HP 3PAR Recovery Manager 4.2.0 Software for Microsoft SQL Server

User's Guide

Abstract

This guide is designed for System Administrators and Microsoft SQL Server Administrators who are responsible for backing up Microsoft SQL Server databases and who understand Microsoft™ Windows™ and Microsoft SQL Server™.

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Documentation

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Contents

1 Introduction....6
Related Documents....6
Typographical Conventions....6
Advisories....7
2 Overview of Recovery Manager....8
System Requirements....8
Windows Server Requirements....8
Windows Server 2003 with SP2 or above....8
Windows Server 2008....8
Windows Server 2008 R2....8
Additional System Requirements....8
Recovery Manager Requirements....9
Running Recovery Manager on a Japanese OS....9
Features Supported....10
Features Not Supported....11
Microsoft Volume Shadow Copy Service....11
Supported VSS Components....12
How HP 3PAR VSS Software Works with Microsoft SQL Server....12
Recovery Manager Layout....13
3 Installation and Deinstallation....15
Upgrading to Recovery Manager 4.2.0 for SQL....15
Upgrading the Production Server....15
Upgrading the Backup Server....15
Verifying the Upgrade....15
Pre-Installation Steps....15
Installing Recovery Manager....16
Verifying the Installation....17
Understanding the Registry....17
Deinstalling Recovery Manager....18
4 Configuring Recovery Manager....19
Configuring the SQL Database....19
Configuring Recovery Manager....19
Installation Location....19
Search Path....19
Changing the Recovery Manager TCP/IP Port....19
Changing a Production Server Port from the Backup Server....20
Configuring Recovery Manager Policies....20
Configuring Mount Functionality....20
Managing SQL Servers across Multiple Active Directory Domains....20
Grouping Volumes into Autonomic Groups....20
Domain Sets....20
Volume Sets....21
Host Sets....21
Testing SQL Connectivity....21
Troubleshooting SQL Connectivity....22
Configuring the Host Computer and the HP 3PAR Storage System....22
Formatting Partitions on a New HP 3PAR VLUN....23
Windows Server 2003....23

5 Configuring Backup Software....24
Overview....24
Before You Begin....24
Setting Up Symantec NetBackup....24
Configuring HP Data Protector....25
Requirements....25
Setting Up the HP Data Protector Backup Specification....25
Setting Up HP Data Protector Cell Manager Access....25
Using Your Backup Software....26
Using Symantec NetBackup....26
Using HP Data Protector....26
6 Using the Recovery Manager GUI....27
Overview of the Recovery Manager GUI....27
Menu Bar....27
Node Tree Pane....27
Informational Pane....27
Opening the Recovery Manager GUI....27
Closing the Recovery Manager GUI....27
Registering the Server....27
Updating Registration after Server Modification....28
Unregistering a SQL Server Instance....29
Setting the Recovery Manager Policy....29
How Recovery Manager Policies Work....29
Numeric-Based Policies....29
Expiration-Based Policies....29
Retention Time Restrictions....30
Setting Recovery Manager Policies....30
Modifying the Policy for a Virtual Copy....31
Configuring Email Notifications....31
Deleting Email Configurations....32
Creating Virtual Copies....32
How Virtual Copy Creation Works....32
Manually Creating a Virtual Copy....32
Creating Remote Virtual Copies....33
How Remote Virtual Copy Works....33
Manually Creating a Remote Virtual Copy....33
Displaying Remote Virtual Copies....33
Scheduling Automatic Virtual Copies....33
Automating Tasks....34
Scheduling Automated Tasks with Task Scheduler....34
Managing Automated Tasks with Task Manager....35
Mounting a Virtual Copy....35
Unmounting a Virtual Copy....36
Backing Up a Virtual Copy....36
Manually Creating Backups at the Instance or Database Level....36
Scheduling Automatic Backups of an Instance or Database....37
Creating a Backup of a Virtual Copy....38
Removing a Backup from the Repository....38
Restoring Instances, Databases, and Volumes....38
Restoring an Instance or Database with Volume Restore....39
Restoring an Instance or Database with File Copy Restore....39
Restoring an Instance or Database from a Backup....40
Analyzing and Synchronizing the Repository....40
Removing a Virtual Copy....41

Viewing Event Message Descriptions....41
7 Using the Recovery Manager CLI....42
Recovery Manager for SQL Server Command Line Interface (CLI)....42
Recovery Manager Commands....42
RMSql analyze....43
RMSql backup....44
RMSql create....46
RMSql deletebackup....49
RMSql display....50
RMSql listbackup....51
RMSql mount....52
RMSql policy....53
RMSql portconfig....56
RMSql remove....57
RMSql report....58
RMSql repository....59
RMSql restore....60
RMSql setvc....63
RMSql timeconfig....65
RMSql unmount....66
Running Recovery Manager as a Scheduled Job....66
Scheduling an Automated Task in Windows 2003....66
Scheduling an Automated Task in Windows 2008....67
8 Recovery for Microsoft SQL Server....68
Microsoft SQL Server Recovery Models....68
Recovering Data with HP 3PAR Recovery Manager....68
Preparing for the Recovery Process....68
Recovering from Logical Errors with Point-in-Time Recovery....68
Restoring a SQL Instance in an MSCS Environment Using File Copy Restore....69
Restoring a Volume in an MSCS Environment Using Volume Restore....69
Recovering All Data with Point-of-Failure Recovery....69
Determining Whether You Can Perform a Point-of-Failure Recovery....70
Performing a Point-of-Failure Recovery....70
9 Remote Copy for Recovery Manager....72
Overview....72
How Remote Copy Works....72
Setting Up Remote Copy....73
Support for Remote Copy Modes and Policies....74
Support for GeoCluster for Microsoft Windows....74
Setting Up Remote Copy Volume Groups....74
Setting Up a Remote Copy Volume Group for Databases....74
Setting Up a Remote Copy Volume Group for Instances....75
Recovering a SQL Database from a Remote Copy Backup Server....75
A Server Virtualization Environments....76
VMWare and Egenera....76
B Troubleshooting....77
C Event Messages....79

1 Introduction

Related Documents

For Information About…	Read the…
Using the HP 3PAR InForm OS Command Line Interface (CLI) to configure and manage the HP 3PAR Storage System	*HP 3PAR InForm OS CLI Administrator's Manual*
Using the HP 3PAR InForm Management Console to configure and administer HP 3PAR Storage Systems	*HP 3PAR InForm Management Console Help*
Assigning the appropriate user roles and rights	*HP 3PAR InForm OS Concepts Guide* *HP 3PAR InForm OS CLI Administrator's Manual*
Identifying HP 3PAR Storage System components and fixing problems	*HP 3PAR InForm OS Messages and Operator's Guide*
Understanding the HP 3PAR Storage System and its features	*HP 3PAR InForm OS Concepts Guide*
Shadow copies using HP 3PAR VSS Provider Software for Microsoft Windows	*HP 3PAR VSS Provider Software for Microsoft Windows User's Guide*
Platform-specific release levels	HP 3PAR InForm OS Configuration Matrix To obtain a copy of this documentation, go to http://www.hp.com/go/3par/, navigate to your product page, click **Support for your product**, and then click **Manuals**.

Typographical Conventions

Typeface	Meaning	Example
ABCDabcd	Used for dialog box elements such as titles and button labels.	Enter your system name in the **Value** box and click **OK**.
`ABCDabcd`	Used for file names, paths, and screen output, and for text you are to enter.	`Found < 12 > 73G disks.` Enter `cli` at the Windows command prompt.
`ABCDabcd`	Used to contrast your input with system output.	`cli% removevv VV1 Removing vv VV1.`
`ABCDabcd` **`ABCDabcd`**	Used for variables in file names, paths, and screen output, and for variables in user input.	[root*`@(systemID-nodeID)`* root] `To continue enter your system name ==>` **`systemname`**

NOTE: The InServ Storage Server has been rebranded as HP 3PAR Storage System. There are instances in this document where screenshots and/or menu items and command output refer to the HP 3PAR Storage System as InServ or InServ Storage Server.

Advisories

To avoid injury to people or damage to data and equipment, be sure to observe the cautions and warnings in this guide. *Always be careful when handling any electrical equipment.*

WARNING! Warnings alert you to actions that can cause injury to people or irreversible damage to data or the operating system.

CAUTION: Cautions alert you to actions that can cause damage to equipment, software, or data.

NOTE: Notes are reminders, tips, or suggestions that supplement the procedures included in this guide.

2 Overview of Recovery Manager

System Requirements

Windows Server Requirements

Microsoft Windows Server 2003 with SP2 or above, Windows Server 2008, or Windows Server 2008 R2

Windows Server 2003 with SP2 or above

x86-based computer:

- 1.4 GHz processor
- 512+ MB RAM
- 2+ GB hard disk space

x64-based computer:

- 1.4 GHz processor
- 512+ MB RAM
- 4+ GB hard disk space

Windows Server 2008

x86-based computer:

- 2 GHz processor
- 2+ GB RAM
- 40 GB hard disk space

x64-based computer:

- 1.4 GHz processor
- 2+ GB RAM
- 40 GB hard disk space

Windows Server 2008 R2

- Either 1.4 GHz (x64) or 1.3GHz (Dual Core) processor
- 2+ GB RAM
- 32+ GB hard drive space

Additional System Requirements

- Microsoft SQL Server 2005 with SP2 or above, Microsoft SQL Server 2008, or Microsoft SQL Server 2008 R2.
- SQL Server client utilities must be installed on the backup server.
- All SQL instances must be TCP/IP enabled.
- To automatically display the SQL server name and instance name in the server-registration wizard, turn on the corresponding SQL Browser Service(s).
- Microsoft .NET framework 3.5 SP1 or above.
- HP 3PAR Recovery Manager for SQL Software license for the HP 3PAR Storage System.

- Virtual copy (snapshot) space must be available on virtual volumes where the SQL Server database resides.
- To create virtual copies on the base volume, you must associate virtual copy space with the base volume itself. For more information on creating a base volume with virtual copy space, or assigning virtual copy space after the base volume is created, see the *HP 3PAR InForm OS Command Line Interface Reference*.

NOTE: For platform-specific release levels, refer to the latest HP 3PAR InForm OS Configuration Matrix. To obtain a copy of this documentation, go to http://www.hp.com/go/3par/, navigate to your product page, click **Support for your product**, and then click **Manuals**.

Recovery Manager Requirements

- To create virtual copies and perform one-click backup, the Microsoft SQL Server database for which virtual copies are to be created must be online.
- One backup server is required.
- Because Recovery Manager operates through HP 3PAR VSS Software, the database must be online to perform a file copy restore at the database level. To restore a SQL database that is detached, you can either mount a previously created snapshot of this database to the production server and copy over the database files, or you can issue a volume restore at the database level. For more information about restoring volumes, see "Recovery Manager Commands" (page 42).
- Backup and production server(s) must be running the same level OS version and the same version of HP 3PAR Recovery Manager for SQL Software. Recovery Manager does not support cross-platform configurations.
- The same version of the InForm CLI must be installed on both the production and backup servers.
- The SQLServerWriter service must be running.
- Volumes exported to a host must be base volumes; you cannot export snapshot volumes.

