VERITAS™

VERITAS Replication Exec™ version 3.1 for Windows

Clustering Reference Guide

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Preface

This *VRE 3.1 Clustering Reference Guide* describes how to cluster the Job Agent and Replication Management Server (RMS) using VERITAS Cluster Server™ (VCS) and Microsoft Cluster Server™ (MSCS).

What You'll Find in this Manual...

- Chapter 1. "Clustering the Job Agent with VCS" on page 1
- Chapter 2. "Clustering the Job Agent with MSCS" on page 17
- Chapter 3. "Clustering the RMS with VCS" on page 31
- Chapter 4. "Clustering the RMS with MSCS" on page 43

Getting Help

VERITAS offers you a variety of support options for *VERITAS Replication Exec 3.1*, including its Clustering capabilities.

Accessing the VERITAS Support Web Site

The VERITAS Support Web site allows you to:

- contact the VERITAS Support staff and post questions to them
- get the latest patches, upgrades, and utilities
- view the *Replication Exec* Frequently Asked Questions (FAQ) page
- search the knowledge base for answers to technical support questions
- receive automatic notice of product updates
- find out about *Replication Exec* training
- read current white papers related to *Replication Exec*

The VERITAS Support Web site: `http://support.veritas.com`

Documentation Set

The following manuals and help files comprise the *Replication Exec* documentation set:

Document Title	Description
Replication Exec Administrator's Guide (admin_en.pdf)	The *VRE 3.1 Administrator's Guide* is in Adobe Acrobat format.
VRE 3.1 Help files (admin_en.chm)	Accessible as a standard Windows help file from the *VRE 3.1* software.
srTool Reference Guide (srtool_en.pdf)	The *srTool Reference Guide* is in Adobe Acrobat format.
srTool Help files (srtool_en.chm)	Accessible as a standard Windows help file from the *VRE 3.1* or srTool software.
VRE 3.1 Clustering Reference (cluster_en.pdf)	The *Clustering Reference Guide* is in Adobe Acrobat format.
VRE 3.1 Backup Exec SmartLink Reference Guide (smartlink_en.pdf)	The *Backup Exec SmartLink Reference Guide* is in Adobe Acrobat format, and includes HTML Help.

Conventions

Typographical Conventions

Here are the typographical conventions used throughout the manuals:

Conventions

Convention	Description
GUI Font	Used to depict graphical user interface (GUI) objects, such as fields, listboxes, menu commands, and so on. For example: Enter your password in the **Password** field.

Conventions (continued)

Convention	Description
Italics	Used for placeholder text, book titles, new terms, or emphasis. Replace placeholder text with your specific text. For example: Replace *filename* with the name of your file. Do *not* use file names that contain spaces.
`Code`	Used to show what commands you need to type, to identify pathnames where files are located, and to distinguish system or application text that is displayed to you or that is part of a code example.
Key+Key	Used to show that you must hold down the first key while pressing the second key. For example: Ctrl+S means hold down the Ctrl key while you press S.

You should use the appropriate conventions for your platform. For example, when specifying a path, use backslashes on Microsoft Windows and slashes on UNIX. Significant differences between the platforms are noted in the text.

Tips, Notes and Cautions

Tips, notes, and cautions are used to emphasize information. The following samples describe when each is used.

Tip Used for nice-to-know information, like a shortcut.

Note Used for important information that you should know, but that shouldn't cause any damage to your data or your system if you choose to ignore it.

Caution Used for information that will prevent a problem. Ignore a caution at your own risk.

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Clustering the Job Agent with VCS 1

The Job Agent for VERITAS Cluster Server (VCS) is an optional feature that can be installed as part of the *VERITAS Replication Exec* software installation after *VERITAS Cluster Server* is installed and configured. The cluster server software supports failover of a primary Job node to a secondary node.

The *VERITAS Replication Exec* (VRE 3.1) Job Agent allows users to create and configure replication operations. To ensure that replication continues after system failures, either the Source, Target, or both can be operated on a cluster. In the event that a clustered server is shut down, replication moves to another node in the cluster, and the Job restarts the replication on the new node.

Note Only Standard (one-to-one) or Centralization (many-to-one) replication Jobs that are set to replicate continuously can be clustered with the Job Agent.

Note VRE 3.1 Job Agent is *not* a means to provide shared nothing clusters. VRE 3.1 will only replicate to physical file systems mounted directly on a Windows 2000 or 2003 server.

Prerequisites

The following should be performed before installing the Job Agent.

- The VERITAS Cluster Server software must be installed and configured for correct operation.
- The drive letter for the data being replicated must be the same on all nodes.
- The VCS Service Group requires a shared storage device, managed by VCS, that is available for replicated data.
- Ensure that the latest VCS service pack is installed.
- All nodes involved in replication as well as the RMS must have the same administrative account with backup and restore privileges.

Installation and Configuration

When the RSA is installed on a machine all necessary clustering binaries are copied to the VRE services directory: `C:\Program Files\VERITAS\Replication Exec\Services`. The clustering agent is not configured as part of the VRE installation.

▼ **To install and configure the Job agent:**

1. Install VRE on a clustered node
2. Reboot
3. Open a command window and run the following command line:
   `clusinst.exe /install /rx`

Upgrading

Upgrading from any version of VSR/VRE 3.0 or higher will automatically update any installed and configured cluster agents. The agents must be taken off line before performing the VRE upgrade.

Note Upgrading over VSR 2.x will not upgrade the old cluster agent configurations. Follow the manual steps for the install of the agents as in the fresh install above.

▼ **To upgrade VRE 3.1 to future releases:**

1. Take the Job Agent resource off line on all nodes in the cluster.

   Note If the resources are active when VRE is upgraded, the user will be prompted to continue.

2. Upgrade VRE according to the procedures in the VRE 3.1 *Administrator's Guide*. This will automatically upgrade the cluster agents
3. Reboot.

Job Agent Resource Types

Before configuring the Agent, review the following resource attributes and their dependencies.

Attributes	Type and Dimension	Definition
JobName	string	The name of the Job.
JobGUID	string	Reserved
IsSource	integer	0, if this server is the Job Target server; 1, if it is the Job Source server;
RMSUser	string	The name of a user of the RMS machine. This parameter is used to give the Job access to a valid NT account on the RMS. This user account must be valid on all machines involved in the replication process.
RMSDomain	string	The domain in which the account originated. This parameter is used to give the Job access to a valid NT account on the RMS.
RMSPassword	string	The password generated by RxCrypt. See "Creating a Parameter Password" on page 4. This parameter is used to give the Job access to a valid NT account on the RMS.

Type Definition

Here is a sample of the text that appears in the *types.cf* file, a configuration file for VCS.

```
  type VREJob (
  static str ArgList[] = {JobName, JobGUID, IsSource, RMSUser,
RMSDomain, RMSPassword, AgentDebug}
  str JobName
  str JobGUID
  int IsSource
  str RMSUser
  str RMSDomain
  str AgentDebug
  str RMSPassword
  int ConfInterval = 300
  int ToleranceLimit = 5
```


Creating a Parameter Password

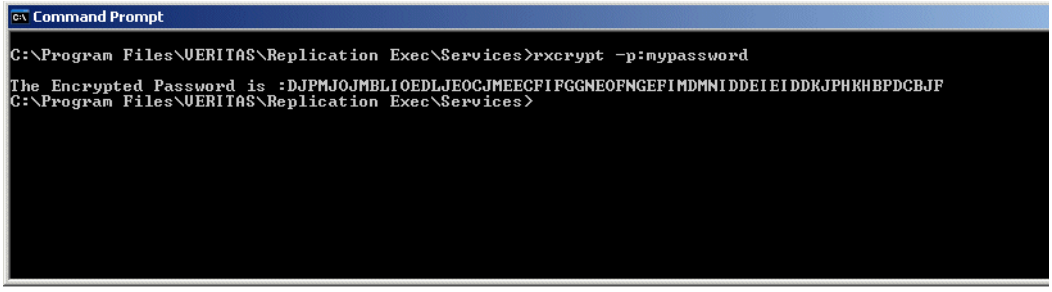
When the Job Agent contacts the RMS, a valid user name, domain, and password are required. When you establish a new VREJob resource, you set these as parameters for the Agent to use. Since these parameters are stored in the cluster configuration file, encrypting the password parameter allows better security.

▼ **To encrypt the Job Agent password:**

1. Run RxCrypt from the install directory of VRE:
   `C:\Program Files\VERITAS\Replication Exec\Services`

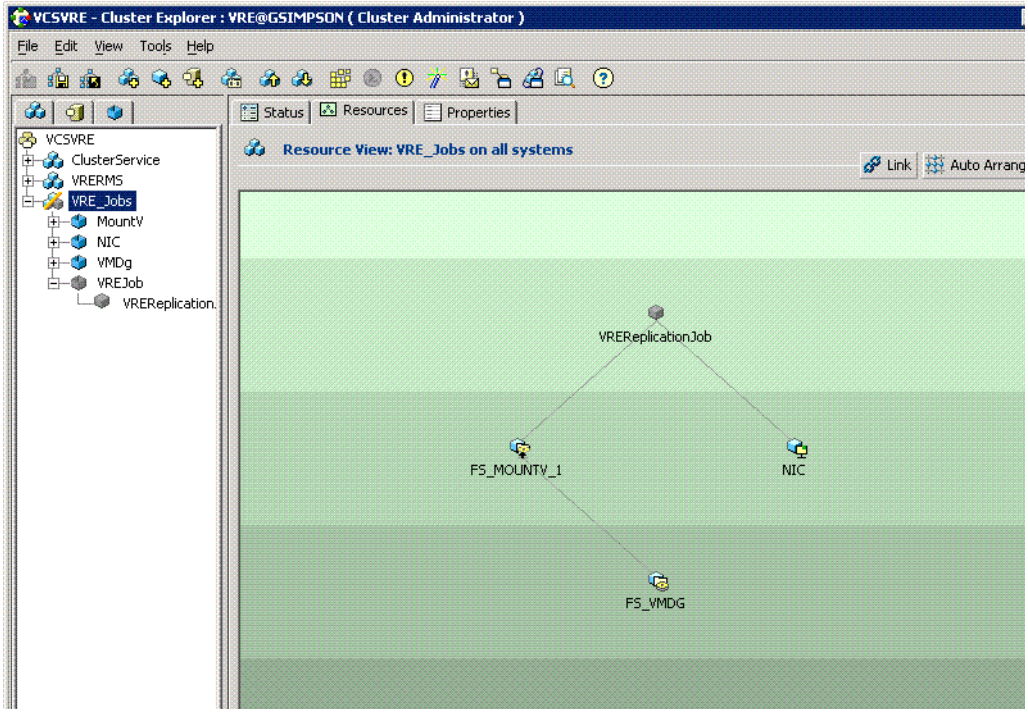
2. In the command window, enter the valid password for the RMSUser name being used for Job Agent access. Press **Enter** to run the utility.

