It also displays the effective recovery point and effective startup time for *vbs1*.
	Note: Currently, you can see the startup time and AppRecoveryPoint only for a global service group.

Enable debug logs for the VBS daemon.	`vbslog -addtags tag1 [tag2 tag3 ....]` You can enable the DBG_MSG, DBG_POLICY, DBG_SECURITY, and DBG_PING tags.
Disable debug logs for the VBS daemon.	`vbslog -deltags tag1 [tag2 tag3 ....]` You can disable the enabled tags.
View the `vbslog` usage list.	`vbslog [-help]`

View information about tasks performed on virtual business services	`vbstask -display [task_id(s)] [-vbs vbs(s)] [-tag tag_name]`
	Example
	`vbstask -display`
	Displays information about the tasks performed on all virtual business services in the cluster.
	`vbstask -display {41920582-1dd2-11b2-8d2b-b518e666c59d}`
	Displays information about the task with task ID *{41920582-1dd2-11b2-8d2b-b518e666c59d}*
	`vbstask -display -vbs vbs1`
	Displays information about the tasks performed on the virtual business service *vbs1*.
	`vbstask -display -tag mytag`
	Displays information about the tasks associated with tag *mytag*.

Table A-1 Virtual Business Services commands *(continued)*

Operation	Command syntax and examples

View information about tier-level sub-tasks	`vbstask -subtasks task_id`
	Or
	`vbstask -substasks -tag tag_name`
	Example
	`vbstask -substasks {41920582-1dd2-11b2-8d2b-b518e666c59d}`
	Displays information about the tier-level actions (sub-tasks) performed as part of the VBS task with task ID *{41920582-1dd2-11b2-8d2b-b518e666c59d}*.
	`vbstask -subtasks -tag mytag`
	Displays information about the tier-level actions (sub-tasks) performed as part of the VBS task associated with the tag *mytag*.

View step-wise progress of a task	`vbstask -progress task_id`
	Or
	`vbstask -progress -tag tag_name`
	Example
	`vbstask -progress {41920582-1dd2-11b2-8d2b-b518e666c59d}`
	Displays step-wise progress of a task with task ID *{41920582-1dd2-11b2-8d2b-b518e666c59d}*. It includes the order in which the tier-level actions were performed and their outcomes.
	`vbstask -progress -tag mytag`
	Displays step-wise progress of a task associated with tag *mytag*.

Appendix B

Troubleshooting and recovery

This appendix includes the following topics:

- Troubleshooting Virtual Business Services
- Virtual Business Services log files

Troubleshooting Virtual Business Services

This section includes error messages associated with Virtual Business Services and provides descriptions and the recommended action.

Command line cannot connect to the VBS daemon

When you run a command from Virtual Business Services command line, the system can display the following message:

```
Cannot connect to VBS daemon
```

The error might occur due to one of the following conditions:

- The vbsapp resource is not online.
- In case the virtual IP is set for this cluster, then verify that the ClusterAddress attribute is set.
- In case the virtual IP is set for this cluster, then verify that the IP address set in the ClusterAddress attribute is reachable.

Workaround: Verify that the ClusterAddress attribute is set correctly. Bring the vbsapp resource online.

Virtual business service state is unknown

If a virtual business service goes into an unknown state, perform the following tasks in sequence till the issue is resolved.

- Run the Veritas Operations Manager Policy Check with the VBS Availability Configuration signature. Verify whether your configuration conforms to predefined standards and take appropriate corrective action. For more information on running Policy Check, refer to *Veritas Operations Manager Management Server User Guide*.
  See "About the Veritas Operations Manager policy checks for Virtual Business Services " on page 17.
- Check states of the individual service groups from the VBS command line. If some of the remote clusters are not reachable, perform the corrective actions, such as rectifying cluster or node failures, network communication failure, firewall issues, or configuration issues.
  See "Viewing the virtual business services status from the command line" on page 55.
- Refresh the hosts of the cluster whose service groups are in unknown state. You can refresh the hosts from the Management Server or by running the following command from a managed host.
  UNIX:

  ```
  # /opt/VRTSsfmh/bin/mh_ctl.pl --family VCS --refresh
  ```