Running Recovery Manager on a Japanese OS

CAUTION: To be fully compatible with Recovery Manager, you must use English-language naming conventions in your SQL Server setup (for example, for domain names, instance and database names, path names, and so on).

Recovery Manager does not function correctly when any language other than English is used, even for areas in which SQL Server itself supports Japanese characters.

- SQL Server OS: Windows Server 2008 R2, Japanese OS
- Microsoft SQL Server 2008 R2
- HP 3PAR VSS Provider Software 2.1.0
- HP 3PAR Recovery Manager Software for SQL Server 4.2
- HP 3PAR Storage System 2.3.1 or higher

NOTE: The Japanese OS does not support scheduling virtual copies using Task Scheduler. (In other words, the functionality described in "Automating Tasks" (page 34) is not available in the Japanese OS.)

Features Supported

- Windows Enterprise Server
  For detailed OS version support, see the *HP 3PAR InForm OS Configuration Matrix*.
- Microsoft SQL Server
  For detailed SQL server version support, see the *HP 3PAR InForm OS Configuration Matrix*.
- Volume Shadow Copy Service **Full** backup type
- Virtual copy creation using HP 3PAR VSS Provider Software for Microsoft Windows
- Scheduling and management of automated tasks
- Access HP 3PAR Storage System via HP 3PAR InForm OS CLI
- Mount virtual copies locally or remotely
- Mount virtual copies in read/write mode
- Unmount virtual copies
- Delete virtual copies
- Environment Report
- File Copy restore
- Database-level file restore in "No Recovery" mode
- Restore from virtual copies
- Backups using HP Data Protector or Symantec NetBackup – both client and master
- Database cloning
- Restore from backup using HP Data Protector or Symantec NetBackup
- Recovery Manager GUI
- Recovery Manager CLI
- Volume analysis
- Volume restore
- Virtual copy creation of local and remote Microsoft SQL Server
- MSCS environment
- Remote Copy
- Virtual copy operations on SQL instance and database level
- Virtual Lock of an instance and its virtual copies
- Autonomic groups (domain sets, volume sets, and host sets)

NOTE: Due to an SQL instance limitation, the recommended maximum number of databases for which you can create snapshot backups at the same time is 35.

For more information, see Microsoft KB 943471: http://support.microsoft.com/kb/943471

Features Not Supported

- Microsoft SQL Server offline backup
- VSS backup types "Incremental," "Differential," "Copy," and "Log"
- All backup tools, except for HP Data Protector and Symantec NetBackup
- Access to HP 3PAR Storage System via SSH
- Display of different versions of Microsoft SQL Server from the same Recovery Manager backup server
- Interoperability between Windows Server 2003 and Windows Server 2008

  In other words, you cannot mount a virtual copy created under Windows 2003 to a Windows 2008 target host.
- Taking a snapshot of the SQL servers created with the **SQL Server Authentication** setting.

  Recovery Manager for SQL supports SQL servers created with the **Windows Authentication** setting. If you are running SQL Server, Recovery Manager supports both **Windows Authentication** mode and **SQL Server and Windows Authentication** mode.
- Taking a snapshot of a database residing on a network mapped volume
- Virtual copy ownership transferring. For example, you can only remove virtual copies if you created them, and you can only unmount virtual copies if you mounted them.
- Taking a snapshot of an instance or database that resides on dynamic disks
- Mounting snapshots to a Windows host that resides in virtual environment
- Performing a restore in a virtualization environment
- Date customization. Recovery Manager always displays dates in month/day/year format.
- Windows automount feature

Microsoft Volume Shadow Copy Service

Microsoft includes Volume Shadow Copy Service (VSS) in Windows 2003 and Windows 2008 to simplify the enterprise's storage environment, which provides a framework for creating a point-in-time copy of either a single volume or multiple volumes.

Microsoft Windows Server 2008 VSS works with VSS-aware applications that are used to determine when a volume shadow copy (snapshot) can be made. (A snapshot is a virtual copy: a copy of some data set—for example, a disk volume—at a point in time.) Before making a snapshot, VSS communicates with the operating system and applications to freeze computing tasks, which enables an application-consistent snapshot to be taken. The shadow copy volume is then used for the actual backup. After VSS saves the shadow copy volume on the backup device, it deletes the shadow copy.

The HP 3PAR VSS Provider Software coordinates between Requestors (backup applications such as Recovery Manager), Writers (applications in windows services such as Microsoft SQL Server) and Providers (components that create the shadow copies).

VSS Component	VSS Component Description
Requestor	The requestor is backup software that initiates the creation of the shadow copy.
Writer	The writer is any application software that participates in the shadow copy process and whose files and data are included in the process.
Provider	The provider is the storage technology that does the actual shadow copy.

Supported VSS Components

Requestor:

- Recovery Manager
- Symantec NetBackup for Microsoft Windows
- HP Data Protector for Microsoft Windows

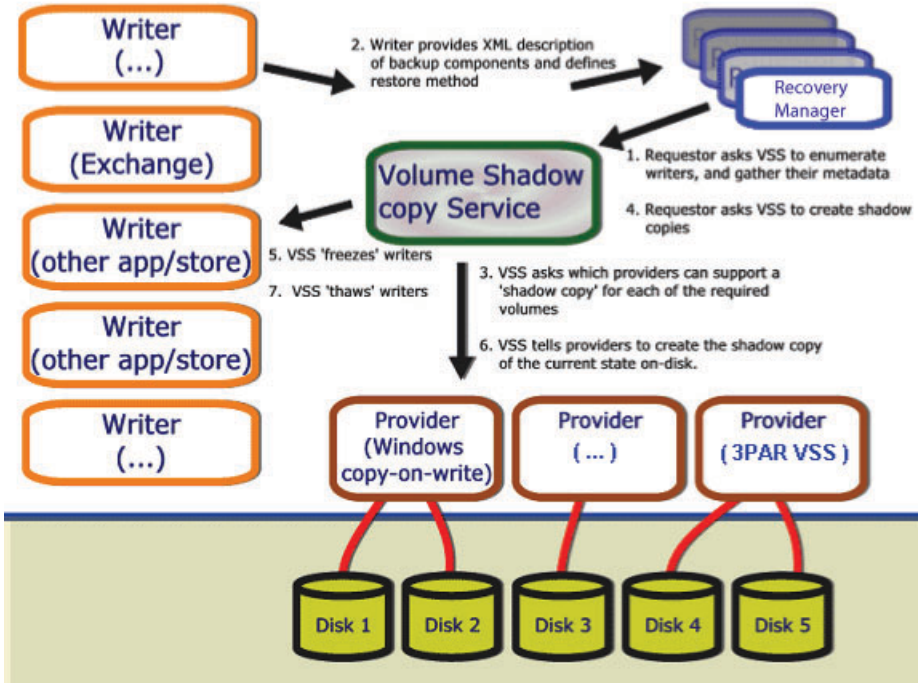
Writer:

- Microsoft SQL Server 2005, 2008, and 2008 R2 with SQL Server Writer

NOTE: For platform-specific release levels, refer to the latest HP 3PAR InForm OS Configuration Matrix. To obtain a copy of this documentation, go to http://www.hp.com/go/3par/, navigate to your product page, click **Support for your product**, and then click **Manuals**.

How HP 3PAR VSS Software Works with Microsoft SQL Server

Figure 1 HP 3PAR VSS Provider Software for Microsoft Windows Operation Overview



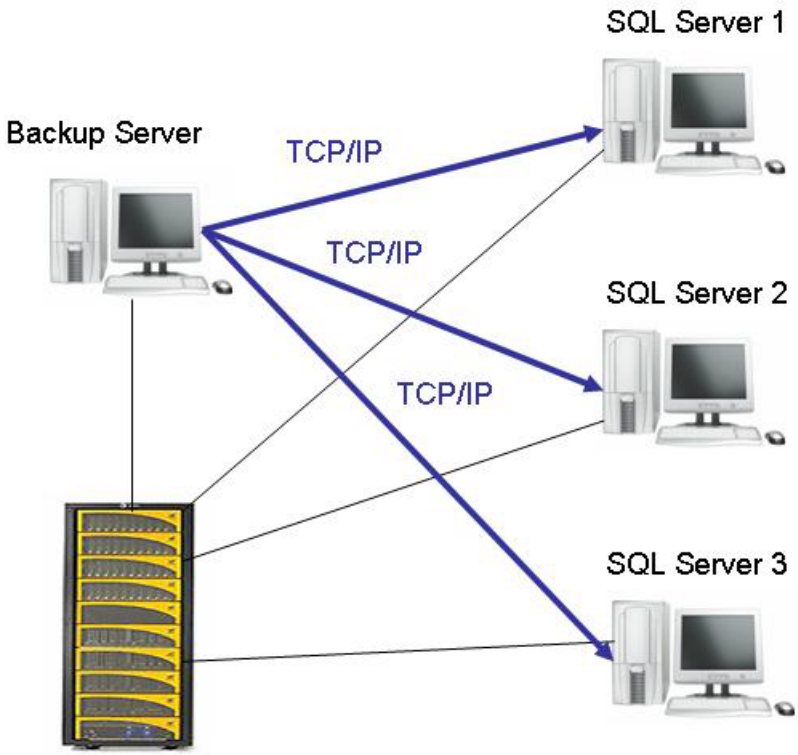
1. The requestor (HP 3PAR Recovery Manager) sends a command to the Volume Shadow Copy service to take a shadow copy of the selected Microsoft SQL Server database.

2. Volume Shadow Copy service communicates with SQL Writer on the Microsoft SQL Server to flush the current log files to disk and suspend any writes to the transaction log files and to the database file. However, HP 3PAR VSS Software allows read-only access so the client can access any data that is already in the SQL Server database.
3. Volume Shadow Copy service communicates with the provider to initiate the shadow copy process for the disk volumes that contain the Microsoft SQL Server data.
4. HP 3PAR VSS Software then communicates with the writers and providers to start creating the shadow copy. The provider actually creates the shadow copy.

   The shadow copy typically takes less than a minute.
5. After the shadow copy is created, Volume Shadow Copy service communicates with the Microsoft SQL Server with MSDE writer or SQL writer to indicate that it can resume writing to disk.
6. The queues of the SQL transactions are written to the logs.

   The shadow copy is now available to the requestor for backing up.

Recovery Manager Layout



HP 3PAR Recovery Manager Software for SQL provides off-host backup and mounting capabilities. These features reduce the impact on the production server and also provide centralized management for the backup and restore functions across all SQL servers.

- Backup Server

  A backup server is the central control point for Recovery Manager. It controls and manages the backup and restore on different SQL servers.

- SQL Server

  The SQL Server can be a standalone or clustered server. The release version of SQL Server must be 2005, 2008, or 2008 R2. Versions prior to SQL Server 2005 are not supported.

- Connectivity

  Both the backup server and SQL Server must be connected to the same HP 3PAR Storage System.

3 Installation and Deinstallation

Upgrading to Recovery Manager 4.2.0 for SQL

You can upgrade to HP 3PAR Recovery Manager 4.2.0 Software for Microsoft SQL Server from Recovery Manager 3.0.2 for SQL or Recovery Manager 4.1.0 for SQL.

Upgrading the Production Server

1. Deinstall 3PAR Recovery Manager for SQL. For more information, see "Deinstalling Recovery Manager" (page 18).
2. Install HP 3PAR Recovery Manager 4.2.0 for SQL. For more information, see "Installing Recovery Manager" (page 16).