3. From the command window, copy the *entire* password string (all letters *after* the colon). Paste this string into the Password Parameter field in the Job Agent **Add Resource** field.



Creating a Job Resource

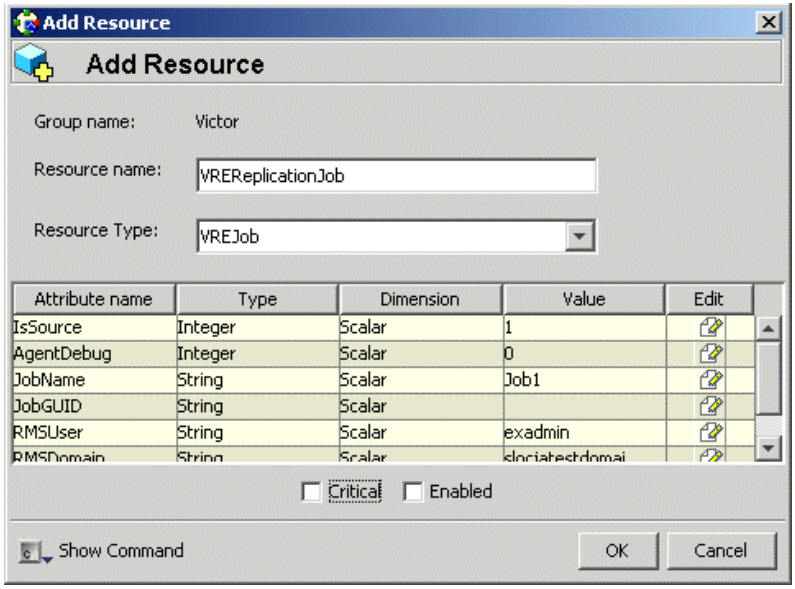
The figure below shows a correctly configured Service Group with a Job resource.



Once the Job Agent software is installed on each node, add the Job resource.

Ensure that the following systems are available and operating correctly:

- VCS Cluster Manager/Explorer
- A Service Group that contains a resource of type DiskRes and a resource of type Mount. These resources control the device that becomes the replication Source or Target.
- A resource of type NIC.



Note Several things can cause a VRE 3.1 Job resource to fail. Examples are the failure of a computer involved in the replication process, or failure of the computer hosting the RMS service. For this reason, you may want to set the **Critical** attribute of the VREJob resource to **FALSE**. This will prevent the VREJob resource from causing the entire service group to fail-over in the case of a replication Job failure.

▼ **To add the Job resource group:**

1. Open the **Add Resource** window by right-clicking the **Service Group** in the VCS Cluster Explorer.
2. Name the resource. This name should be unique in VCS, and describe the resource clearly for your use. We name our example "VRE Job" for clarity.
3. Select the VREJob resource in the **Resource Type** field.
4. In the **Value** fields, enter the parameters for the Job resource. See "Job Agent Resource Types" on page 3.
5. Click **Enabled**. This allows the Job resource to begin as soon as the resource is added.
6. Click **OK**. The Job resource is added within the VCS cluster.

7. Create the dependency in the Resource View. The Job resource should be dependant on the mount resource. The parent is the Job and the child is the mount resource; the NIC resource is another child of the Job resource.

To begin replicating with this Job, bring the Job Resource online. When the Job resource fails over, the replication Job stops and restarts in synchronization phase. This can lead to a small window of time in which write-order fidelity is compromised.

Offline for the VRE Job Agent means that the *Replication Exec* Job is stopped. Online means that the Job is started.

Replicating from Cluster to Cluster

When replicating files from a Source cluster to a Target cluster, each cluster needs to have its own cluster resource. When creating this resource for the Source cluster, set the cluster resource attribute "IsSource" to 1. For the replication Target cluster, set the cluster resource attribute "IsSource" to 0.

Note VCS clustering supports only one failover at a time.

Running the RMS and Job Resources in the Same Cluster

It is preferred that the RMS and Job resources operate in separate clusters. This gives the greatest protection to your data. It is possible to operate both in a single cluster.

If your cluster is configured to simultaneously run *rms* and *VREJob* resources, create a dependency between the rms resource and the VREJob resources. This dependency ensures that the rms resource will be brought online before the VREJob resources. You may still have to manually intervene after a system failure to bring VREJob resources online after a system failure. This happens because it can take several minutes for the *VREJob* type agent to reconnect to the *Replication Exec* RMS after an RMS failure. During this time, the *VREJob* resources will be marked as **offline** which can cause the cluster server software to "timeout" the resources and mark them as failed.

Changing Job Properties

Editing a *Replication Exec* Job that is under cluster control must be done outside of cluster control to avoid problems. When editing a Job, either with srTool or with the *Replication Exec* Console, follow this procedure.

▼ **To change a VRE 3.1 Job properties:**

1. Take the VREJob resource **offline**.
2. Set the Enabled attribute of the VREJob resource to **False**.
3. After the cluster resource has gone offline, and has been marked as **Not Enabled**, use either VRE 3.1 Console or the srTool to change the properties of the Job.
4. When the Job property changes have been made, set the Enabled attribute of the VREJob resource to **True**.
5. Bring the VREJob resource back **online**.

Sample Job Agent Configuration

This is an example of how the *Replication Exec* Job Agent can be used.

```
group ReplicateToFileShareGroup (
    )

  DiskRes RFS_DiskRes (
    Disks={1}
    Signatures = {4191935953}
    )

  FileShare RFS_User1 (
    Critical = 0
    ShareName = USER1
    MaxUsers = 200
    PathName = "\\HOME\\USER1"
    MountResName = RFS_Mount
    UserPermissions = { Administrator=FULL_CONTROL }
    )

  FileShare RFS_User2 (
    Critical = 0
    ShareName = USER2
    MaxUsers = 200
    PathName = "\\HOME\\USER2"
    MountResName = RFS_Mount
    UserPermissions = { Administrator=FULL_CONTROL }
    )

  Lanman RFS_Lanman (
```

```
    VirtualName = LANMAN1
    )

  Mount RFS_Mount (
    DriveLetter = T
    PartitionNo = 1
    FileSystemType = NTFS
    Signature = 4191935953
    ForceUnmount = 1
    ListApplication = 1
    )

  NIC RFS_NIC (
    UseConnectionStatus = 1
    AdapterName= El90x2
    PingTimeoutMseconds = 1000
    MaxTxErrorPercentage = 50
    MaxTxErrInterval = 10
    PingHostList = { }
    )

  VREJob RFS_ReplicationJob (
    JobName=MyJobName// The name of the replication job
    JobGUID=0 // Always 0
    IsSource=0// The cluster is the target of replication
    RMSUser=MyUserName// Your NT user name.
    RMSDomain=NTDomainName// Your NT domain Name.
    RMSPassword=xxxxxxxxxxxxxxx// Your password as encrypted with
rxcrypt.exe.
    AgentDebug=0// Do you want FULL logging.  This will generate a
LARGE amount of logging.
    Critical=0
  )

  RFS_Lanman requires RFS_User1
  RFS_Lanman requires RFS_User2
  RFS_ReplicationJob requires RFS_Mount
  RFS_User1 requires RFS_Mount
  RFS_User2 requires RFS_Mount
  RFS_Mount requires RFS_DiskRes

  RFS_Lanman requires RFS_NIC
  RFS_ReplicationJob requires RFS_NIC
```


Removing the Agent

When VRE is uninstalled the cluster agents are automatically uninstalled.

Note The cluster resources must be deleted before uninstalling a clustered RSA. Removing a clustered VRE component while the resources are defined can cause unwanted failovers and other configuration problems.

▼ To uninstall VERITAS Replication Exec:

1. Delete the VRE Job resource.

   Note If the resources exist when VRE is uninstalled, the user will be prompted before being allowed to continue. *If uninstall is continued, the uninstall of the cluster agents will fail and the user will have to remove the cluster resource type and any configured resources manually with the cluster administrative tools.*

2. Go to **Add/Remove** programs, select **VERITAS Replication Exec**, and remove the software.

3. Reboot.

▼ To remove the Job cluster agent only from a VRE server (leaving VRE installed):

1. Delete any resources of the VRE Job.

2. Open a command window and run the following command line:
   `clusinst.exe /uninstall /rx`

   To remove both the Job and RMS agents, run the following command:

   `clusinst.exe /uninstall /rms /rx`

Understanding Error Messages

This section contains all of the event logging messages that are displayed with normal logging turned on. When AgentDebug is turned on (set to 1), a message for every event and software action is placed in the log, and those extra messages are not listed here.

Message	Description
Add replication pair *server-name* : *server-name* failed because *error-string*.	The Job Agent software was not able to successfully make changes to the Job. SOLUTION: Make sure that the Job properties have not been changed. If they have been, delete the cluster resource and create a new one.
After start, couldn't get the job state for job *job-name* returned *error-string*.	The Job Agent software was not able to query the RMS to retrieve the state of the Job. The operation will be retried.
Begin Edit failed in SetReplicationPair *file-name: line-number*	The Job Agent software was trying to lock the Job but was unable to do so. SOLUTION: Ensure that the Job is not being edited by either the srtool utility or the *Replication Exec* Console.
Begin Edit Failed in SetReplicationPair *server-name* %d.	The Job Agent software was trying to lock the Job but was unable to do so. SOLUTION: Ensure that the Job is not being edited by either the srtool utility or the *Replication Exec* Console.
Begin Edit Failed in SetReplicationPair *job-name*	The Job Agent software was trying to lock the Job but was unable to do so. SOLUTION: Ensure that the Job is not being edited by either the srtool utility or the *Replication Exec* Console.
Could not cancel job *job-name* because *error-string.*	The Job Agent software was unable to stop the Job. SOLUTION. Verify that the computer's connection to the RMS is still valid. Also, ensure that the RMS is still available.
Could not find job *job-name* because *error-string*. Does it really exist?	The Job Agent software was not able to locate the Job. SOLUTION: Verify that the Job has not been deleted. Verify that the Job name is spelled correctly in the cluster resource argument list.