  Windows:

  ```
  cd C:\Program Files\Veritas\VRTSsfmh\bin
  perl.exe mh_ctl.pl --family VCS --refresh
  ```

- If you reinstalled only the Management Server and did not reinstall the managed hosts, re-create the virtual business service and rescan by running the following command from the Management Server.
  UNIX:

  ```
  # /opt/VRTSsfmh/bin/xprtlc -l \
  https://localhost:5634/admin/cgi-bin/vbs_configurator.pl -d \
  rescan=all
  ```

  Windows:

  ```
  "C:\Program Files\Veritas\VRTSsfmh\bin\xprtlc.exe" -l
  https://localhost:5634/admin/cgi-bin/vbs_configurator.pl -d
  rescan=all
  ```

- If you moved a managed host from one Management Server to another Management Server, run the following command from the new Management Server. The command makes the credentials available to the managed host.
  UNIX:

  ```
  # /opt/VRTSsfmh/bin/xprtlc -l \
  https://localhost:5634/admin/cgi-bin/vbs_configurator.pl -d \
  rescan=cred
  ```

  Windows:

  ```
  "C:\Program Files\Veritas\VRTSsfmh\bin\xprtlc.exe" -l
  https://localhost:5634/admin/cgi-bin/vbs_configurator.pl -d
  rescan=cred
  ```

- If the ClusterAddress of any of the tiers is not set, ensure that all the tiers are upgraded to VBS version 6.0 and the hosts in the participating clusters can communicate with one another.

Disaster recovery of a virtual business service fails

When you try to bring a virtual business service online at the DR site, the `vbssvc -start` command fails if the global service groups have any VCS-level dependency.[2489965]

Workaround: To start the virtual business service at the DR site, take the virtual business service offline at the production site and then bring it online at the DR site.

Virtual Business Services log files

Table B-1 lists the log files that you can use for troubleshooting issues with Virtual Business Services.

Table B-1 Log files for Virtual Business Services

Log file	Location
VBS daemon log	UNIX: `/var/VRTSvbs/log/vbsd_A.log` Windows: `C:\Program Files\Veritas\VRTSvbs\log\vbsd_A.log`
VBS deployment log	UNIX: `/var/VRTSvbs/log/vbsdeploy.log` Windows: `C:\Program Files\Veritas\VRTSvbs\log\vbsdeploy.log`

Table B-1 Log files for Virtual Business Services *(continued)*

Log file	Location
VBS configuration update log	UNIX: `/var/VRTSvbs/log/notify_config_update.log` Windows: `C:\Program Files\Veritas\VRTSvbs\log\notify_config_update.log`
VCS discovery on Managed Host log	UNIX: `/var/opt/VRTSsfmh/VCS/log/mh.log` Windows Server 2008: `C:\ProgramData\Symantec\VRTSsfmh\VCS\log\mh.log` Windows Server 2003: `C:\Documents and Settings\All Users\Application Data\Symantec\VRTSsfmh\VCS\log\mh.log`
VBS configuration log on managed host	UNIX: `/var/opt/VRTSsfmh/logs/vbs_config.log` Windows Server 2008: `C:\ProgramData\Symantec\VRTSsfmh\logs\vbs_config.log` Windows Server 2003: `C:\Documents and Settings\All Users\Application Data\Symantec\VRTSsfmh\logs\vbs_config.log`
Configurator log on Management Server	UNIX: `/var/opt/VRTSsfmcs/logs/vbs_configurator.log` Windows Server 2008: `C:\ProgramData\Symantec\VRTSsfmcs\logs\vbs_configurator.log` Windows Server 2003: C:\Documents and Settings\All Users\Application Data\Symantec\VRTSsfmcs\logs\vbs_configurator.log

Appendix C

Known issues and limitations

This appendix includes the following topics:

- Known issues and limitations

Known issues and limitations

This section covers the known issues and limitations in this release.