Upgrading the Backup Server

The upgrade steps for the Recovery Manager backup server also apply to the Remote Copy backup server(s), if applicable to your setup.

1. If you plan to use a different installation folder for the new version of Recovery Manager for SQL and not the same folder as the previous version, make a copy of the repository. The repository is located in:
   - Recovery Manager 4.1.0 for SQL: `<Install Directory>\RM\SQL\Data`
   - Recovery Manager 3.0.2 for SQL: `<Install Directory>\VCDBA\SQL\Data`

   If you plan to use the same installation folder for the new version as the folder that was used for the previous version, skip this step.
2. Deinstall the previous version of 3PAR Recovery Manager for SQL. For more information, see "Deinstalling Recovery Manager" (page 18).
3. Install HP 3PAR Recovery Manager 4.2.0 for SQL. For more information, see "Installing Recovery Manager" (page 16).
4. If you used a different installation folder for Recovery Manager 4.2.0 for SQL, copy the repository data from the previous version of Recovery Manager for SQL to:

   `<Install Directory>\RM\SQL\Data`

   If you used the same installation folder for both the new and previous version, skip this step. Recovery Manager for SQL automatically imports all the repository data.

Verifying the Upgrade

1. Verify that **Recovery Manager for SQL** is listed as a service that is currently running.
2. Check whether you can see the previously created virtual copies in the GUI. Re-register the SQL servers if necessary.
3. If you used the **Recovery Manager Backup** or **All of above** option to install Recovery Manager, verify that the **3PAR Recovery Manager for SQL Server** icon appears on the desktop.
4. Verify the registry key. For more information, see "Understanding the Registry" (page 17).

Pre-Installation Steps

Before installing HP 3PAR Recovery Manager Software, install the following:

- HP 3PAR InForm OS Command Line Interface (CLI) for remote clients. For more information, see the *HP 3PAR InForm OS CLI Administrator's Manual*.
- HP 3PAR VSS Provider Software for Microsoft Windows. For more information, see the *HP 3PAR VSS Provider User's Guide*.

Installing Recovery Manager

To install HP 3PAR Recovery Manager Software on Windows:

△ **CAUTION:** Do not install Recovery Manager on a clustered drive. If you do so, Recovery Manager allows you to proceed with the installation, but after the install is complete, the process hangs and evicts the clustered disk.

1. Log on as the system administrator to the Microsoft SQL Server host computer.

   NOTE: You can perform the installation from a remote desktop connection, but HP recommends that you install the application directly from the system console.

2. Insert the Recovery Manager CD.
3. Open a Windows Explorer window and click the CD-ROM drive to expand the files.
4. Select the corresponding package for your OS version.

   Table 1 Operating System Packages

Operating System	Package
Win2003 32-bit	RMS_W2K3_x86.msi
Win2003 64-bit	RMS_W2K3_x64.msi
Win2008 32-bit	RMS_W2K8_x86.msi
Win2008 64-bit	RMS_W2K8_x64.msi
Win2008 R2 64-bit	RMS_W2K8_x64.msi

5. In the **3PAR Recovery Manager for SQL Server Setup** wizard, click **Next**.
6. After the license agreement appears, select **I Agree** and click **Next**.
7. Select the type of server on which you are installing Recovery Manager:
   - **Recovery Manager Backup Server** - Select this option if this server is your backup server. This option installs the Recovery Manager GUI on this server; you can use this GUI to manage your SQL production servers.

     NOTE: You must install the SQL Server client utilities on the host on which the Recovery Manager Backup Server is installed.

   - **Recovery Manager Agent for SQL Server** - Select this option if this server is one of your SQL production servers running Microsoft SQL Server.
   - **All of above** - Select this option if this server is both your backup server and your SQL production server. This option installs the Recovery Manger GUI and all of the Recovery Manager Agent components on this server.
8. Specify the installation directory for Recovery Manager.

   NOTE: To check whether the server has enough space for Recovery Manager, click the **Disk Cost** button. The wizard analyzes the amount of available storage space and compares it to the amount required for the Recovery Manager installation.

9. Click **Next** to confirm the installation destination.
10. After installation is complete, click **Close**.
11. Recovery Manager for SQL runs a utility to scan for possible configuration errors.
12. After this utility completes, the results are automatically displayed in a Notepad file.

    Carefully review the information displayed in the Notepad file. Pay special attention to any WARNING or ERROR messages and correct them before running Recovery Manager for SQL.

13. If you are using a remote desktop session to install Recovery Manager, log off all connected remote sessions after the installation is complete. The newly added environment variables then go into effect.
14. If you are installing Recovery Manager for SQL on a system that also has a Symantec NetBackup service running in the background, restart the NetBackup service after Recovery Manager installation is complete. The environment path is then registered in the NetBackup service.

Verifying the Installation

1. Log on as the system administrator.
2. Depending on your operating system, do the following:
   - In Windows 2003, click **Start→Control Panel→Add/Remove Programs**.
   - In Windows 2008 or 2008 R2, click **Start→Control Panel→Programs and Features**.
3. Verify that Recovery Manager appears in the **Currently installed programs** column.
4. If you used the **Recovery Manager Backup** or **All of above** option to install Recovery Manager, verify that the **3PAR Recovery Manager for SQL Server** icon appears on the desktop.

Understanding the Registry

After Recovery Manager is successfully installed, information is written into the registry database under: `HKEY_LOCAL_MACHINE\SOFTWARE\3PAR\RM_SQL`

△ **CAUTION:** DO NOT edit the registry key value unless asked by your local service provider for support purposes.

Table 2 System Registry Values for Recovery Manager

Name	Value
AnalyzeInterval	Interval in minutes between automatic synchronizations of the repository with the InForm. The default interval is 60 minutes.
BackupTimeout	Backup process timeout value in minutes to confirm that NetBackup has received the backup request.
Build	Build number of the installed version of Recovery Manager for SQL.
DataFilePath	Location of the XML repository.
InstallPath	Recovery Manager for SQL installation path.
LogFilePath	Tracing log files.
TraceHistory	Number of trace files to keep before deleting.
TraceLevel	Trace level for the log file.
TraceLog	Information used to generate the trace file name.
TraceLogSize	Size of the log files.
PortNo	Port used by Recovery Manager for SQL. PortNo is set to 9932 by default.
PromoteTimeout	Time interval in seconds to monitor the status of volume restore operation.
Version	Current version of Recovery Manager for SQL Server.

NOTE: The `DataFilePath` field is created in the registry database only after you launch the Recovery Manager GUI for the first time.

Deinstalling Recovery Manager

1. Log on as the system administrator.
2. Depending on your operating system, do the following:
   - In Windows 2003, click **Start→Control Panel→Add/Remove Programs**.
   - In Windows 2008, click **Start→Control Panel→Programs→Programs and Features**.
3. Select **3PAR Recovery Manager for Microsoft SQL Server**.
4. Click **Remove**.

NOTE: After deinstalling Recovery Manager, snapshots and scheduled tasks still reside locally in the **Data** folder as well as on the system. You can remove snapshots and/or scheduled tasks later, if desired.

4 Configuring Recovery Manager

Configuring the SQL Database

When you configure the SQL database:

- Be sure to use database files and transaction logs created on basic disks using the NTFS file system.

  Recovery Manger for SQL Server does not support other types of disks.

- Maintain a 1:1 relationship between databases and volumes:
  - Do not add more than one database plus its transaction log files to a volume.
  - Do not add files from one database (including its transaction log files) to multiple volumes.

△ **CAUTION:** Be sure to maintain a one database:one volume relationship.

If you add multiple databases to one volume, backup and disaster recovery operations on one database can result in conflicts between the databases in the volume.

Configuring Recovery Manager

Installation Location

By default, Recovery Manager installs in:

```
C:\Program Files\3PAR\RM\SQL
```

Search Path

After installation, you can instantly issue Recovery Manager CLI commands from any directory. Although the Recovery Manager executables are installed in a fixed location that is specified during installation, the location is automatically added to the Windows `PATH` environment variable.

Changing the Recovery Manager TCP/IP Port

By default, Recovery Manager for SQL uses port 9932 for cross-server communication. As long as port 9932 is available, no extra port configuration is necessary.

If port 9932 is not available or is occupied by another system process, you must change the Recovery Manager TCP/IP port.

1. Select an available port. The valid TCP/IP port range is 1024 to 65535.
2. To set your desired port number, run the Recovery Manager CLI `RMSql portconfig` command.

   For example, to change the port number to 9999, use: `RMSql portconfig -n 9999`

△ **CAUTION:** If you are changing ports from the backup server, be sure to change the Recovery Manager ports on the production servers first. If you change the backup server port first, you cannot then access the production servers in order to change their ports.

3. From the Windows Service console, restart the **Recovery Manager for SQL** service.
4. Repeat these steps for all production servers and the backup server.

NOTE: The TCP/IP port used by Recovery Manager for SQL must be the same on all servers.

Changing a Production Server Port from the Backup Server

1. On the backup server, run the following Recovery Manager CLI command:

   ```
   RMSql portconfig -s <Windows_host/production_server> -n <port_number>
   ```

2. On the production server, restart the **Recovery Manager for SQL** service.

Configuring Recovery Manager Policies

- To use the Recovery Manager GUI to set database policies, see "Using the Recovery Manager GUI" (page 27).
- To use the Recovery Manager CLI to set database policies, see "Using the Recovery Manager CLI" (page 42), for information about using the `RMSql policy` command.

Configuring Mount Functionality

The Windows automount feature is not compatible with Recovery Manager. To ensure that the Windows automount feature is disabled:

1. Open a command prompt (cmd) window.
2. Enter: **`diskpart`**
3. At the `DISKPART` prompt, enter: **`automount disable`**
4. Exit the command prompt window.

Managing SQL Servers across Multiple Active Directory Domains

If you are configuring Recovery Manager to work with SQL Servers across multiple Active Directory domains, you must store the appropriate login and password in the Windows user account on the backup server.

1. On the backup server:
   - In Windows 2003, click **Start→Control Panel→Stored User Names and Passwords** and click **Add**.
   - In Windows 2008, click **Start→Control Panel→User Accounts** and click Manage your network passwords.

     In the **Logon Information Properties** dialog box, click **Add**.
   - In Windows 2008 R2, click **Start→Control Panel→User Accounts** and click **Manage your credentials→Add a Windows credential**.
2. In the **Log on to** field (or, for Windows 2008 R2, the **Internet or network address field**), enter the network location to which you want automatic access.

   You can use a wildcard if you want access to multiple computers on a domain. For example: ***.aztec.com**
3. Enter the appropriate login and password.
4. Repeat these steps for all SQL Server domains in the Recovery Manager configuration.

Grouping Volumes into Autonomic Groups

You can group virtual volumes into autonomic groups (domain sets, volume sets, or host sets).

Domain Sets

If your SQL Server configuration involves multiple database servers that belong to different HP 3PAR Virtual Domains, you can use the domain set feature to group these virtual domains into one

HP 3PAR Storage System domain set. This configuration allows you to use just one Recovery Manager backup server to manage all your database servers.