Message	Description
Could not find job *job-name* because *error-string*.	The Job Agent software could not find the Job. SOLUTION: Verify that the Job still exists and is spelled correctly in the JobName attribute of the resource.
Could not start job *job-name* because *error-string*.	The Job Agent software was not able to start the Job. This could be an indication that one of the computers involved in the Job is not functioning properly. This could also indicate that the connection to the RMS has been lost.
Deleted pair FAILED with server name *server-name*	The Job Agent software was not able to successfully make changes to the Job. SOLUTION: Ensure that the Job properties have not been changed. If they have been, delete the cluster resource and create a new one.
EndEdit failed for the Job *job-name file-name: line-number*	The Job Agent software was unable to save the Job properties changes that it has made. SOLUTION: Make sure that the Job properties have not been changed in the VRE 3.1 Console. If they have been, delete the cluster resource and create a new one. Also ensure that the computer's connection to the RMS is still active.
EndEdit failed in Set Replication Pair *server-name job-name*	The Job Agent software was unable to save the Job properties changes that it has made. SOLUTION: Make sure that the Job properties have not been changed. If they have been, delete the cluster resource and create a new one. Also, ensure that the computer's connection to the RMS is still active.
Entering RxMonitor for empty job name and returning offline.	The cluster resource is not properly configured. SOLUTION: Verify the that the resource and VREJob resource type are properly configured.
Entering RxOffline without a job name.	The cluster resource is not properly configured. SOLUTION: Verify the that the resource and VREJob resource type are properly configured.

Message	Description
Entering RxOnline without a job name.	The cluster resource is not properly configured. SOLUTION: Verify the that the resource and VREJob resource type are properly configured.
Monitor returning FALSE because SOB is not connected. Is your RMS online?	The Job Agent resource was not able to determine the state of the Job because it has either lost its connection to the RMS or has not connected yet. SOLUTION: Verify the connection to the RMS. If the RMS just came up, retry the operation after two minutes.
Offline returning FALSE because SOB is not connected. Is your RMS connected?	The Job Agent resource was not able to bring the resource offline because it has either lost its connection to the RMS or has not connected yet. SOLUTION: Verify the connection to the RMS. If the RMS just came up, retry the operation after two minutes.
Online returning FALSE because SOB is not connected. Is your RMS up?	The Job Agent software was unable to bring the cluster resource online, probably because the RMS is not connected or available.
ONLINE: SetReplicationPair failed while job still running because *error-string*.	The Job Agent software was not able to update the replication pair for the Job. The operation will be retried.
ONLINE: SetReplicationPair failed because *error-string*.	The Job Agent software was not able to update the replication pair for the Job. This could indicate a configuration problem with the Job or the cluster resource. SOLUTION: Verify the settings for the Job and the cluster resource.
ONLINE: Failed to call SetReplicationPair failed because *error-string*.	The Job Agent software was not able to update the replication pair for the Job. This could indicate configuration problems with the Job or the cluster resource. SOLUTION: Verify the settings for the Job and the cluster resource.
ONLINE: Was not able to start the job *job-name* because *error-string.*	The Job Agent software was not able to start the Job. This could indicate that one of the computers involved in the Job is not functioning properly. The operation will be retried.
RxInitialize -- count = *number*	This message does not indicate problem. This message is a marker in the log to show that the VREJob software started.

Message	Description
RxInitialize returned *error-string*. Will try again in *number* minutes. Waited a total of *number* minutes. TID: %d	The Job Agent software was not able to connect to the RMS server. This operation will be retried. SOLUTION: Ensure that the RMS server is running and that the network connection to the RMS server is functional.
RxMonitor : Job *job-name* Found Unexpected Job State : %s.	The Job Agent software found the Job to be in an unexpected state. SOLUTION: Please verify that the Job is correctly configured. If the Job is paused, please unpause it.
RxMonitor : Job *job-name* found to be running with errors.	The Job Agent software found the Job to be running with errors. SOLUTION: Using the VRE 3.1 console, diagnose the problem.
RxMonitor : Could not get state value for job *job-name* because *error-string*.	The Job Agent software was not able to determine the run state of the Job. This may indicate that the RMS server is not functioning or that the network connection to the RMS server is down.
RxMonitor : Returning OFFLINE: Could not open pair iterator because *error-string*.	The Job Agent software was not able to gather information pertaining to the pairs that make up the Job. This may indicate that the RMS server is not functioning or that the network connection to the RMS server is down.
RxMonitor : Returning OFFLINE: Could not determine replication pairs because *error-string*.	The Job Agent software was not able to gather information pertaining to the pairs that make up the Job. This may indicate that the RMS server is not functioning or that the network connection to the RMS server is down.
RxMonitor : Could not determine job state because GetComputerName failed. GLE=*Windows-error*.	The Job Agent software was not able to determine the name of this computer. The Windows error code is part of this message.
RxMonitor : Could not find Job *job-name* because *error-string*.	The Job Agent software could not find the Job. SOLUTION: Verify that the Job still exists and is spelled correctly in the JobName attribute of the resource.
RxMonitor : Returning OFFLINE because no pairs were detected.	The Job Agent software has determined that the Job contains no pairs. Please verify the configuration of the Job.

Message	Description
RxOnline : Could not set cluster specific properties for job *job-name*. Error = *error-string*.	The Job Agent software was not able to mark the Job as being owned by a cluster.
RxShutdown -- count = *number.*	This message does not indicate a problem. This message logs the fact that the connection to the RMS server has been closed.
SetReplicationPair was unable to get the server name property because *error-string*	While trying to update Job properties, the Job Agent software was not able to get some properties of the Job. SOLUTION: Ensure that the RMS is running correctly, that the Job exists, and that the network connection to the RMS is functioning properly.
Set SourceServerID in rule failed for server *server-name server-name*	The Job Agent software was not able to set the Source server id for the Job. This could indicate a problem with the configuration of the Job or the cluster resource. SOLUTION: Verify that the Job includes a server that is a member of the cluster. Also, ensure that the computer is still connected to the RMS.
Set SourceServerName in rule failed for server *server-id-number error-string*.	The Job Agent software was not able to properly set the Source server for the Job. This could indicate that the Source server is no longer part of the Replication Neighborhood or a problem with the Job itself. SOLUTION: Ensure that the Job still includes a member of the cluster. If the problem persists, recreate the Job first and then the cluster resource.
SOB_Open failed because *error-string.*	A connection to the RMS could not be opened. Please ensure that the RMS is running and that the network is properly connected. The software will automatically retry the operation.
Unable to detect RMS disconnect events. *error-string*	This message indicates that an internal error occurred and that the software will not be able to determine if the RMS server goes offline.

Clustering the Job Agent with MSCS 2

The Job Agent for Microsoft Cluster Server (MSCS) is an optional feature that can be installed with the RMS after the MSCS Cluster Server is installed. The cluster server software supports failover of a primary Job node to a secondary node.

The *VERITAS Replication Exec* (VRE 3.1) Job Agent allows network administrators, using cluster technology, to create replication Jobs in which the Source or the Target is highly available. In the event that a clustered server is shut down, replication Jobs running on the cluster follow the storage device associated with the replication Job to another node in that cluster, and where replication automatically resumes.

Note Only Standard (one-to-one) or Centralization (many-to-one) replication Jobs that are set to replicate continuously can be clustered with the Job Agent.

Note VRE 3.1 Job Agent is *not* a means to provide shared nothing clusters. VRE 3.1 will only replicate to physical file systems mounted directly on a Windows 2000 or 2003 server.

Prerequisites

The following should be performed before installing the Job Agent.

- The Microsoft Cluster Server software must be installed and configured for correct operation.
- The drive letter for the data being replicated must be the same on all nodes.
- The MSCS Service Group requires a shared storage device, managed by MSCS, that is available for replicated data.
- Ensure that the latest MSCS service pack is installed.
- User accounts that MSCS is running under must have backup and restore rights on the RMS and all nodes involved in replication.

Installation and Configuration

When the RSA installed on a machine all necessary clustering binaries are copied to the VRE services directory: `C:\Program Files\VERITAS\Replication Exec\Services`. The clustering agent is not configured as part of the VRE installation.

▼ **To install and configure the Job agent:**

1. Install VRE on a clustered node
2. Reboot
3. Open a command window and run the following command line:

   `clusinst.exe /install /rx`

Upgrading

Upgrading from any version of VSR/VRE 3.0 or higher will automatically update any installed and configured cluster agents. The agents must be taken off line before performing the VRE upgrade.

Note Upgrading over VSR 2.x will not upgrade the old cluster agent configurations. Follow the manual steps for the install of the agents as in the fresh install above.

▼ **To upgrade VRE 3.1 to future releases:**

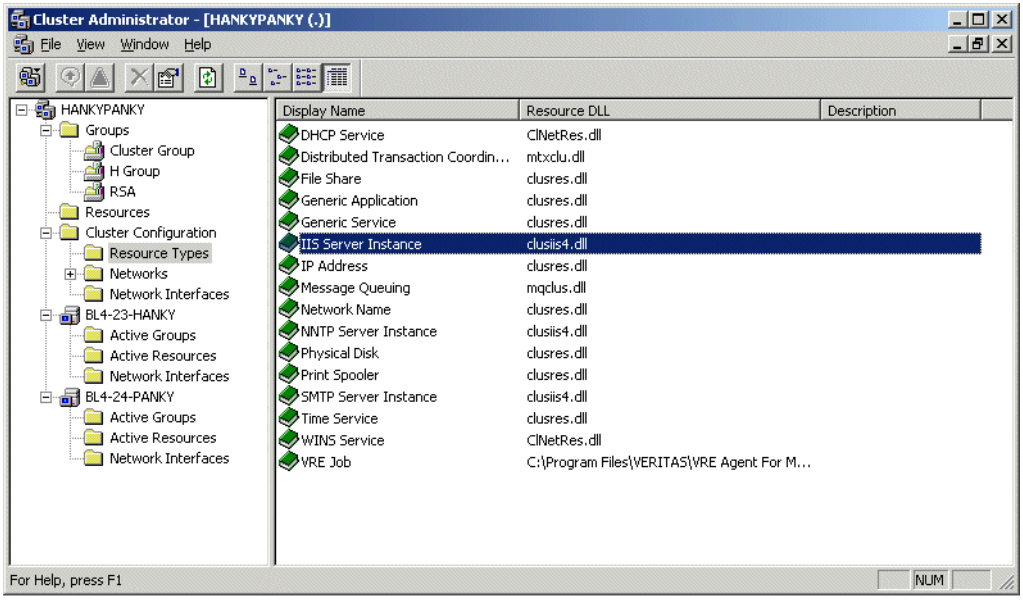
1. Take the Job agent resource off line on all nodes in the cluster.