Complete cluster fault is not handled

Complete cluster fault is not handled by Virtual Business Services. If one of the participating clusters in a virtual business service is not available due to network outage, failure of the High Availability daemon, or failure of the VBS daemon, fault management might not work. The failed cluster might be a multi-node cluster or a single node ApplicationHA cluster.

You can continue to perform operations on the VBS if a single cluster faults. You can choose to proceed with the operation after ignoring the unreachable clusters.

Fault propagation for shared service groups

In case of shared service groups, fault events and recovery events may not be propagated for all affected virtual business services if the faulted group was not the shared group.

Consider a case where the middle tier is shared between more than one virtual business service. If the bottom tier of one virtual business service faults, the fault may not be propagated up the dependency tree of the other virtual business services.

Veritas Operations Manager displays stale status for a virtual business service

This issue occurs with the virtual machines where Symantec ApplicationHA is configured to monitor applications. In ApplicationHA, if the Virtual Machine auto-recovery is configured, the virtual machine is restarted if the application being monitored fails to start after a configurable number of attempts. If the Virtual Machine auto-recovery is triggered, the last successful virtual machine snapshot is restored from the backup. It also restores the applications running on the virtual machine. However, Veritas Operations Manager fails to discover the restored application status, and continues to display the application as faulted. [2573158]

Workaround: To display the current application status, refresh the Veritas Operations Manager console.

The CLI command to refresh the Veritas Operations Manager console is as follows:

- Unix:

```
# /opt/VRTSsfmh/bin/mh_ctl.pl --rescan
```

- Windows:

```
C:\Program Files\Veritas\VRTSsfmh\bin> "C:\Program Files\Veritas
\VRTSsfmh\bin\perl.exe" "C:\Program Files\Veritas\VRTSsfmh\bin\
mh_ctl.pl" --rescan
```

Virtual Business Service start operation does not validate the service group's resource criticality (2169223)

The start operation does not validate whether the service group has any non-critical resource. So, the operation does not detect any fault that occurs while bringing these resources online, nor does it detect if such resources are already faulted when the VBS start is attempted. If such faults exist, VBS operation will not complete. You can choose to abort the operation. As a preventive step, configure all the resources of a service group as critical.

Propagation of multiple child fault or recovery events may be missed if fault action on parent service group is in progress (2745323)

In case of firm dependency if the child service group has faulted the parent service group is brought offline. Subsequently when the child service group recovers, the parent service group is brought online. However, if the child service group faults again before the parent has recovered, this new child fault event is missed. This

could happen if the parent recovery takes time. As a result the parent service group may remain online.

Workaround: No workaround.

ClusterService group having vbsapp resource does not link vbsapp to newly created gcoip (2713002)

If GCO is configured in a cluster using `gcoconfig` which already has vbsapp resource configured as a part of CLusterService group, vbsapp does not get linked to the newly created gcoip resource.

Workaround: Run the following commands to link the resource manually:

```
# haconf - makerw
# hares -link vbsapp gcoip
# haconf -dump -makero
```

CLI command returns incorrect state of the virtual machine in VBS (2789621)

The CLI command to elicit the state of the virtual machine in a VBS may display incorrect state of the VM. This is observed after a VBS stop operation if VM takes a long time to go offline. VBS daemon might fetch the state of the virtula machine even before the virtual machine goes offline.

Workaround: No workaround. A subsequent start operation refreshes the state of the virtual machine.

VBS dependencies get deleted during the upgrade of ApplicationHA or SFWHA configured in a VBS [2832599]

VBS dependencies get deleted when you upgrade the ApplicationHA or SFWHA configured under VBS to any of its later versions. This is particularly observed if you have upgraded SFMH on the nodes to version 6.0 to enable VBS 6.1 functionalities.

Workaround: Stop and disable SFMH service before the upgrade and start it after the upgrade is complete. You can also recreate the VBS dependencies through the Veritas Operations Manager console.

VBS start operation may fail from Veritas Operations Manager when VM start/stop is enabled [2848118]

VBS start operation may fail with the following error when the start operation is performed through the Veritas Operations Manager console with VM start/stop is enabled.

```
org.xml.sax.SAXParseException;invalid encoding name "PLAIN".
```

This is observed only on Windows Management Server.