- All hosts, users, and virtual volumes, including the backup server, must belong to the same HP 3PAR Virtual Domain.
- To mount a virtual copy or media backup to a server that is in a different HP 3PAR Virtual Domain than the domain in which it was created, you must use the Recovery Manager CLI command `RMSql mount -ts`.
- To create a Remote Copy group for a virtual volume that is in a user-defined domain, the associated virtual volume on the Remote Copy backup server must be in the same user-defined domain.

To configure domain sets, use HP 3PAR CLI commands to:

1. Ensure you are running HP 3PAR InForm Operating System Software 2.3.1 or higher.
2. Ensure you have access to all domains.
3. Create a domain set that contains all HP 3PAR Virtual Domains for all the database servers.
4. Create a Command Provisioning Group (CPG) belonging to the new virtual domain.
5. Create a virtual volume belonging to the CPG you just created.
6. Create a host belonging to the virtual domain.
7. Export the VLUN to the host.
8. On the Recovery Manager backup and production servers, set the user for the HP 3PAR VSS Provider Software.
9. Ensure the HP 3PAR Storage System connection is good.

NOTE: For more information on HP 3PAR CLI commands, see the *HP 3PAR InForm OS Command Line Interface Reference*. For more information on HP 3PAR VSS Provider Software, see the *HP 3PAR VSS Provider Software for Microsoft Windows User's Guide*.

Volume Sets

To configure volume sets:

- In a volume set, place either:
  - one database and its log files
  - one instance and its related files
- Do not place one volume in more than one volume set.
- Do not place unrelated volumes in a volume set.

Host Sets

You can configure your system with host sets and volume sets, or with host sets only. You can add all nodes of a cluster to one host set.

Testing SQL Connectivity

After you install and configure Recovery Manager on the backup server and all of the production servers, verify that your SQL instances are reachable:

1. Log onto the backup server as the system administrator.
2. Launch SQL Server Management Studio.
3. In the **Connect to Server** window, enter or select the following:

   Server type: `Database Engine`

Server name: Enter the server and instance name as follows:

- For the default instance, enter the name of your SQL server. For example:

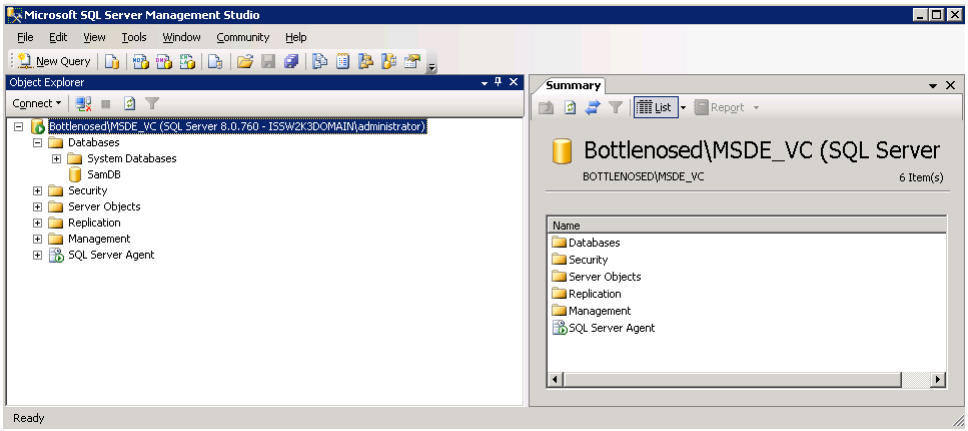
  Server name: `Bottlenosed`

- For a named instance, enter the name of your SQL server and the name of your SQL instance in the format: *<SQLserverName>\<instanceName>*. For example:

  Server name: `Bottlenosed\MSDE_VC`

Authentication: `Windows Authentication`

4. Click **Connect**. SQL Server displays a screen similar to the following:



If you are able to connect, the installation and configuration is complete.

If the connection cannot be made, you must fix the SQL configuration. For more information, see "Troubleshooting SQL Connectivity" (page 22).

Troubleshooting SQL Connectivity

1. Log onto the SQL production server as system administrator and check connectivity:
   - From the SQL production server, launch SQL Server Management Studio to make sure the connection can be made locally.
   - From Management Studio, right-click **SQL server→Properties→Connections**.

   Make sure the **Allow remote connections to this server** box is checked.
   - Make sure the SQL server for that instance has a status of **started**.
   - For named instances, make sure the SQL server browser has a status of **started**.
   - Double-check the settings under **Properties→Security**.
   - Double-check the settings under **Properties→Permissions**.
2. After you have fixed the SQL configuration on the production server, log onto the backup server and run the SQL connectivity test again.

NOTE: Your backup server must pass this SQL connectivity test before you can use HP 3PAR Recovery Manager Software for Microsoft SQL Server.

Configuring the Host Computer and the HP 3PAR Storage System

For information about configuring the HP 3PAR Storage System to communicate with the host computer, see the *HP 3PAR InForm OS Concepts Guide* and the *HP 3PAR InForm OS CLI Administrator's Manual*.

NOTE: The HP 3PAR Storage System source volumes used by Recovery Manager must be base volumes. Recovery Manager cannot use physical copies or virtual copies as source volumes.

Formatting Partitions on a New HP 3PAR VLUN

When you create HP 3PAR VLUNs for use with SQL Server, you must align the partitions.

Windows Server 2003

Before formatting a partition on a new HP 3PAR VLUN, use the Windows `diskpart.exe` tool to align the starting partition offset. Align the offset to 64KB, as recommended in this article: Disk Partition Alignment Best Practices for SQL Server

To check the current offset value, use the Microsoft System Information utility, included with Windows:

1. Launch the System Information utility one of the following ways:
   - Select **Start→Programs→Accessories System Tools→System Information**
   - At the command prompt, run the command: `msinfo32.exe`
2. Select **System Summary→Components→Storage→Disks**.
   The offset for each disk in the system is displayed in bytes in the **Partition Starting Offset** field.

5 Configuring Backup Software

Overview

HP 3PAR Recovery Manager Software for Microsoft SQL Server can be used with either Symantec NetBackup or HP Data Protector to back up and restore the virtual copies created by Recovery Manager.

If you are using backup software in the backup environment, you must install a backup master or client on the backup server.

NOTE: For information about the supported versions of Symantec NetBackup and HP Data Protector, see the latest HP 3PAR InForm OS Configuration Matrix. To obtain a copy of this documentation, go to http://www.hp.com/go/3par/, navigate to your product page, click **Support for your product**, and then click **Manuals**.

Before You Begin

Ensure that you have set up a storage unit for storing virtual copy backups. For more information, see the documentation for the backup software you are using.

Setting Up Symantec NetBackup

To set up your Symantec NetBackup software, see the Symantec NetBackup documentation.

To configure Symantec NetBackup to function with Recovery Manager for SQL, set the following parameters during the configuration process:

Backup Policy Parameter	Setting
Policy type	**MS-Windows-NT**
Clients	Select the machine on which the Recovery Manager Backup Server component is installed.
Collect disaster recovery information for Bare Metal Restore	Ensure this option is unchecked.
Type of backup	**User backup**
Starting times for backups	Activate all the time slots: • **Modify Day**: Mon • **Start Time**: 12:00:00AM • **End Day**: Sun • **End Time**: 12:00:00AM • **Duration (days)**: 7

NOTE: If the backup server is running the NetBackup client interface, NetBackup cannot validate the policy.

NOTE: If you add the NetBackup path to the system's `PATH` environment variable after you install HP 3PAR Recovery Manager Software for Microsoft SQL Server, you must restart Recovery Manager for your changes to take effect.

Configuring HP Data Protector

Requirements

- HP Data Protector Software 6.2
- Data Protector patch for `omnidl` (# DPWIN_00514)
- Each data list name (also known as the backup specification) must be unique across the entire system

Setting Up the HP Data Protector Backup Specification

To use HP Data Protector with Recovery Manager, you must set up a default backup specification. The backup specification specifies the default mount point and the necessary devices for tape backup.

1. Open the Data Protector GUI.
2. Select **Backup→Add Backup**.
3. In the **Create New Backup** dialog box, select **Blank_Filesystem_Backup** and click **OK**.
4. Click **Next** (do not select any items).
5. Select the device that Data Protector is to use for backups.
6. Click **Next** until the **Manual add...** appears.
7. Click **Manual add...**
8. Select **Windows filesystem** and click **Next**.
9. Enter the appropriate client system, mount point, and description. HP recommends:

Client system	*<server_used_as_backup_client>*
Mount point	C:
Description	default

NOTE: Recovery Manager uses this information only to create a backup template. Recovery Manager does not use the actual data entered.

10. Click **Next** until the **Finish** button is enabled.
11. Save the backup specification.

    When you issue the `RMSql backup` command with the `-dl` option, use the name with which you saved the backup specification (e.g., **DPbackup**) as the value of the `-dl` option.

Setting Up HP Data Protector Cell Manager Access

To use HP Data Protector with Recovery Manager, you must enable the system accounts on the registered client system to access the Data Protector Cell Manager.

1. Open the Data Protector GUI.
2. In the toolbar drop-down list, select **Users**.
3. Under the **Users** folder in the left pane, select **admin→SYSTEM**.
4. In the **Client system** drop-down list on the **General** tab in the right pane, select **<Any>**.

For more information on installing HP Data Protector, see HP Data Protector documentation.

Using Your Backup Software

- The default mount point for virtual copy backups is:

  `<system drive>:\3parSnapshot`

- You must manually synchronize backups. If a backup expires in your backup software, you must manually remove the backup from Recovery Manager. If you remove a valid backup from Recovery Manager, you must manually remove it from your backup software.
- Recovery Manager does not track restore progress. You must use your backup software to monitor restore progress.
- For more information about using CLI commands with your backup software, see `RMSql backup`, `RMSql deletebackup`, `RMSql listbackup`, and `RMSql restore` in "Using the Recovery Manager CLI" (page 42).
- For more information about using your backup software to back virtual copies up to media, see "Backing Up a Virtual Copy" (page 36).
- For more information about using your backup software to restore virtual copies from media, see "Restoring Instances, Databases, and Volumes" (page 38).

Using Symantec NetBackup

- Symantec NetBackup software is case-sensitive. If you are using NetBackup, make sure all information entered pertaining to the policy is supplied with the proper case.
- Any time you are using NetBackup to back up to media or restore from media, you can monitor the progress using the progress log:

  `<RM installation location>\log\nbulog\database_timestamp.log`

- To modify the timeout value for NetBackup software initialization, see "Understanding the Registry" (page 17).

Using HP Data Protector

For each HP Data Protector backup you create, a postscript (.bat) file is created in the `$DP_HOME\bin` folder (where $DP_HOME is the Data Protector install location; for example, `C:\ program files\Omniback`.) This script cleans up after the associated backup is complete.

Note that Recovery Manager does not clean these postscripts. After a backup is complete (either successfully or with failures), you can manually remove the associated postscript batch file if desired.

6 Using the Recovery Manager GUI

Overview of the Recovery Manager GUI

HP 3PAR Recovery Manager Software for SQL Server provides a Graphical User Interface (GUI) for managing SQL servers.