   Note If the resources are active when VRE is upgraded, the user will be prompted to continue.

2. Upgrade VRE according to the procedures in the VRE 3.1 *Administrator's Guide*. This will automatically upgrade the cluster agents
3. Reboot.

Creating a Job Resource

Once the Job Agent software is installed on each node, you are ready to add the Job resource, using Microsoft Cluster Administrator.



Ensure that the following systems are available and operating correctly:

- MSCS Cluster Administrator
- A group with a physical disk resource

Note Several things can cause a VRE 3.1 Job resource to fail. Examples of this are the failure of a computer involved in the replication process, or the failure of the computer hosting the RMS service. For this reason, you may want to *uncheck* the **Affect the Group** attribute for the resource. This will prevent the VRE 3.1 Job resource from causing the entire group to fail-over in the case of a replication Job failure.

▼ To add the Job resource to the Group:

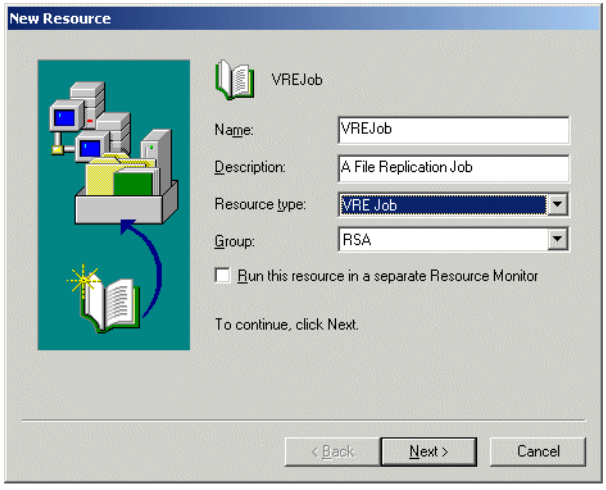
1. In the MSCS Cluster Administrator, select **File** menu, **New**, **Resource** to open the **New Resource** window. In the **New Resource** window, enter the following information:

   a. Name — you may want to give the resource the same name as the VRE 3.1 Job, to keep it simple and clear, although you can name it anything that is meaningful to you.

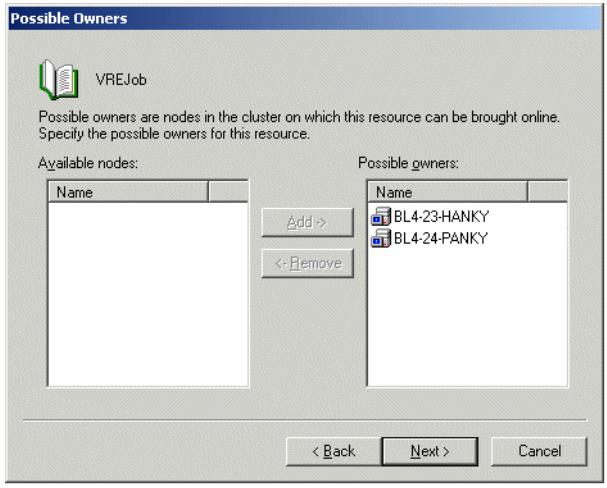
b. Description — optional.

c. Resource Type — from the drop-down menu, select **VRE Job**. If this is not available, then install the *Job Agent for Microsoft Cluster Server* software on this node. See "Creating a Job Resource" on page 19.

d. Group — from the drop-down menu, select the group where this resource is to be created. Click **Next** to continue.



2. On the Possible Owners window, choose the nodes where the Job resource can be brought online. This allows you to exclude some nodes in the cluster, if desired.



   a. Select the nodes to be included in the **Nodes** field.

   b. Click the **Add** button to move the node to the **Possible Owners** field. The figure above shows this step correctly completed.

   c. When all nodes that should be able to bring the Job Source or Target online are in the Possible Owners area, click **Next** to continue.

3. Create the **Dependencies**. Choose the resources to be brought online before the VRE 3.1 Job resource. The **Resource Dependencies** field on the right of the window lists the items available to the Job resource.

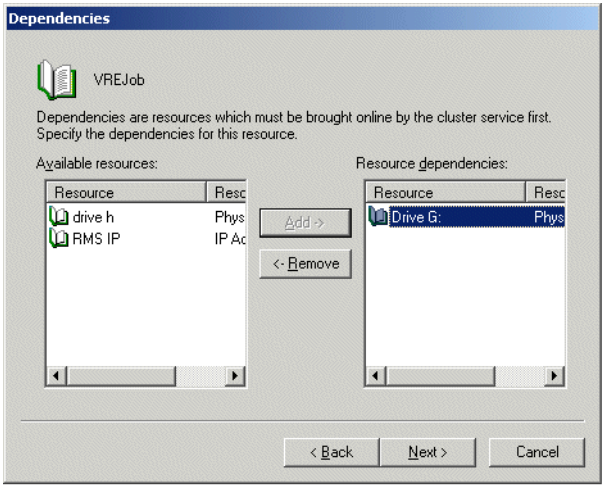
   a. Select the Job resource in the Resource field.

   b. Select the physical disk where you want the Job and click that disk icon in the Resource Dependencies field.

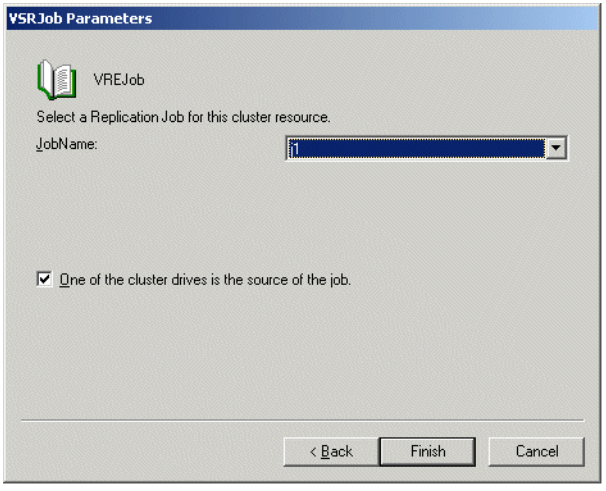
   c. Click the **Add** button to move the Job to the disk. The figure below shows this step correctly completed.

   d. Click **Next** to complete that creating the dependency.

   e. Select other resources as desired.



4. Select the Job to be clustered from the Job Name drop-down menu. This menu lists all the Jobs in this Replication Neighborhood that qualify to run under Cluster control. To create a new Job, click that button. For more information about creating a new Job, see the *VERITAS Replication Exec Administrator's Guide*.



If the replication Source server is on this cluster, leave the checkbox selected. To cluster the Target server, uncheck the box.

To begin replicating with this Job, bring the Job resource online. The physical disk resource must already be online, with a correctly running MSCS system. When the Job resource fails over, the replication Job stops and restarts in synchronization phase. This can lead to a small window of time in which write-order fidelity is compromised.

Offline for the VRE 3.1 Job Agent means that the VRE 3.1 Job is stopped. Online means that the Job is started.

Running the RMS and Job Resources in the Same Cluster

It is preferred that the RMS and Job resources operated in separate clusters. This gives the greatest protection to your data. It is possible to operate both in a single cluster.

If your cluster is configured to simultaneously run VRE RMS and VRE 3.1 Job resources, create a dependency between the RMS resource and the VRE 3.1 Job resources. This dependency ensures that the RMS resource will be brought online before the Job resources. You may still have to manually intervene after a system failure to bring Job resources online after a system failure. This happens because it can take several minutes for the VRE Job type agent to reconnect to the VRE 3.1 RMS after an RMS failure. During this time, the Job resources will be marked as **offline** which can cause the cluster server software to "timeout" the resources and mark them as failed.

Changing Job Properties

Editing a VRE 3.1 Job that is under cluster control must be done outside of cluster control to avoid problems. When editing a Job, either with srTool or with the *Replication Exec* Console, follow this procedure.

▼ **To change a VRE 3.1 Job properties:**

1. Take the VRE 3.1 Job resource offline.

2. After the cluster resource is offline, use either *Replication Exec* Console or the srTool to change the properties of the Job.

3. When the Job property changes have been made, bring the VRE 3.1 Job resource back online.

Removing the Agent

When VRE is uninstalled the cluster agents are automatically uninstalled.

Note The cluster resources must be deleted before uninstalling a clustered Job Agent. Removing a clustered VRE component while the resources are defined can cause unwanted failovers and other configuration problems.

▼ **To uninstall VERITAS Replication Exec:**

1. Delete the VRE Job resource.

   Note If the resources exist when VRE is uninstalled, the user will be prompted before being allowed to continue. *If uninstall is continued, the uninstall of the cluster agents will fail and the user will have to remove the cluster resource type and any configured resources manually with the cluster administrative tools.*

2. Go to **Add/Remove** programs, select **VERITAS Replication Exec**, and remove the software.

3. Reboot.

▼ **To remove the Job cluster agent only from a VRE server (leaving VRE installed):**

1. Delete the VRE Job resource.

2. Open a command window and navigate to the VRE services directory

3. Run the following command line:

   ```
   clusinst.exe /uninstall /rx
   ```

   To uninstall the Job and RMS agents, run the following command:

   ```
   clusinst.exe /uninstall /rms /rx
   ```

Understanding Error Messages

This section contains all of the event logging messages that are displayed with normal logging turned on.

Message	Description
Add replication pair *server-name*: *server-name* failed because *error-string*.	The Job Agent software was not able to successfully make changes to the Job. SOLUTION: Make sure that the Job properties have not been changed. If they have been, delete the cluster resource and create a new one.
After start, couldn't get the job state for job *job-name* returned *error-string*.	The Job Agent software was not able to query the RMS to retrieve the state of the Job. The operation will be retried.