Workaround: Start the virtual machine manually and retry the operation.

Clusters running on SFWHA 5.1SP1 or 5.1SP2 configured with virtual IP addresses cannot migrate to VIP-less communication (2845412)

If you have already configured clusters running on SFWHA 5.1SP1 or SFWHA 5.1SP2 with virtual IP addresses, these clusters are not able to participate in VIP-less communication by setting the ClusterAddress attribute to null.

See "Configuring auto discovery for each cluster in VBS" on page 30.

Workaround: No workaround.

Pop up showing error message during VBS uninstallation on Windows 2008 remains hidden behind other windows (2872716)

On Windows 2008 systems, if fault management is enabled and you uninstall VBS when the VBS daemon is running, the uninstallation of VBS from the **Control Panel > Add or Remove Programs** menu exits with an error message that is behind the installation screens. You must manually bring the focus to the error message window to read it.

```
vbsd.exe is running on your system. Please stop this process and retry un-
installation, uninstallation wizard will exit now.
```

Workaround: Take the vbsapp resource offline on cluster nodes and then uninstall VBS.

Events generated for VBSD lack correct description (2833160)

On Windows systems configured under a virtual business service, the Event Viewer does not have appropriate description for the events generated by event source VBSD.

Workaround: Check the `vbsd_A.txt` log file inside the `C:\Program Files\Veritas\VRTSvbs\log\` folder for error messages.

DR fails to start in VBS 6.0 or lower for VBS formed of global service groups [3240419]

If you configure VBS formed of global service groups and bring it online on the disaster recovery (DR) site, make sure that all the global service groups on the primary site are brought offline. This is because only the lowest tier of the primary site switches to the DR site and the rest of the service groups fail to switch as VBS attempts to online the rest of the tiers on the DR site.

Workaround: Offline the global service groups on the primary site before you bring them online on the DR site.

Installation or upgrade of VRTSsfmh or VRTSvbs package from Veritas Operations Manager may fail if publisher is set (3306997)

Installation or upgrade of VRTSsfmh or VRTSvbs package through Veritas Operations Manager may fail with the following error message:

```
pkg install: The proposed operation on this parent image
cannot be performed because temporary origins were specified and
this image has children. Please either retry the operation again
without specifying any temporary origins, or if packages from
additional origins are required, please configure those origins
persistently.
```

The error occurs if you install or upgrade the VRTSsfmh or VRTSvbs package using Veritas Operations Manager on a host where a publisher is already set for the package.

Workaround: Unset the publisher on the host and again install or upgrade the package.

Operation performed on service groups with disabled resources remains stuck [3280718, 3288725]

The operations that you run on your service groups remain stuck if:

- The service groups have one or more disabled resources.
- The service groups are configured in a cluster running on VCS versions lower than 6.1.

Workaround: Upgrade the VCS version to 6.1.

Recover and takeover messages are not displayed during DR of a VBS with a global service group [3315435]

During a disaster recovery of a VBS containing a global service group, the recover or takeover messages are not displayed on the Veritas Operations Manager console.

Workaround: No workaround.

Appendix D

Fixed issues

This appendix includes the following topics:

- Fixed issues

Fixed issues

Table D-1 lists the fixed issues for Virtual Business Services.

Table D-1 Virtual Business Services fixed issues

Incident	Description
2616497	Fault propagation does not work if the parent isin faulted state on one or more nodes.
2867710	For VBS having controller on single node, ApplicationHA tier virtual machine gets stopped even if we have additional service groiups on it. If a virtual machine took considerable time to stop, its latest state was not reflected in the output of the `vbssvc -state` command.
2870827	Virtual machines that are part of a VBS having fault management enabled might sometimes show the fault management status as Not Enabled after the virtual machine is stopped or started. This discrepancy causes a drift between the VBS configurations on the virtual machine and on Veritas Operations Manager.
2813445	If the virtual machine name contains non-ASCII special characters, the starting or stopping of virtual machines as part of VBS start and stop operations does not work from the command line.

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