The Recovery Manager GUI enables you to create, remove, mount, unmount, back up, and restore a virtual copy of an individual database or an entire instance (i.e., all databases within an instance). In addition, the Recovery Manager GUI enables you to configure automatic email notifications, schedule automatic creation and backup of virtual copies, view event messages, and sync the backup repository.

The Recovery Manager GUI contains a menu bar, a node tree pane on the left, an informational pane on the right, and a command log window.

Menu Bar

The menu bar consists of the following menu options:

- **Console** - allows you to exit the GUI.
- **Actions** - provides access to virtual copy functionality, including: create, email notification, mount, policies, register, remove, rescan, restore, refresh, remote copy, and unmount.
- **Scheduled Tasks** - provides access to the Task Manager.
- **About** - allows you to access event message descriptions and version information.

Node Tree Pane

After you register the SQL server, the node tree pane displays the SQL server's instances, databases, virtual copies, and backup records as a nested tree. Servers configured in a non-cluster environment are represented by blue icons; servers configured in a cluster environment are represented by orange icons. For more information about registering SQL servers, see "Registering the Server" (page 27).

Informational Pane

When a tree node is selected, the informational pane displays detailed information about the node.

Opening the Recovery Manager GUI

To open the Recovery Manager GUI, double-click the **3PAR Recovery Manager for SQL Server** icon on your desktop or, in the taskbar, click **Start→All Programs→3PAR→Recovery Manager for SQL Server**.

Closing the Recovery Manager GUI

To close the Recovery Manager GUI, either close the entire window or select **Console→Exit**.

Registering the Server

In order for the Recovery Manager GUI to manage your SQL servers, you must register the SQL Server instances.

To register a SQL instance:

1. Right-click the **MS SQL Server** node and select **Register Server**.

   NOTE: If your backup server and SQL production servers reside on different networks, the **Recovery Manager for SQL Server Register** window might not display all of the available SQL servers.

   In addition, the displayed list of SQL servers can vary depending on factors such as network traffic, timeouts, routers, lost broadcasted packets, and other network issues.

2. Depending on whether the **Recovery Manager for SQL Server Register** window displays the SQL server you want to register, do the following:

   - If the list displays the SQL server you want to register, Recovery Manager discovered the server instance. Continue as follows:
     a. Click the **Register** checkbox for the server instance.
     b. Click **OK.**
   - If the list does not display the SQL server you want to register, you must manually register the instance. To do so:
     a. In the **Server Name** text box, enter the SQL server name and instance name. Use the format `SQLServerName\instanceName` as follows:
       - If you are registering the default instance, either enter the SQL server name only, or enter the SQL server name and **default**, separated by a backslash.

         For example, **Aztec** or **Aztec\default**.
       - If you are registering a named instance, enter the SQL server and instance name, separated by a backslash.

         For example: **Aztec\Bld2**.

     b. Click **Add**. Recovery Manager adds the new SQL server and instance to the list and automatically selects the **Register** checkbox for the entry.
     c. Click **OK** to start the registration.

   NOTE: Depending on your network traffic, it may take up to several minutes for the Recovery Manager GUI to register a SQL server instance.

3. Depending on the success of the registration, do one of the following:

   - If Recovery Manager displays **Update Success** in the entry's **Status** column, Recovery Manager successfully registered the instance. Click **OK**; you can now use the Recovery Manager GUI to manage the instance.
   - If Recovery Manager displays **UpdateFailed** in the entry's **Status** column, Recovery Manager was not able to connect to the instance. Continue as follows:
     a. To fix any connectivity issues, see "Troubleshooting SQL Connectivity" (page 22). The instance must pass the SQL connectivity test before the Recovery Manager GUI can successfully register the instance.
     b. Repeat the registration steps for the SQL server until Recovery Manager successfully registers the instance.

Updating Registration after Server Modification

If you modify a registered instance's configuration (e.g., you create a new database under that instance), you must rescan the instance to update the registration.

To rescan an instance:

1. Right-click the **MS SQL Server** node.
2. Select **Rescan Server Configuration**.

Unregistering a SQL Server Instance

To remove a server instance from the list of registered servers:

1. Right-click the MS SQL Server node.
2. Select **Register Server**.
3. Uncheck the **Register** checkbox for the server instance you are deleting.
4. Click **OK**.

Setting the Recovery Manager Policy

Recovery Manager applies policy settings at the instance level; therefore, each instance can have its own policy. In addition, you can configure individual virtual copies with their own policy settings.

How Recovery Manager Policies Work

The Recovery Manager policy-setting feature allows you to:

- Specify either a numeric-based or expiration-based policy for each instance and database on a selected SQL server
- Specify a retention time during which the instance or database and its virtual copies cannot be removed (if you have a Virtual Lock license)

NOTE: Modifications you make to an existing policy are not retroactive. Virtual copies created under a previous policy (whether numeric or expiration-based) retain the policy setting under which they were created.

Numeric-Based Policies

If you specify a numeric-based policy, you can modify the maximum number of virtual copies allowed per database and per instance. By default, Recovery Manager allows you to create a maximum of 10 virtual copies per database and 10 virtual copies per instance.

The numeric-based policy also enables you to set Recovery Manager to automatically remove the oldest virtual copy for each database and instance, after the maximum limit of virtual copies is reached, before creating a new virtual copy. If you do not choose to automatically remove virtual copies when required in order to create a new virtual copy, you must manually delete old virtual copies before you can create new copies.

NOTE: A virtual copy must be unmounted to be removed. If the oldest virtual copy is mounted, a new virtual copy is not created until the oldest copy is unmounted.

Expiration-Based Policies

If you choose an expiration-based policy, you can set Recovery Manager to automatically remove virtual copies after a specified period of time has elapsed.

If you specify an expiration time for a remote virtual copy:

- If Remote Copy is set up in asynchronous periodic mode, Recovery Manager sets the expiration time for the remote virtual copy on the Remote Copy backup server only, not for the virtual copy created on the primary server.
- If Remote Copy is set up in synchronous mode, Recovery Manager sets the expiration time for both the virtual copy on the primary server and the remote virtual copy on the Remote Copy backup server.

For more information, see the *HP 3PAR Remote Copy Software User's Guide*.

The expiration-based policy option is only available if your HP 3PAR Storage System is running HP 3PAR InForm Operating System Software 2.3.1 or above.

Retention Time Restrictions

If you have a Virtual Lock license, you can set a retention time for virtual copies. The instance or database and the associated virtual copies created within the retention period cannot be removed during the retention period.

When setting a retention time, keep in mind the following restrictions:

- You must have a Virtual Lock license to set retention times.
- The minimum retention time is 1 hour; the maximum is 43,800 hours/1,825 days (5 years). The default maximum retention time is 336 hours (14 days).
- You can set a retention time for both numeric-based and expiration-based policies.
- The retention time cannot exceed the default maximum retention time set for the Storage Server.
- The retention time cannot be longer than the expiration time (if the policy is expiration-based).
- If you create a remote virtual copy and Remote Copy is set up in asynchronous periodic mode, the retention time is applied to the remote copy on the Remote Copy backup server only. If Remote Copy is set up in synchronous mode, the retention time is applied to both the remote copy on the Remote Copy backup server and the virtual copy on the primary server.
- After the retention time is set, it can be increased, but it cannot be removed or reduced.

Setting Recovery Manager Policies

1. In the node tree pane, right-click the instance you want to configure and select **Policy**.
2. Depending on whether you want to set a maximum number of copies or you want to set an expiration time frame, do the following in the **Policy Setup** dialog box:

To set:	Follow these steps:
Maximum number of virtual copies	1. Select the **Numeric** radio button. 2. In the **Maximum Instance level Virtual Copies** and **Maximum Database level Virtual Copies** text boxes, enter the desired maximum for each as a number between 1 and 500. 3. To remove the oldest virtual copy each time a copy above the maximum is created, check the **Remove the oldest Virtual Copies** checkbox. To keep the oldest virtual copy (and therefore prevent new virtual copies from being made after the maximum number is reached), uncheck the **Remove the oldest Virtual Copies** checkbox.
Expiration time frame for virtual copies	1. Select the **Expiration** radio button. 2. In the **Expire In** text box, enter the number of hours or days after which you want Recovery Manager to remove each virtual copy. The maximum expiration period is 43800 hours/1825 days (5 years). 3. In the drop-down list, select either **Hours** or **Days**.

3. To modify the default retention time for the instance and its virtual copies, enter the number of hours or days you want to keep the instance and its contents.

   The minimum retention period is 1 hour; the maximum is 43,800 hours/1,825 days (5 years). For more information about retention time restrictions, see "How Recovery Manager Policies Work" (page 29).

4. Click **Finish**.

   The virtual copy policy is effective immediately for all future virtual copies.

NOTE: You can also use the Recovery Manager CLI command `RMSql policy` to set Recovery Manager policies. For more information, see "Using the Recovery Manager CLI" (page 42).

Modifying the Policy for a Virtual Copy

To modify the retention time or the expiration time or both for a virtual copy:

1. In the node tree pane, right-click the virtual copy you want to modify, and select **Edit Time Constraints**.
2. To set a new retention time, check the **Retention Time** checkbox and enter a new value.
3. To set a new expiration time, check the **Expiration Time** checkbox and enter a new value.

   For more information on setting the retention and expiration time, see "How Recovery Manager Policies Work" (page 29).
4. Click **Ok**.

NOTE: You can also use the CLI command `RMSql policy` to modify Recovery Manager policies. For more information, see "Using the Recovery Manager CLI" (page 42).

Configuring Email Notifications

You can configure Recovery Manager to automatically send an email when:

- You create a virtual copy or remote virtual copy, or Recovery Manager automatically creates a virtual copy or remote virtual copy according to the task schedule.
- You create a backup or Recovery Manager automatically creates a backup according to the task schedule.
- You restore a volume, instance, or database.

In addition, you can configure the email to notify you only when an operation completes, only when an error message displays, or when either occurs.

NOTE: For more information about scheduling automatic virtual copies and remote virtual copies, see "Scheduling Automatic Virtual Copies" (page 33). For more information about scheduling automatic backups, see "Scheduling Automatic Backups of an Instance or Database" (page 37).

To configure email notifications:

1. In the node tree pane, right-click the instance for which you want to configure email notifications, and select **Email Config**.
2. In the **Email Configuration** pane, enter the appropriate information in the following text boxes:
   - **Email Type** - Type of email server (e.g., SMTP)
   - **SMTP Host Name** - Name of the email server
   - **Port** - Port of the email server
   - **Sender Email Address** - Email address of the sender
   - **Password** - Password for the sender's email address
   - **Receiver Email Address** - Email address of the person to be notified of task activity and/or errors
3. To send email notifications via the Secure Sockets Layer protocol, ensure the **SSL** checkbox is checked.
4. To make sure the email configuration works, click the **Test Connection** button.

5. In the **Operations** pane, check the desired checkboxes in the tab for each type of task (**Create Virtual Copy**, **Backup**, and/or **Restore**) for which you want emails:
   - **Info** - Recovery Manager sends informational emails for successful operations.
   - **Error** - Recovery Manager sends informational emails for operations that were not completed successfully.

   Both informational and error emails contain the result of the operation and the related CLI output.
6. Click **Finish**.