Message	Description
Begin Edit failed in SetReplicationPair *file-name: line-number*	The Job Agent software was trying to lock the Job but was unable to do so. SOLUTION: Ensure that the Job is not being edited by either the srTool utility or the VRE Console.
Begin Edit Failed in Set Replication Pair *server-name* %d.	The Job Agent software was trying to lock the Job but was unable to do so. SOLUTION: Ensure that the Job is not being edited by either the srTool utility or the VRE Console.
Begin Edit Failed in Set Replication Pair *job-name*	The Job Agent software was trying to lock the Job but was unable to do so. SOLUTION: Ensure that the Job is not being edited by either the srTool utility or the VRE Console.
Could not cancel job *job-name* because *error-string.*	The Job Agent software was unable to stop the Job. SOLUTION. Verify that the computer's connection to the RMS is still valid. Also, ensure that the RMS is still available.
Could not find job *job-name* because *error-string*. Does it really exist?	The Job Agent software was not able to locate the Job. SOLUTION: Verify that the Job has not been deleted. Verify that the Job name is spelled correctly in the cluster resource argument list.
Could not find job *job-name* because *error-string.*	The Job Agent software could not find the Job. SOLUTION: Verify that the Job still exists and is spelled correctly in the JobName attribute of the resource.
Could not start job *job-name* because *error-string.*	The Job Agent software was not able to start the Job. This could be an indication that one of the computers involved in the Job is not functioning properly. This could also indicate that the connection to the RMS has been lost.
Deleted pair FAILED with server name *server-name*	The Job Agent software was not able to successfully make changes to the Job. SOLUTION: Ensure that the Job properties have not been changed. If they have been, delete the cluster resource and create a new one.

Message	Description
EndEdit failed for the Job *job-name file-name: line-number*	The Job Agent software was unable to save the Job properties changes that it has made. SOLUTION: Make sure that the Job properties have not been changed in the VRE Console. If they have been, delete the cluster resource and create a new one. Also ensure that the computer's connection to the RMS is still active.
EndEdit failed in Set Replication Pair *server-name job-name*	The Job Agent software was unable to save the Job properties changes that it has made. SOLUTION: Make sure that the Job properties have not been changed. If they have been, delete the cluster resource and create a new one. Also, ensure that the computer's connection to the RMS is still active.
Entering RxMonitor for empty job name and returning offline.	The cluster resource is not properly configured. SOLUTION: Verify the that the resource and VREJob resource type are properly configured.
Entering RxOffline without a job name.	The cluster resource is not properly configured. SOLUTION: Verify the that the resource and VREJob resource type are properly configured.
Entering RxOnline without a job name.	The cluster resource is not properly configured. SOLUTION: Verify the that the resource and VREJob resource type are properly configured.
Monitor returning FALSE because SOB is not connected. Is your RMS online?	The Job Agent resource was not able to determine the state of the Job because it has either lost its connection to the RMS or has not connected yet. SOLUTION: Verify the connection to the RMS. If the RMS just came up, retry the operation after two minutes.
Offline returning FALSE because SOB is not connected. Is your RMS connected?	The Job Agent resource was not able to bring the resource offline because it has either lost its connection to the RMS or has not connected yet. SOLUTION: Verify the connection to the RMS. If the RMS just came up, retry the operation after two minutes.
Online returning FALSE because SOB is not connected. Is your RMS up?	The Job Agent software was unable to bring the cluster resource online, probably because the RMS is not connected or available.
ONLINE: SetReplicationPair failed while job still running because *error-string*.	The Job Agent software was not able to update the replication pair for the Job. The operation will be retried.

Message	Description
ONLINE: SetReplicationPair failed because *error-string*.	The Job Agent software was not able to update the replication pair for the Job. This could indicate a configuration problem with the Job or the cluster resource. SOLUTION: Verify the settings for the Job and the cluster resource.
ONLINE: Failed to call SetReplicationPair failed because *error-string*.	The Job Agent software was not able to update the replication pair for the Job. This could indicate configuration problems with the Job or the cluster resource. SOLUTION: Verify the settings for the Job and the cluster resource.
ONLINE: Was not able to start the job *job-name* because *error-string.*	The Job Agent software was not able to start the Job. This could indicate that one of the computers involved in the Job is not functioning properly. The operation will be retried.
RxInitialize -- count = *number*	This message does not indicate problem. This message is a marker in the log to show that the VREJob software started.
RxInitialize returned *error-string*. Will try again in *number* minutes. Waited a total of *number* minutes. TID: %d	The Job Agent software was not able to connect to the RMS server. This operation will be retried. SOLUTION: Ensure that the RMS server is running and that the network connection to the RMS server is functional.
RxMonitor : Job *job-name* Found Bogus Job State : %s.	The Job Agent software found the Job to be in an unexpected state. SOLUTION: Please verify that the Job is correctly configured. If the Job is paused, please unpause it.
RxMonitor : Job *job-name* found to be running with errors.	The Job Agent software found the Job to be running with errors. SOLUTION: Using the VRE console, diagnose the problem.
RxMonitor : Could not get state value for job *job-name* because *error-string.*	The Job Agent software was not able to determine the run state of the Job. This may indicate that the RMS server is not functioning or that the network connection to the RMS server is down.
RxMonitor : Returning OFFLINE: Could not open pair iterator because *error-string.*	The Job Agent software was not able to gather information pertaining to the pairs that make up the Job. This may indicate that the RMS server is not functioning or that the network connection to the RMS server is down.
RxMonitor : Returning OFFLINE: Could not determine replication pairs because *error-string.*	The Job Agent software was not able to gather information pertaining to the pairs that make up the Job. This may indicate that the RMS server is not functioning or that the network connection to the RMS server is down.

Message	Description
RxMonitor : Could not determine job state because GetComputerName failed. GLE=*Windows-error.*	The Job Agent software was not able to determine the name of this computer. The Windows error code is part of this message.
RxMonitor : Could not find Job *job-name* because *error-string.*	The Job Agent software could not find the Job. SOLUTION: Verify that the Job still exists and is spelled correctly in the JobName attribute of the resource.
RxMonitor : Returning OFFLINE because no pairs were detected.	The Job Agent software has determined that the Job contains no pairs. Please verify the configuration of the Job.
RxOnline : Could not set cluster specific properties for job *job-name*. Error = *error-string*.	The Job Agent software was not able to mark the Job as being owned by a cluster.
RxShutdown -- count = *number.*	This message does not indicate a problem. This message logs the fact that the connection to the RMS server has been closed.
SetReplicationPair was unable to get the server name property because *error-string*	While trying to update Job properties, the Job Agent software was not able to get some properties of the Job. SOLUTION: Ensure that the RMS is running correctly, that the Job exists, and that the network connection to the RMS is functioning properly.
Set SourceServerID in rule failed for server *server-name server-name*	The Job Agent software was not able to set the Source server ID for the Job. This could indicate a problem with the configuration of the Job or the cluster resource. SOLUTION: Verify that the Job includes a server that is a member of the cluster. Also, ensure that the computer is still connected to the RMS.
Set SourceServerName in rule failed for server *server-id-number error-string.*	The Job Agent software was not able to properly set the Source server for the Job. This could indicate that the Source server is no longer part of the Replication Neighborhood or a problem with the Job itself. SOLUTION: Ensure that the Job still includes a member of the cluster. If the problem persists, recreate the Job first and then the cluster resource.
SOB_Open failed because *error-string.*	A connection to the RMS could not be opened. Please ensure that the RMS is running and that the network is properly connected. The software will automatically retry the operation.

Message	Description
Unable to detect RMS disconnect events. %s	This message indicates that an internal error occurred and that the software will not be able to determine if the RMS server goes offline.

Clustering the RMS with VCS 3

The RMS Agent for VERITAS Cluster Server (VCS) is an optional feature that can be installed with VRE 3.1 after the Cluster Server software is installed and configured. The cluster server software supports failover of a primary RMS node to a secondary node.

The Replication Management Server (RMS) manages many replication operations in the Replication Neighborhood. To ensure that these operations continue, the RMS can be operated on a cluster. In the event that the RMS server suffers a failure, the replication management functions move to another node in that cluster, and the cluster server software restarts the RMS on the new node.

Prerequisites

The following should be performed before installing the RMS Agent.

- The VERITAS Cluster Server software must be installed and configured for correct operation.
- The drive letter for the data being replicated must be the same on all nodes.
- The VCS Service Group requires a shared storage device, managed by VCS, that is available for replicated data.
- Ensure that the latest VCS service pack is installed.

Installation and Configuration

When the RMS is installed on a machine all necessary clustering binaries are copied to the VRE services directory: `C:\Program Files\VERITAS\Replication Exec\Services`. The clustering agent is not configured as part of the VRE installation.

The RMS should be installed on every node in the cluster before configuring the RMS agent. This requires some manual steps.

▼ **To install and configure the RMS agent:**

1. Install VRE 3.1 on each machine in the cluster, and reboot.
2. Open a command window and run the following command line:

   ```
   clusinst.exe /install /rms
   ```

3. Repeat step 2 on each machine in the cluster.

Upgrading

Upgrading from any version of VSR/VRE 3.0 or higher will automatically update any installed and configured cluster agents. The agents must be taken off line before performing the VRE upgrade.

Note Upgrading over VSR 2.x will not upgrade the old cluster agent configurations. Follow the manual steps for the install of the agents as in the fresh install above.

▼ **To upgrade VRE 3.1 to future releases:**

1. Take the RMS resource off line on all nodes in the cluster.

   Note If the resources are active when VRE is upgraded, the user will be prompted to continue.

2. Upgrade VRE according to the procedures in the VRE 3.1 *Administrator's Guide*. This will automatically upgrade the cluster agents
3. Reboot, if the machine is also an RSA.

Creating an RMS Resource

Once the RMS Agent software is installed on each node, you are ready to add the RMS resource.

Ensure that the following systems are available and operating correctly:

- VCS Cluster Manager/Explorer
- A Service Group that contains a resource of type VMDg (VM disk group) and a resource of type MountV. These resources are used by the RMS to store the database.

- A resource of type IP address to be used by RMS clients to connect. See "Configuring Replication Exec for Your Network" on page 36.

Note Only one RMS resource is allowed per cluster.

RMS Agent Resource Types

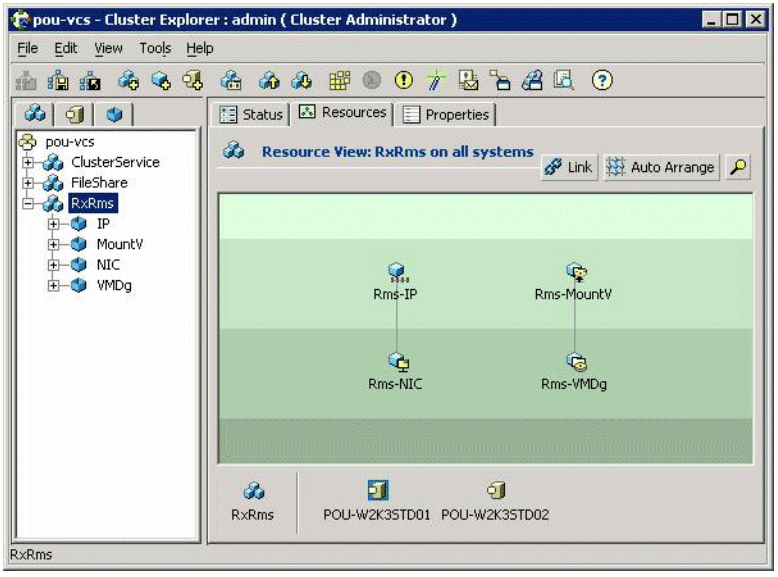
Before configuring the Agent, review the following resource attributes and their dependencies.

Attributes	Type and Dimension	Definition
PathName	string	The full path name to a directory on the shared device that holds the RMS database directories. The drive used in this path name must be in the same Service Group as the mount point.
RmsID	string	The GUID for the RMS server. (Read only)

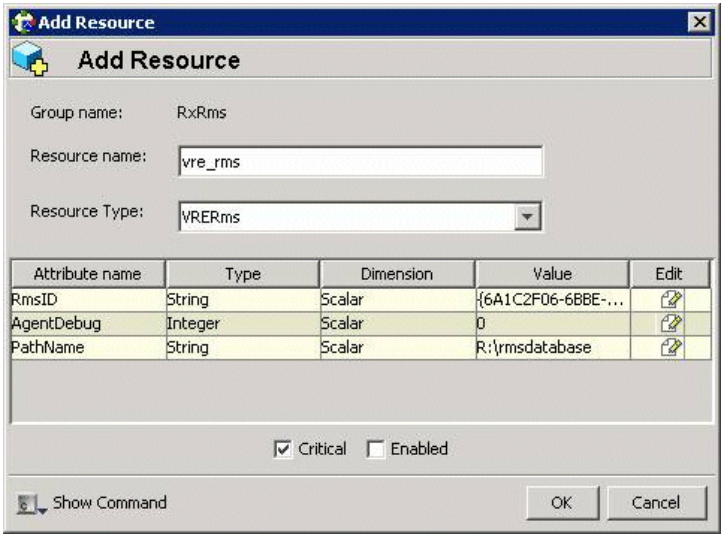
▼ To add the RMS resource to a Service Group:

1. Open the **Add Resource** menu by right-clicking the Service Group in the VCS Cluster Administrator.

   Create the VCS Service Group before creating the RMS resource. The VCS Service Group contains the IP resource, NIC resource, MountV resource, and VMDg resource.



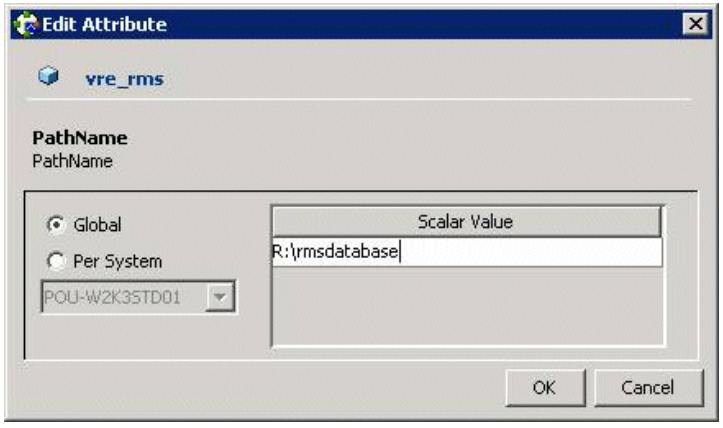
2. Name the resource. This name should be unique in VCS, and describe the resource clearly for your use. We name our example "vre_rms" for clarity.



3. Select the **VRERms** resource type in the **Resource Type** field.

4. Click **Edit** to change the Attribute (path) name. Enter the path to the directory on which to store RMS data files. This must be on a drive managed by this Service Group.

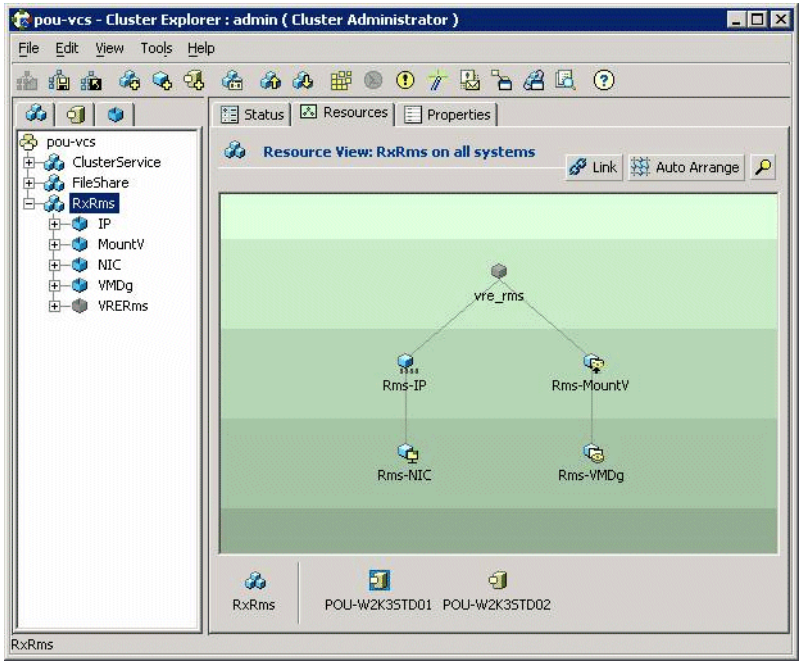
   Edit the attribute `PathName` to enter the RMS database location (for example, `R:\rmsdatabase`).



5. Click **OK**. The VRERms resource is added within the VCS Service Group.

   Add **VRERms** resource to VCS service group (for example `RxRms`).

6. Create the dependency in the Service Group's **Resources View**. VRERms is the parent of both IP and MountV resource.



7. Bring the RMS resource online to begin using this RMS. When the RMS resource fails over, it will stop and restart. This can lead to a small window of time in which the Console cannot connect to the RMS.

Configuring Replication Exec for Your Network

In a clustered environment, the *Replication Exec* RMS Agent software uses two types of network addresses, one that is assigned to the cluster that is used by the VRE 3.1 clients to connect to the *Replication Exec* RMS and network addresses that are not shared among the nodes of the cluster that are used for internal communications.

Your *Replication Exec* RMS resource should depend on a Shared IP Address resource that the members of your Replication Neighborhood can use to contact the *Replication Exec* RMS. If the computers in your Replication Neighborhood are not in the same network or sub-network as the nodes of your cluster that will host the RMS Service, you will have to make a change to your registry to enter the shared IP address.

Make the following registry change on the computers that make up your Replication Neighborhood that are not in the same sub-net as the nodes that can host your RMS. Using the REGEDIT application, locate the key under `HKEY_LOCAL_MACHINE\SOFTWARE\VERITAS\ENL`. If the key Network.TCPIP does not

exist under the ENL key, create it. Under the Network.TCPIP key, create a **REG_SZ** value called **Gateway**. Assign the shared IP address to this value using standard dotted notation. *Do not use a host name. You must enter the TCP/IP address.*

The *Replication Exec* RMS software needs to know which TCP/IP address to use for internal communications. The address supplied must have the following properties.

- The address may not be shared with other computers or among the nodes of the cluster. The address must be unique to the node that it is being used on.
- The address must be a static address.
- The network address must be accessible from the computers that make up your Replication Neighborhood. This usually means that the address must be on your public network. Do not choose a network address that is used exclusively for cluster communications.
- It must be an IP address assigned to a public adapter.

On each node of your cluster that can host the RMS, make the following change. Using the REGEDT32 application, locate the key under `HKEY_LOCAL_MACHINE\SOFTWARE\VERITAS\ENL`. If the key Network.TCPIP does not exist, create it. Under the Network.TCPIP key, create a **REG_SZ** value called **PreferredAddress**. Assign the shared IP address to this value using standard dotted notation. *Do not use a host name. You must enter the TCP/IP address.*

Sample VRERms Agent Configuration

This is an example of how the VRERms Agent can be used.

```
group RxRms (
SystemList = { POU-W2K3STD02 = 0, POU-W2K3STD01 = 1 }
            )
            IP Rms-IP (
                        Address = "10.141.65.214"
                        SubNetMask = "255.255.248.0"
                       MACAddress @POU-W2K3STD02 = "00-08-74-C5-95-E1"
                       MACAddress @POU-W2K3STD01 = "00-0B-DB-28-12-49"
                        )

            MountV Rms-MountV (
                        MountPath = "R:"
                        VolumeName = Mirrored_34GB
                        VMDGResName = Rms-VMDg
                        ForceUnmount = ALL

                        )
```


```
NIC Rms-NIC (
             Enabled = 0
           MACAddress @POU-W2K3STD02 = "00-08-74-C5-95-E1"
           MACAddress @POU-W2K3STD01 = "00-0B-DB-28-12-49"
             )

VMDg Rms-VMDg (
             DiskGroupName = MirrorClusterGroup
             ForceImport = 1
             ForceDeport = 1
             )

Rms-MountV requires Rms-VMDg
Rms-IP requires Rms-NIC
```

Removing the Agent

Uninstalling the RMS Agent software leaves the VRE 3.1 Console and RSA intact.

Moving a Clustered RMS to a Standalone Server

When removing the RMS from a cluster, the RMS data files need to be moved to a standalone server. The RMS journal files are specific to a computer and should not be moved.

Note Moving the RMS data will cause a brief interruption of the RMS service.

Caution If the standalone server that will become the RMS has any previous RMS data, that data will be overwritten when the clustered RMS files are moved to the standalone RMS.

▼ To move the clustered RMS data to a standalone server

1. Bring the RMS resource offline.
2. Copy the RMS database files (`rms.db` and `rms.log`) from the cluster database location to the standalone RMS server database location.
3. So that the RMS can now locate the database files, make the following Registry change on the standalone server.