   Recovery Manager encrypts the password and saves the configuration as an XML file with the filename *servername_instancename*`_EmailConfig.xml`. Each time a virtual copy or backup is created or a restoration is performed on this instance, Recovery Manager checks the XML file and, if email is configured for the task, sends an email with the task information and/or error messages.

Deleting Email Configurations

To permanently stop all email notifications for an instance:

1. Select the instance for which you do not want to receive any email notifications.
2. Select **Actions→Delete Email Config**.

Creating Virtual Copies

You can use Recovery Manager to manually create virtual copies at the instance and database level. You can also schedule Recovery Manager to automatically make virtual copies of instances and/or databases.

NOTE: You can configure Recovery Manager to automatically send email notifications when virtual copies are manually or automatically created. For more information, see "Configuring Email Notifications" (page 31).

How Virtual Copy Creation Works

When Recovery Manager creates a virtual copy for an instance, it creates a virtual copy of all databases under that instance, including the instance's system databases. Similarly, when Recovery Manager creates a virtual copy for a database, it creates a virtual copy of the entire volume where the database and log files reside.

If you have Remote Copy set up, you can also create a virtual copy to be saved on the Remote Copy backup server; this type of copy is called a remote virtual copy.

NOTE: For more information about setting up instances, databases, and volumes to avoid data loss, see "Configuring the SQL Database" (page 19).

Manually Creating a Virtual Copy

To create a virtual copy:

1. In the node tree pane, right-click the instance or database for which you want to create a virtual copy, and select **Create Virtual Copy**.

2. Optional: To adjust policy values for this virtual copy (or, if you are scheduling automatic copies, this group of virtual copies):
   - To adjust the expiration time, check the **Expiration Time** checkbox and enter the new expiration time.
   - To adjust the retention time, check the **Retention Time** checkbox and enter the new retention time.

     Valid values are 0 (for no retention time) to 43,800 hours/1,825 days.

   For more information, see "Setting the Recovery Manager Policy" (page 29).
3. To immediately create one virtual copy, click **Finish** in the **Create Virtual Copy** dialog box. To schedule virtual copies, see "Scheduling Automatic Virtual Copies" (page 33)

Creating Remote Virtual Copies

How Remote Virtual Copy Works

When you create remote virtual copies, Recovery Manager uses HP 3PAR Remote Copy Software to send the virtual copies to the Remote Copy backup server. The Remote Copy backup server is a remote server that is the Recovery Manager backup server.

To use remote virtual copy functionality:

- The HP 3PAR Remote Copy Software license must be installed.
- Remote Copy volume groups must be configured.
- Both the Remote Copy primary server and Remote Copy backup server must be running the same version of Recovery Manager.

For more information, see "Remote Copy for Recovery Manager" (page 72).

Manually Creating a Remote Virtual Copy

To create a remote virtual copy:

1. In the node tree pane, right-click the instance or database for which you want to create a remote virtual copy, and select **Create Remote Virtual Copy**.
2. In the **Target Server Name** field, enter the name of the Remote Copy backup server.
3. Optional: To view the policy values for the remote server, click **Fetch Policy**.
4. Optional. To edit the modifiable remote server policy values for the remote virtual copy (or copies) you are creating, make your changes in the **Policy Info** area.
5. To immediately create one remote virtual copy, click **Finish** in the **Create Remote Virtual Copy** dialog box. To schedule virtual copies, see "Scheduling Automatic Virtual Copies" (page 33)

Displaying Remote Virtual Copies

The Recovery Manager GUI on the backup server does not automatically display remote virtual copies. To display a remote virtual copy:

- To display the virtual copy in the Recovery Manager GUI on the Remote Copy backup server, refresh the **Virtual Copy Management** node on the Remote Copy backup server.
- To use a Recovery Manager CLI command to display the virtual copy, enter the CLI command `RMSql display` with the `-rc` option on the Remote Copy primary server. For more information, see "Using the Recovery Manager CLI" (page 42).

Scheduling Automatic Virtual Copies

To schedule automatic virtual copies:

1. In the node tree pane, right-click the instance or database for which you want to create a virtual copy, and select one of the following:
   - **Create Virtual Copy**
   - **Create Remote Virtual Copy**
2. Click **Next** in the **Create Virtual Copy** dialog box.

   The **Task Scheduler** appears. For more information on using the Task Scheduler, see "Scheduling Automated Tasks with Task Scheduler" (page 34).

Automating Tasks

You can use the Task Scheduler to schedule Recovery Manager to automatically create virtual copies, remote virtual copies, and one-click backup.

You can use Task Manager to manage all your scheduled virtual copies and backups for all Recovery Manager products running on your servers.

Scheduling Automated Tasks with Task Scheduler

To schedule automatic virtual copies and backups:

1. Set up a virtual copy creation or backup creation task as desired. For more information, see:
   - "Scheduling Automatic Virtual Copies" (page 33)
   - "Scheduling Automatic Backups of an Instance or Database" (page 37)
2. In the **Task Scheduler** dialog box, check the **Schedule this task** checkbox.
3. In the **Password** text box, enter a local user password for the backup server.
4. In the **Password (confirm)** text box, re-enter the password.
5. From the **Start Time** drop-down list, select the hour at which you want Recovery Manager to start creating automatic virtual copies.
6. To specify the frequency with which the automatic virtual copies are to be created, select the appropriate radio button in the left pane of the **Schedule Pattern** area.

   The right pane of the **Schedule Pattern** area displays a calendar with which you can specify exactly when Recovery Manager is to automatically create virtual copies. The type of calendar displayed depends on the frequency of the automatic virtual copies selected in the left pane of the **Schedule Pattern** area.

   - **Once** - Schedules one automated virtual copy.

     In the right pane, select the month and year in which to create the virtual copy from the drop-down list above the calendar view, then select the day on the calendar.
   - **Hourly** - Schedules automated virtual copies multiple times a day at the interval you specify.

     From the drop-down list in the right pane, select the number of hours you want to pass between automated copies.
   - **Daily** - Schedules automated virtual copies on a daily basis at the interval you specify.
     - To schedule copies at regular intervals during the week, select the radio button for **Every day** in the right pane and enter the number of days between copies.
     - To schedule copies on a daily basis, select the radio button for **Every weekday** in the right pane and, in the **Start Date** text box, enter the start date or use the **Calendar** icon to select a start date.

- **Weekly** - Schedules automated virtual copies by the day of the week.

  In the right pane, enter the number of weeks you want to pass between automated copies and check the checkbox for each day of the week on which a virtual copy is to be created.

- **Monthly** - Schedules automated virtual copies by day or date of the specified months.
  - **Day** - To schedule copies on a specific date at a specific monthly interval, enter the date (as a number) and the number of months between copies. For example, if you enter **Day 24 of every 2 months**, Recovery Manager automatically creates a virtual copy every 24th day of every other month.
  - **The (first Sunday)** - To schedule copies on a specific day and in specific months, use the drop-down lists to specify the day and the checkboxes to specify the exact months to create copies. For example, if you enter **The first Sunday of every month** and check the **Jan**, **Apr**, and **Aug** checkboxes, Recovery Manager automatically creates a virtual copy the first Sunday in January, the first Sunday in April, and the first Sunday in August.

7. Click **Finish**.

You can use the **Task Manager** to edit, run, delete, and view details of scheduled tasks. For more information, see "Managing Automated Tasks with Task Manager" (page 35).

NOTE: All tasks created in **Task Scheduler** and their associated script files are not automatically removed when you deinstall Recovery Manager. Retention of tasks allows you to upgrade your version of Recovery Manager without losing scheduling information.

Managing Automated Tasks with Task Manager

You can use the Task Manager to manage all your scheduled virtual copies and backups for all Recovery Manager products running on your servers.

1. In the node tree pane, ensure a node is selected.
2. Select **Scheduled Tasks→Task Manager**.

   Recovery Manager lists all scheduled tasks in the **Task Name** column of the **Task Manager** dialog box, prefixing Recovery Manager for SQL Server tasks with **RMS**.
3. To manage a scheduled task, select it and click one of the following buttons:
   - **Edit** - Opens the **Task Scheduler**, with which you can modify the task. To save your changes, you must enter your password. For more information, see "Scheduling Automatic Virtual Copies" (page 33).
   - **Detail** - Displays task information in the **Task Detail** dialog box.
   - **Delete** - Deletes the task and its associated script file.
   - **Edit Script** - Displays the task script and enables you to modify it.
   - **Run Now** - Performs the selected task immediately (in addition to its scheduled run time).
   - **Refresh** - Updates the list and status of scheduled tasks.
4. To exit the **Task Manager** dialog box, click **OK**.

Mounting a Virtual Copy

You can use Recovery Manager to mount a virtual copy at the instance or database level.

1. In the node tree pane, right-click the timestamp for the virtual copy you want to mount and select **Mount**.
2. In the **Mount Virtual Copy** dialog box, ensure the **Target Server** text box displays the server name to which you want the virtual copy mounted.
3. In the **Mount Point Only** text box, select the mount point.

NOTE: Recovery Manager does not support mounting a virtual copy to a drive letter.

4. Click **OK**.

   Recovery Manager:

   - Adds the mounted virtual copy to the list view in the informational pane
   - Displays the server to which the copy is mounted in the **Exposure** column
   - Displays the absolute path on which the copy is mounted in the **Mount Point** column
   - Displays the icon for the mounted virtual copy in green

Unmounting a Virtual Copy

1. In the node tree pane, right-click the timestamp for the virtual copy you want to unmount, and select **Unmount**.
2. Recovery Manager displays a dialog box asking you to confirm the unmount. Click **OK**.

   Recovery Manager:

   - Removes the mounted virtual copy from the list view in the informational pane
   - Displays **Not Mounted** in the **Exposure** column
   - Displays the icon for the mounted virtual copy in blue

Backing Up a Virtual Copy

You can use Recovery Manager to back up virtual copies to media using HP Data Protector or Symantec NetBackup.

To back up a virtual copy to media, you must first configure your backup software (Data Protector or NetBackup) as described in "Configuring Backup Software" (page 24).

You can create a backup of an instance or database on the instance or database level or at the timestamp level.

- When you create a backup on either the instance or database level, Recovery Manager creates a new virtual copy, and your backup software backs it up.
- When you create a backup at the timestamp level, Recovery Manager mounts the existing virtual copy, and your backup software backs it up using the same timestamp.

You can also schedule Recovery Manager to automatically create backups of instances and/or databases.

NOTE: You can configure Recovery Manager to automatically send email notifications when backups are manually or automatically created. For more information, see "Configuring Email Notifications" (page 31).

Manually Creating Backups at the Instance or Database Level

When you create a backup of a virtual copy for an instance or database, Recovery Manager automatically creates a virtual copy and mounts it, your backup software backs the virtual copy up to media, and Recovery Manager unmounts the virtual copy. You can also choose to have Recovery Manager automatically remove the newly created virtual copy.

To create a backup of a virtual copy at the instance or database level:

1. In the node tree pane, right-click the instance or database you want to back up and select **Backup to Media**.

2. From the **Select Vendor** drop-down list, select the backup software you are using:
   - Symantec NetBackup
   - HP Data Protector
3. In the **Parameters** area, enter the required information, depending on your backup software:

If you are using:	Enter these parameters:
Symantec NetBackup	• **Master Server Name**: The NBU master server • **NBU Policy Name**: The name of the policy you are using • **NBU Full Schedule Name**: The name of the schedule within the policy you are using For more information, see Symantec NetBackup documentation and "Configuring Backup Software" (page 24).
HP Data Protector	• **Data List**: The name of the data list For more information about data lists, see the description of backup specifications in HP Data Protector documentation.

NOTE: Recovery Manager saves the information entered in the **Parameters** area and displays it as the default the next time you create a backup.

4. To automatically remove the newly created virtual copy after backup, ensure the **Remove Virtual Copy from InServ after backup** checkbox is checked.
5. To immediately create one backup, click **Finish**.
   - Recovery Manager creates the backup, names it as its timestamp, and adds it to the **Backup Management** node under the relevant instance or database in the node tree pane if:
     - You are using an expiration-based policy, or
     - You are using a numeric-based policy but either have not reached the maximum number of virtual copies allowed or the policy is configured to remove old copies as necessary (i.e., the **Remove the oldest Virtual Copies** checkbox is checked).
   - Recovery Manager does not create the backup if you are using a numeric-based policy and:
     - The policy is not configured to remove the oldest virtual copies (i.e., the **Remove the oldest Virtual Copies** checkbox is not checked), and
     - You have reached the maximum number of virtual copies allowed, and therefore Recovery Manager cannot create a new virtual copy.

   For more information, see "Setting the Recovery Manager Policy" (page 29).

Scheduling Automatic Backups of an Instance or Database

To schedule automatic backups of an instance or database:

1. In the node tree pane, right-click the instance or database you want to back up, and select **Backup to Media**.
2. In the **Backup to Media** dialog box, enter the appropriate information. For more information, see "Manually Creating Backups at the Instance or Database Level" (page 36).
3. Click **Next**.
4. In the **Task Scheduler**, schedule backups as desired. For more information, see "Scheduling Automated Tasks with Task Scheduler" (page 34).

Creating a Backup of a Virtual Copy

When you create a backup of one virtual copy, Recovery Manager copies the existing virtual copy, and the backup software backs the copy up to the media using the same timestamp as the original copy. Recovery Manager does not create a new virtual copy for a backup of an individual virtual copy.

To create a backup of one virtual copy:

1. In the node tree pane, right-click the instance or database you want to back up and select **Backup to Media**.
2. From the **Select Vendor** drop-down list, select the backup software you are using:
   - Symantec NetBackup
   - HP Data Protector
3. In the **Parameters** area, enter the required information, depending on your backup software:

If you are using:	Enter these parameters:
Symantec NetBackup	• **Master Server Name**: The NBU master server • **NBU Policy Name**: The name of the policy you are using • **NBU Full Schedule Name**: The name of the schedule within the policy you are using For more information, see Symantec NetBackup documentation and "Configuring Backup Software" (page 24).
HP Data Protector	• **Data List**: The name of the data list For more information about data lists, see the description of backup specifications in HP Data Protector documentation.

NOTE: Recovery Manager saves the information entered in the **Parameters** area and displays it as the default the next time you create a backup.

4. To immediately create one backup, click **Finish**. Recovery Manager creates the backup, names it as its timestamp, and adds it to the **Backup Management** node under the relevant instance or database in the node tree pane.

   For more information, see "Setting the Recovery Manager Policy" (page 29).

NOTE: Recovery Manager does not support scheduling automated timestamp backups.

Removing a Backup from the Repository

To use Recovery Manager to remove a backup from the repository, right-click the backup and select **Delete Backup**.

Restoring Instances, Databases, and Volumes

You can use either the volume restore feature or the file copy feature of Recovery Manager to restore an instance or a database from a virtual copy, or you can perform a media restore from a backup. Volume restore is the fastest method.

NOTE: If your servers are configured in a shared volume environment such as a Microsoft cluster environment, see the following sections for more information on performing a restore in an MSCS environment:

- "Restoring a SQL Instance in an MSCS Environment Using File Copy Restore" (page 69)
- "Restoring a Volume in an MSCS Environment Using Volume Restore" (page 69)

Alternatively, you can use InForm CLI commands to promote the virtual copy to its parent base volume. For more information, see the *HP 3PAR InForm OS CLI Administrator's Manual*.

Restoring an Instance or Database with Volume Restore

⚠ **WARNING!** DO NOT perform a volume restore if the base volume to which you are promoting the virtual copy contains files for other instances or databases.

The volume restore feature promotes the virtual copy to the base volume and overwrites all data on the volume. If you perform a volume restore on a volume that hosts files for multiple instances or databases, the operation deletes all data not contained in the promoted virtual copy.

1. Schedule downtime for the SQL Server service; Recovery Manager for SQL automatically stops and starts the SQL Server service during a restore.
2. Under the **Virtual Copy Management** node in the node tree pane, right-click the timestamp for the virtual copy you want to use for the restore, and select **Restore Using→Volume**.
3. To confirm you understand the ramifications of proceeding with the restore, check the **Click to continue** checkbox.
4. Click **OK**.

   The virtual copy completely overwrites the instance or database. The instance or database is now restored.

Restoring an Instance or Database with File Copy Restore

The file copy restore feature enables you to restore a specific instance or a database from a virtual copy. Unlike the volume restore feature, the file copy restore feature does not overwrite the entire volume.

1. Schedule downtime for the SQL Server service; Recovery Manager for SQL automatically stops and starts the SQL Server service during a restore.
2. Under the **Virtual Copy Management** node in the node tree pane, right-click the timestamp of the virtual copy you want to use for the restore, and select **Restore Using→File Copy**.

   NOTE: The **Vendor Restore Method** field of the **File Copy Restore** dialog box automatically displays **Virtual Copy (File Copy)**.

   By default, Recovery Manager restores the virtual copy to its parent instance or database (specified in the **Target Server** field).
3. To restore a virtual copy of a database to a database different from its parent database, you can specify an alternate database as the target of the restore:
   a. In the **Database Restore Option** area of the **File Copy Restore** dialog box, check the **Clone Database** checkbox.
   b. In the **Database Name** text box, enter the name of the database to which you want the virtual copy restored.
   c. If you want to restore the clone database to a location other than its parent location, enter the directory path to the alternate database In the **Alternate Path** text box. Note that if

you enter an alternate location, you must enter an alternate name in the **Database Name** text box.

If you leave this text box blank, the clone database is restored to the parent location of the original virtual copy.

d. To use the point-of-failure recovery method to restore the database, check the **No Recovery** checkbox. For more information about completing a point-of-failure recovery, see "Recovering All Data with Point-of-Failure Recovery" (page 69).

4. To confirm you understand the warning and the ramifications of proceeding with the restore, check the **Click to continue** checkbox.
5. Click **OK**.

   Depending on whether you restored the virtual copy to its parent location or created a clone database, Recovery Manager does the following:

   - If you restored the virtual copy to its parent location, Recovery Manager completely overwrites the instance or database with the virtual copy. The instance or database is now restored.
   - If you restored the virtual copy with an alternate database name but you did not specify an alternate database path, Recovery Manager copies the virtual copy to the specified clone database name (at the parent location) and attaches the database.
   - If you restored the virtual copy with an alternate database name with an alternate database path, Recovery Manager copies the virtual copy to the specified clone database name at the alternate location and attaches the database.

Restoring an Instance or Database from a Backup

You can restore backups to their original location (i.e., to the instance or database location of the virtual copy that was used to create the backup, not to the original SQL database or instance location), or you can specify an alternate location.

1. Under the **Backup Management** node in the node tree pane, right-click the timestamp for the backup you want to use for the restore, and select **Restore**.

   By default, Recovery Manager restores the backed-up virtual copy to its original location, which is displayed in the **Alternate Location** text box. The original location is either the directory **C:\3parSnapshot** or **F:\3parSnapshot**, depending on your system drive.
2. If you want to restore the virtual copy to a different location, enter the alternate location in the **Alternate Location** text box or select a location from the file chooser.
3. Click **OK**.

   The backup software mounts the backup to the specified location as a virtual copy. To complete the instance or database restore, move the virtual copy to the volume or database.

Analyzing and Synchronizing the Repository

You can use Recovery Manager to compare and synchronize virtual copies in the Recovery Manager repository with the HP 3PAR Storage System.

1. In the node tree pane, right-click the SQL production server, and select **Analyze**.
2. To automatically synchronize the HP 3PAR Storage System and the repository (if necessary), check the **Synchronize result with Repository** checkbox.

   To analyze the repository without synchronizing it, leave the **Synchronize result with Repository** checkbox unchecked.

3. Click **Yes**.

   Depending on whether you are both analyzing and synchronizing the repository or just analyzing the repository, Recovery Manager does the following:

   - If you opt to automatically synchronize the results, Recovery Manager analyzes the repository, synchronizes the repository and the HP 3PAR Storage System (if necessary), and updates the list of virtual copies under the **Virtual Copy Management** node in the node tree pane.
   - If you opt to only analyze the repository, Recovery Manager displays the **Analyze Repository** dialog box and performs the analysis. To view the list of virtual copies not in the repository, if any, click the **Detail** button in the **Analyze Repository** dialog box.

     To synchronize the results (if necessary), repeat the above steps to launch the **Analyze Repository** dialog box. Be sure to check the **Synchronize result with Repository** checkbox before continuing.

Removing a Virtual Copy

1. Check the **Exposure** column in the information pane and ensure the virtual copy detail displays **Not Mounted**. If the virtual copy is mounted, unmount it.

   For more information, see "Unmounting a Virtual Copy" (page 36).
2. Right-click the virtual copy and select **Remove**.

Viewing Event Message Descriptions

You can view a description of all Recovery Manager error messages (aka event messages), including tips for troubleshooting each event.

1. In the node tree pane, select any node under **Recovery Manager**.
2. Select **About→Event Messages** from the menu bar.

   Recovery Manager uses your default browser to display the **Event Messages** file. The file contains all the events for HP 3PAR Recovery Manager Software for Microsoft SQL Server in order of event ID.

7 Using the Recovery Manager CLI

Recovery Manager for SQL Server Command Line Interface (CLI)

HP 3PAR Recovery Manager Software for Microsoft SQL Server provides a Command Line Interface (CLI). The CLI allows users to manage Recovery Manager functionality using commands rather than the Graphical User Interface (GUI).

To do the following:	Use this CLI command:
Create virtual copies	`RMSql create`
Remove unmounted virtual copies	`RMSql remove`
Mount virtual copies	`RMSql mount`
Unmount virtual copies	`RMSql unmount`
Backup virtual copies to media using Symantec NetBackup or HP Data Protector	`RMSql backup`
Restore from virtual copies	`RMSql restore`
Display virtual copies currently in the repository	`RMSql display`
List backup entries currently in the backup pool	`RMSql listbackup`
Delete backup entries currently in the backup pool	`RMSql deletebackup`
Query and change repository location	`RMSql repository`
Query and change the port location	`RMSql portconfig`
Change the wait time for backup, volume restore, and analysis	`RMSql timeconfig`
Gather the environmental statistics and create a log file for diagnosis	`RMSql report`
Analyze and synchronize the volumes in the HP 3PAR Storage System and the virtual copies in the repository	`RMSql analyze`
Set Recovery Manager policies	`RMSql policy`
Set policy for specified virtual copy	`RMSql setvc`

Recovery Manager Commands

The following sections describe how to administer Recovery Manager for SQL from the Command Line Interface.