   ```
   [HKEY_LOCAL_MACHINE\SOFTWARE\ODBC\ODBC.INI\RMS] "DatabaseFile"=
   <RMS database location>\rms.db
   ```

4. Start the *Replication Exec* DBMS service on the stand-alone server.

Uninstalling the Agent

▼ **To remove the RMS cluster agent only from a VRE server (leaving VRE installed):**

1. Delete the VRE RMS resource.
2. Open a command window and navigate to the VRE services directory
3. Run the following command line:

   ```
   clusinst.exe /uninstall /rms
   ```

   To remove both the Job and RMS agents, run the following command:

   ```
   clusinst.exe /uninstall /rms /rx
   ```

Uninstalling the RMS

When VRE is uninstalled the cluster agents are automatically uninstalled.

Note The cluster resources must be taken off line and deleted before uninstalling a clustered RMS. Removing a clustered VRE component while the resources are active can cause unwanted failovers and other configuration problems.

▼ **To uninstall VERITAS Replication Exec:**

1. Delete the RMS resource.

   Note If the resources exist when VRE is uninstalled, the user will be prompted before being allowed to continue. *If uninstall is continued, the uninstall of the cluster agents will fail to uninstall and the user will have to remove the cluster resource type and any configured resources manually with the cluster administrative tools.*

2. Go to **Add/Remove** programs, select **VERITAS Replication Exec**, and remove the software.

Understanding Error Messages

This section contains all of the event logging messages that are displayed with normal logging turned on. When AgentDebug is turned on (set to 1), a message for every event and software action is placed in the log, and those extra messages are not listed here.

Message	Description
OFFLINE -- Could not create the RMS Service object! *windows-error-code*	The RMS Agent software was not able to allocate memory.
OFFLINE -- Failed to delete the RMS database registry key. *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
OFFLINE -- Failed to stop the RMS service! Error = *windows-error-code*	The RMS Agent software was not able to stop the VRE RMS service. Please verify your *Replication Exec* installation. You may need to reboot to recover from the problem.
ONLINE: Unable to fetch to the ENL Home Path. Error: *windows-error-code*	The RMS Agent software was not able to retrieve critical information from the registry.
ONLINE -- Unable to set the service start type for the RMS service. *windows-error-code*	The RMS Agent software was not able to set the correct start type for the RMS service. Ensure that *Replication Exec* has been properly installed.
MONITOR -- Could not allocate a service object. Perhaps out of memory. *windows-error-code*	The RMS Agent software was not able to allocate memory.
The service *rms* does not exist. *windows-error-code*	The VRE RMS service is not present on the cluster node. Ensure that *Replication Exec* is still installed.
The RMS database directory *directory-name* does not exist and could not be created. Error: *windows-error-code*	This message indicates that the Pathname resource attribute indicates a non-existent directory and that the RMS Agent software was not able to create the directory.
Unable to allocate the RMS Service object. Perhaps out of memory. *windows-error-code*	The RMS Agent software was not able to allocate memory.
Unable to bring the RMS online because the volume *drive-letter* does not exist.	This message indicates that the path name given for the location of the RMS datafiles does not exist. This could be because the cluster resource controlling the device is not online or that the RMS resource is not properly configured.
Unable to determine the run state for the RMS service. *windows-error-code*	The RMS Agent software was not able to determine if the VRE RMS service was running.

Message	Description
Unable to open the registry key *registry-key.* Error: *windows-error-code*	The RMS Agent software was not able to retrieve critical information from the registry.
Unable to open the registry key *registry-key* while trying to create the master key. Error: *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to open the RMS root key.*registry-key windows-error-code*	The RMS Agent software was not able to retrieve critical information from the registry.
Unable to set the ENL Alert path value. Error: *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to set the ENL Store path value. Error: *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to set the 'Master' registry value *registry-key.* WinError= *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to set the last database location in the registry. Error:*windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to set the RMS value. Error: *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to start the RMS Service. Error: *windows-error-code*	The RMS Agent software was not able to start the VRE RMS service. Ensure that the *Replication Exec* software is properly installed. You may need to reboot this cluster node to recover from this error.
Unable to stop the RMS while preparing for resource online. *windows-error-code*	The RMS Agent software was not able to stop the VRE RMS service. You may need to reboot this node to recover.
VRERMS Online	This is a normal condition

Clustering the RMS with MSCS 4

The RMS Agent for Microsoft Cluster Server™ (MSCS) is an optional feature that can be installed after both the Cluster Server and VRE 3.1 software have been installed and configured. The cluster server software supports failover of the RMS operations from one node to another.

The Replication Management Server (RMS) manages many replication operations in the replication Neighborhood. To provide for the continued operation of the RMS service in the event of a system failure, the RMS can be made highly available using MSCS. In the event that the RMS server is shut down, the replication management functions move to another node in that cluster, and the cluster server software restarts the RMS on the new node.

Prerequisites

The following should be performed before installing the RMS Agent.

- The Microsoft Cluster Server software must be installed and configured for correct operation.
- The drive letter for the data being replicated must be the same on all nodes.
- The MSCS Service Group requires a shared storage device, managed by MSCS, that is available for replicated data.
- Ensure that the latest MSCS service pack is installed.

Installation and Configuration

When the RMS is installed on a machine all necessary clustering binaries are copied to the VRE services directory: `C:\Program Files\VERITAS\Replication Exec\Services`. The clustering agent is not configured as part of the VRE installation.

The RMS should be installed on every node in the cluster before configuring the RMS agent. This requires some manual steps.

▼ **To install and configure the RMS agent:**

1. Install VRE 3.1 on each machine in the cluster.
2. Open a command window and run the following command:

   ```
   clusinst.exe /install /rms
   ```

3. Repeat step 2 on each machine in the cluster.

Upgrading

Upgrading from any version of VSR/VRE 3.0 or higher will automatically update any installed and configured cluster agents. The agents must be taken off line before performing the VRE upgrade.

Note Upgrading over VSR 2.x will not upgrade the old cluster agent configurations. Follow the manual steps for the install of the agents as in the fresh install above.

▼ **To upgrade from VSR 3.0 or VRE 3.1 to future releases:**

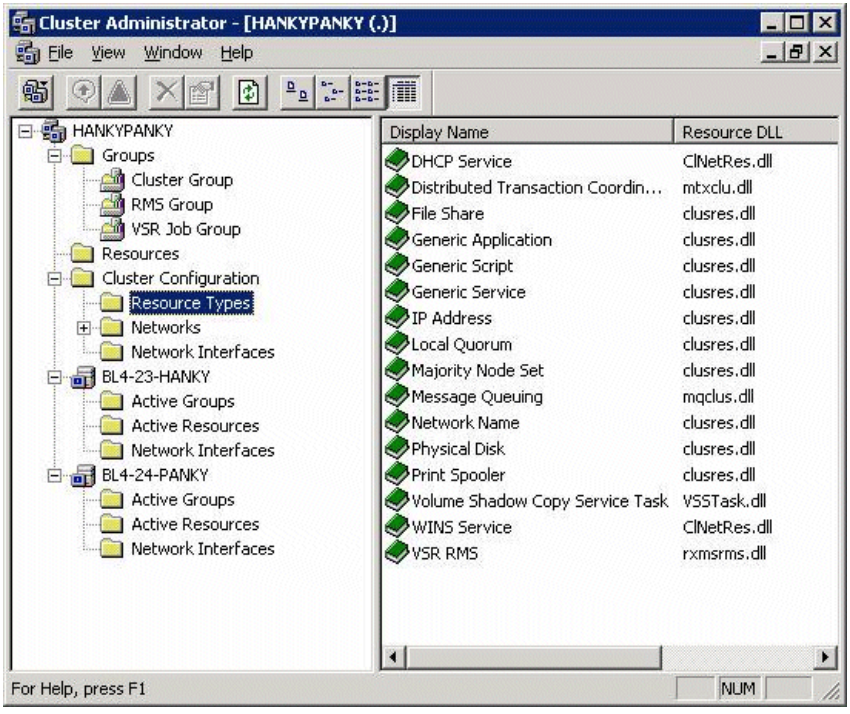
1. Take the RMS resource off line on all nodes in the cluster.

   Note If the resources are active when VRE is upgraded, the user will be prompted to continue.

2. Upgrade VRE according to the procedures in the VRE 3.1 *Administrator's Guide*. This will automatically upgrade the cluster agents

Creating an RMS Resource

Once the RMS Agent software is installed on each node, the RMS resource may be added using Microsoft Cluster Administrator.



Ensure that the following systems are available and operating correctly:

- MSCS Cluster Administrator
- A group with both of the following:
  - A physical disk resource to store the RMS data files.
  - An IP address managed by MSCS. See "Configuring VRE 3.1 for Your Network" on page 48.

Note Only one RMS resource is allowed per cluster.

▼ To add the RMS resource to the Group

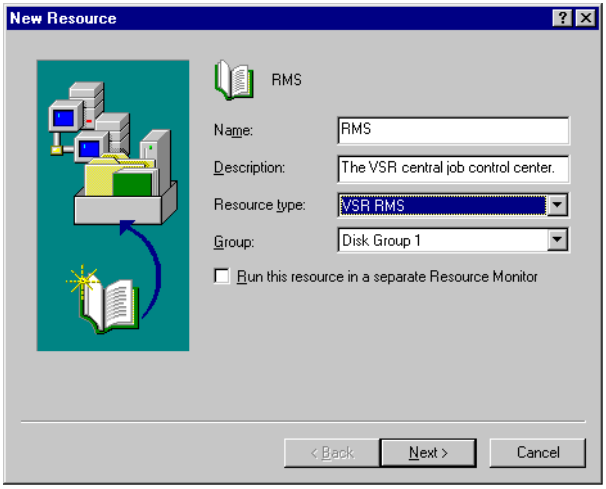
1. In the MSCS Cluster Administrator, select **File** menu, **New**, **Resource** to open the **New Resource** window. In the **New Resource** window, enter the following information:

   a. Name — the resource might be named "RMS" to keep it simple and clear, although any name may be selected.

   b. Description — optional.

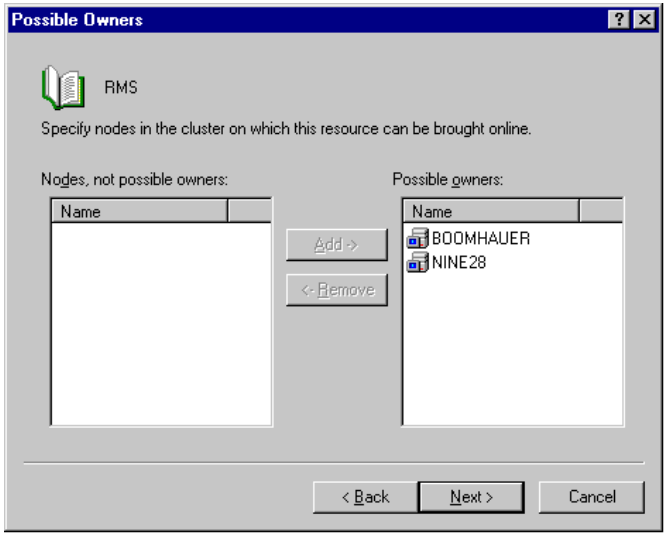
   c. Resource Type — from the drop-down menu, select **VRE RMS**. If this is not available, then install the *RMS Agent for Microsoft Cluster Server* software on this node. See "Creating an RMS Resource" on page 45.

   d. Group — from the drop-down menu, select the group where this resource is to be created.



Click **Next** to continue.

2. On the **Possible Owners** window, choose the nodes where the RMS resource can run. This allows some nodes in the cluster to be excluded, if desired.



   a. Select the nodes to be included in the **Nodes** field.

   b. Click the **Add** button to move the node to the **Possible Owners** field. The figure above shows this step correctly completed.

   c. When all nodes that should be able to bring the RMS online are in the **Possible Owners** area, click **Next** to continue.

3. Create the **Dependencies**. Choose the resources to be brought online before the RMS resource. The RMS resource type requires a dependency on a physical disk resource and an IP address resource. The **Resource Dependencies** field on the right of the window lists the items available to the RMS resource.

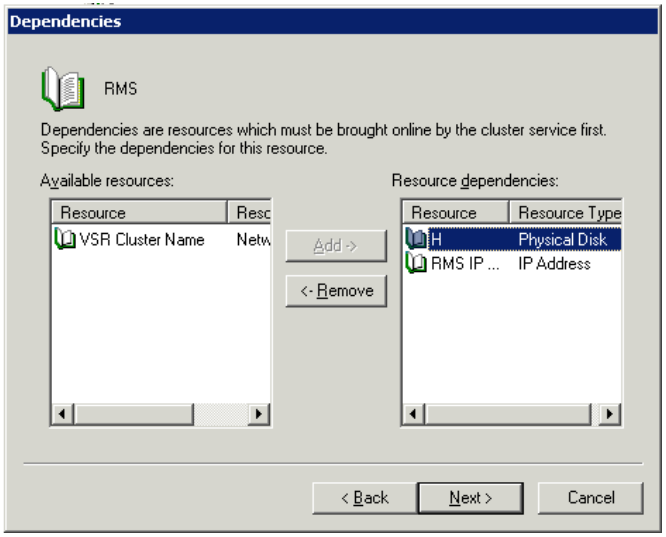
   a. Select the RMS resource in the **Resource** field.

   b. Select the physical disk where the RMS should be placed and click that disk icon in the Resource Dependencies field.

   c. Select an IP address for use by the RMS clients to locate the RMS. See "Configuring VRE 3.1 for Your Network" on page 48.

   d. Click the **Add** button to move the RMS to the disk. The figure below shows this step correctly completed.

e. Click **Next** to complete that creating the dependency.



4. Enter the path to the RMS database directory on the shared drive.

5. Bring the group online to start the RMS service.

Configuring VRE 3.1 for Your Network

In a clustered environment, the RMS Agent software uses two types of network addresses, one that is assigned to the cluster that is used by the *Replication Exec* clients to connect to the VRE 3.1 RMS, and network addresses that are not shared among the nodes of the cluster that are used for internal communications.

The RMS resource should depend on a Shared IP Address resource that the members of the Replication Neighborhood can use to contact the RMS. If the computers in the Replication Neighborhood are not in the same network or sub-network as the nodes of the cluster that will host the RMS Service, changes will have to be made to the registry to enter the shared IP address.

Caution Using Registry Editor incorrectly can cause serious problems that may require reinstalling the operating system. VERITAS cannot guarantee that problems resulting from the incorrect use of Registry Editor can be solved. *Use Registry Editor at your own risk.*

▼ To configure VRE 3.1 for your network

1. Make the following registry change on the computers that make up your Replication Neighborhood that are not in the same sub-net as the nodes that can host the RMS.

2. Using the Registry editor, locate the key under `HKEY_LOCAL_MACHINE\SOFTWARE\VERITAS\ENL`.

   If the key Network.TCPIP does not exist under the ENL key, create it.

3. Under the Network.TCPIP key, create a **REG_SZ** value called **Gateway**.

4. Assign the local IP address to this value using standard dotted notation. *Do not use a host name. You must enter the TCP/IP address.*

   The VRE 3.1 RMS software needs to know which TCP/IP address to use for internal communications. The address supplied must have the following properties.

   - The address may not be shared with other computers or among the nodes of the cluster. The address must be unique to the node that is being used.
   - The address must be a static address.
   - The network address must be accessible from the computers that make up the replication Neighborhood. This usually means that the address must be on the public network. *Do not choose a network address that is used exclusively for cluster communications*.

Note The following two steps are performed on the RMS server and not the RSA server.

5. On each node of your cluster that can host the RMS, make the following change. Using the Registry editor, locate the key under `HKEY_LOCAL_MACHINE\SOFTWARE\VERITAS\ENL`.

   If the key Network.TCPIP does not exist, create it.

6. Under the Network.TCPIP key, create a **REG_SZ** value called **PreferredAddress**. Assign the local IP address to this value using standard dotted notation. *Do not use a host name. The TCP/IP address must be entered.*

Removing the Agent

Uninstalling the RMS Agent software leaves the VRE 3.1 Console and RSA intact.

Moving a Clustered RMS to a Standalone Server

When removing the RMS from a cluster, the RMS data files need to be moved to a standalone server. The RMS journal files are specific to a computer and should not be moved.

Note Moving the RMS data will cause a brief interruption of the RMS service.

Caution If the standalone server that will become the RMS has any previous RMS data, that data will be overwritten when the clustered RMS files are moved to the standalone RMS.

▼ **To move the clustered RMS data to a standalone server**

1. Bring the RMS resource offline.
2. Copy the RMS database files (`rms.db` and `rms.log`) from the cluster database location to the standalone RMS server database location.
3. So that the RMS can now locate the database files, make the following Registry change on the standalone server.

   ```
   [HKEY_LOCAL_MACHINE\SOFTWARE\ODBC\ODBC.INI\RMS] "DatabaseFile"=
   <RMS database location>\rms.db
   ```

4. Restart the *Replication Exec* DBMS service.

Uninstalling the Agent

▼ **To remove the RMS cluster agent only from a VRE server (leaving VRE installed):**

1. Delete the VRE RMS resource.
2. Open a command window and run the following command line:

   `clusinst.exe /uninstall /rms`

   To uninstall the Job and RMS Agents, run the following command:

```
clusinst.exe /uninstall /rms /rx
```

Uninstalling the RMS

When VRE is uninstalled the cluster agents are automatically uninstalled.

Note The cluster resources must be taken off line before uninstalling a clustered RMS. Removing a clustered VRE component while the resources are active can cause unwanted failovers and other configuration problems.

▼ To uninstall VERITAS Replication Exec:

1. Delete the VRE RMS resource.

   Note If the resources exist when VRE is uninstalled, the user will be prompted before being allowed to continue. *If uninstall is continued, the uninstall of the cluster agents will fail to uninstall and the user will have to remove the cluster resource type and any configured resources manually with the cluster administrative tools.*

2. Go to **Add/Remove** programs, select **VERITAS Replication Exec**, and remove the software.

3. Reboot if also an RSA server.

Understanding Error Messages

This section contains the possible event logging messages that are displayed with normal logging turned on.

Message	Description
OFFLINE -- Could not create the RMS Service object! *windows-error-code*	The RMS Agent software was not able to allocate memory.
OFFLINE -- Failed to delete the RMS database registry key. *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
OFFLINE -- Failed to stop the RMS service! Error = *windows-error-code*	The RMS Agent software was not able to stop the VRE RMS service. Please verify that VRE 3.1 is installed. Rebooting the system may be required to recover from the problem.
ONLINE: Unable to fetch to the ENL Home Path. Error: *windows-error-code*	The RMS Agent software was not able to retrieve critical information from the registry.
ONLINE -- Unable to set the service start type for the RMS service. *windows-error-code*	The RMS Agent software was not able to set the correct start type for the RMS service. Ensure that VRE 3.1 has been properly installed.
MONITOR -- Could not allocate a service object. Perhaps out of memory. *windows-error-code*	The RMS Agent software was not able to allocate memory.
The service *arms* does not exist. *windows-error-code*	The VRE 3.1 RMS service is not present on the cluster node. Ensure that VRE 3.1 is still installed.
The RMS database directory *directory-name* does not exist and could not be created. Error: *windows-error-code*	This message indicates that the Pathname resource attribute indicates a non-existent directory and that the RMS Agent software was not able to create the directory.
Unable to allocate the RMS Service object. Perhaps out of memory. *windows-error-code*	The RMS Agent software was not able to allocate memory.
Unable to bring the RMS online because the volume *drive-letter* does not exist.	This message indicates that the path name given for the location of the RMS datafiles does not exist. This could be because the cluster resource controlling the device is not online or that the RMS resource is not properly configured.
Unable to determine the run state for the RMS service. *windows-error-code*	The RMS Agent software was not able to determine if the VRE 3.1 RMS service was running.

Message	Description
Unable to open the registry key *registry-key.* Error: *windows-error-code*	The RMS Agent software was not able to retrieve critical information from the registry.
Unable to open the registry key *registry-key* while trying to create the master key. Error: *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to open the RMS root key.*registry-key windows-error-code*	The RMS Agent software was not able to retrieve critical information from the registry.
Unable to set the ENL Alert path value. Error: *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to set the ENL Store path value. Error: *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to set the 'Master' registry value *registry-key.* WinError= *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to set the last database location in the registry. Error:*windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to set the RMS value. Error: *windows-error-code*	The RMS Agent software was not able to update a critical registry entry.
Unable to start the RMS Service. Error: *windows-error-code*	The RMS Agent software was not able to start the VRE 3.1 RMS service. Ensure that the *Replication Exec* software is properly installed. Rebooting this cluster node may be required to recover from this error.
Unable to stop the RMS while preparing for resource online. *windows-error-code*	The RMS Agent software was not able to stop the VRE 3.1 RMS service. Rebooting this node may be required to recover.
VRERMS Online	This is a normal condition