RMSql analyze

SYNTAX

```
RMSql analyze -s <SQL server> [-sync] [-f]
```

DESCRIPTION

The `RMSql analyze` command validates all virtual copy records by matching virtual copies in the HP 3PAR Storage System against records in the Recovery Manager for SQL repository. If any existing virtual copies in the system are missing from the repository, Recovery Manager for SQL displays them as out-of-sync records. Likewise, if any existing virtual copies in the repository are missing from the system, Recovery Manager for SQL also displays them as out-of-sync records.

PARAMETERS

The following options are supported:

`-s <SQL Server>`	The SQL server to which the database belongs.
`-sync`	Optional. Remove out-of-sync virtual copies from the repository. If not specified, out-of-sync virtual copies remain in the repository.
`-f`	Optional. Forcefully remove out-of-sync records from the repository. You must use this option in conjunction with the `-sync` option. If not specified, the system requires you to confirm the removal of out-of-sync virtual copies.

NOTE: When you use the `-f` option, Recovery Manager automatically removes out-of-sync records without prompting for confirmation.

EXAMPLES

The following example validates all virtual copies under the specified SQL server.

```
RMSql analyze -s <SQLserver>
```

RMSql backup

SYNTAX

```
RMSql backup -s <SQL server> [-i <SQL instance>] [-d <database>] [-t
<timestamp> | -r ] [-ts <target server>][-p <policyName> -u
<ScheduleName> -M <masterServer>] [-noemail] [-dl <DataListName>]
```

DESCRIPTION

The `RMSql backup` command backs up a virtual copy to the specified media. The backup can be an existing virtual copy, or it can be a new virtual copy created by this command.

PARAMETERS

The following options are supported:

`-s <SQL Server>`	The SQL server associated with the database.
`-i <SQL instance>`	Optional. The SQL server instance associated with the database. If not specified, `MSSQLSERVER` (local) is used as the default value.
`-d <database>`	Optional. The database for the virtual copy. If not specified, the instance for the virtual copy is used as the default value.
`-t <timestamp>`	Optional. The timestamp of the virtual copy to back up. If not specified, the system creates a point-in-time virtual copy, uses it to create the backup, and then removes this virtual copy after the backup is complete. If specified, the system retains this timestamp value after the backup is complete.
`-r`	Optional. Retain the virtual copy. Valid only if you do not use the `-t` option. If not specified, the virtual copy is deleted after backup is complete.
`-ts <target server>`	Optional. Target Server for the backups if the `-r` option is not specified. To use this option, the following must be located at the secondary site: • Recovery Manager Backup Component server, with Recovery Manager for SQL Server installed • Symantec NetBackup client or HP Data Protector If not specified, the local system is used as the default value.
`-p <policyName>`	Symantec NetBackup policy name. Only valid if Symantec NetBackup software is in use.
`-u <ScheduleName>`	Name of the NetBackup backup schedule. Only valid if Symantec NetBackup software is in use.
`-M <masterServer>`	NetBackup master server name. Only valid if Symantec NetBackup software is in use.
`-noemail`	Optional. Do not send an email notification even if configured for this operation. If not specified, Recovery Manager sends an email notification of the backup if configured. For more information, see *Configuring Email Notifications*.
`-dl <DataListName>`	Specifies the data list name (aka the backup specification name) and indicates the backup software in use is HP Data Protector. Optional: If not specified, Recovery Manager proceeds as if the backup software used is Symantec NetBackup.

EXAMPLE

The following command performs a backup of virtual copy `020405162103` with the necessary Symantec NetBackup parameters.

```
RMSql backup -s inst1 -d test_db -t 020405162103 -p test -u full -M
host1
```

NOTE: Use quotes ("") when an option value includes spaces.

NOTE: During backup, snapshot volumes of the virtual copy are surfaced to the operating system with a default mount point under the `<SystemDrive>:\3parsnapshot` directory. Therefore, `<SystemDrive>` must use NTFS in order to support the volume mount point.

RMSql create

SYNTAX

```
RMSql create -s <SQL server> [-rc <target server> [-w <waittime>]][-i
<SQL instance>] [-d <database>] [-noemail] [-exp <time>{h|H|d|D}]
[-retain <time>{h|H|d|D}] [-f]
```

DESCRIPTION

The `RMSql create` command creates a virtual copy of a SQL database or databases under an instance on the primary host where the SQL server instance is running. (The virtual copy can be mounted to a host later for off-host processing.)

The `RMSql create` command also allows the user to create a synchronization in periodic mode to a Remote Copy volume group where a single SQL database or all of the SQL databases under an instance are defined, and create another virtual copy at the secondary site as a backup.

As with Recovery Manager for SQL Server itself, this command only supports the online backup of an entire SQL database. Therefore, you must make sure the database is online before creating a virtual copy.

PARAMETERS

The following options are supported:

`-s <SQL server>`	SQL server to which the database belongs.
`-i <SQL instance>`	Optional. SQL server instance to which the database belongs. If not specified, MSSQLSERVER is used as the default.
`-d <database>`	Optional. The database from which to create a virtual copy. If not specified, the instance level of the virtual copy is used as the default.
`-w <waittime>`	Optional. Wait time in seconds. Recovery Manager uses this wait time to poll the status of the remote copy before creating a virtual copy at the secondary site. If not specified, the wait time is 120 seconds by default.
`-rc <target server>`	Remote Copy target server. To use this option, the Recovery Manager Backup Component server, with Recovery Manager for SQL Server installed, must be located at the secondary site.
`-noemail`	Optional. Do not send an email notification even if configured for this operation. If not specified, Recovery Manager sends an email notification of the virtual copy creation if configured. For more information, see *Configuring Email Notifications*.
`-exp <time>{h|H|d|D}`	Optional. Set the expiration time for this virtual copy to the specified time and time unit. Valid values are: • To set the expiration time in hours: 1-43800h (or H) • To set the expiration time in days: 1-1825d (or D) • To remove the expiration period: 0 To use this option, the Recovery Manager for SQL policy must be set to an expiration-based policy. If not specified, Recovery Manager for SQL creates the virtual copy using the expiration time specified in the current policy.
`-retain <time>{h|H|d|D}`	Optional. Set or extend the retention time for the specified virtual copy to the specified time. The virtual copy cannot be removed during this time period.

NOTE: Retention time restrictions are:

- You must have a Virtual Lock license to use the -retain option.
- The minimum retention period is 1 hour; the maximum is 43,800 hours/1,825 days (5 years).
- The default retention time is 336 hours (14 days).
- The retention time cannot exceed the value of the InServ's VVRetentionTimeMax.
- You can set a retention time regardless of whether the policy is numeric- or expiration-based.
- The retention time cannot be longer than the expiration time (if the policy is expiration-based).
- If you create a remote virtual copy and Remote Copy is set up in asynchronous periodic mode, the retention time is applied to the remote copy on the Remote Copy backup server only. If Remote Copy is set up in synchronous mode, the retention time is applied to both the remote copy on the Remote Copy backup server and the virtual copy on the Remote Copy primary server.
- The retention time cannot be removed or reduced after it is set.
- To set no retention time for this virtual copy, use a value of 0h.

`-f` Optional. When used with the -retain option, does not request confirmation for the retention time modification.

EXAMPLES

The following command creates a virtual copy for the database test on the SQL server (SQLServer).

```
RMSql create -s SQLServer -d test
```

The following command creates a virtual copy for the database test on a virtual SQL server (SQLVirtualServer) on a cluster.

```
RMSql create -s SQLVirtualServer -d test
```

The following command creates a Remote Copy snapshot for the database test on a virtual SQL server (SQLVirtualServer) on a cluster to a secondary site server (SecondaryServer).

```
RMSql create -s SQLVirtualServer -d test -rc SecondaryServer
```

NOTE: Use quotes ("") when an option value includes spaces.

NOTE: HP 3PAR VSS Software waits up to 10 seconds for a virtual copy operation; this interval is not configurable. In most cases, 10 seconds is a sufficient window in which to successfully create a virtual copy. However, in some circumstances under very heavy loads, 10 seconds may not be enough time, and the virtual copy might fail on this attempt. This failure is a VSS framework requirement on Microsoft's part.

If such a failure occurs, VSS does not automatically retry the shadow copy creation. You must use the Recovery Manager GUI or CLI to re-attempt to create the virtual copy.

NOTE: During virtual copy creation, the system creates a backup document in XML format. This document contains current system information and can be used for restore purposes.

NOTE: The snapshot volume set is limited to up to 64 volumes. In other words, each database (under database-level operation) or each instance (under instance-level operation) can spread over a maximum of 64 volumes.

NOTE: You can only perform database- or instance-level operations if you have sys **admin** permissions for SQL Server.

RMSql deletebackup

SYNTAX

```
RMSql deletebackup -s <SQL server> [-i <SQL instance>] [-d <database>]
-t <timestamp>
```

DESCRIPTION

The `RMSql deletebackup` command removes the specified backup entry from the Recovery Manager repository only. It does not remove the Symantec NetBackup or HP Data Protector entry, nor does it remove the actual images backed up by the backup process.

PARAMETERS

The following options are supported:

`-s <SQL server>`	SQL server to which the backup belongs.
`-i <SQL instance>`	Optional. The SQL instance associated with the database. If not specified, `MSSQLSERVER` (local) is used as the default value.
`-d <database>`	Optional. The database-level backup to be removed. If not specified, the instance-level backup is removed by default.
`-t <timestamp>`	The backup entry timestamp.

EXAMPLE

The following command deletes the backup timestamp `020405162103`:

```
RMSql deletebackup -s server1 -d db1 -t 020405162103
```

RMSql display

SYNTAX

```
RMSql display -s <SQL server> [-rc <target server>] [-i <SQL instance>]
[-d <database>] [-t <timestamp>]
```

DESCRIPTION

The `RMSql display` command displays all virtual copies in the server at a local site or remote site.

PARAMETERS

The following options are supported:

`-s <SQL server>`	SQL server associated with the database.
`-i <SQL instance>`	Optional. The SQL instance associated with the database. If not specified, MSSQLSERVER is used as the default value.
`-d <database>`	Optional. Display the virtual copies created for a given database. If not specified, all database and instance virtual copies belonging to the SQL server are displayed by default.
`-rc <target server>`	Optional. The Remote Copy target server at secondary site. To use this option, the Recovery Manager Backup Component server, with Recovery Manager for SQL Server installed, must be located at the secondary site. If not specified, the local site is used as the default value.
`-t <timestamp>`	Optional. Display detailed information about a specific virtual copy in the local repository. If not specified, Recovery Manager displays information about all virtual copies.

NOTE: Recovery Manager does not support using the command `RMSql display -t` for display of information about a virtual copy that exists at a secondary site.

The following command displays the virtual copies for `server1`.

```
RMSql display -s server1
```

NOTE: Use quotes ("") when an option value includes spaces.

NOTE: If you create an instance-level virtual copy and then issue the `RMSql display` command, the **Database** column displays `all` to indicate that Recovery Manager has created virtual copies of all databases except the Temp database.

RMSql listbackup

SYNTAX

```
RMSql listbackup -s <SQL server> [-i <SQL instance>] [-d <database>]
[-t <timestamp>]
```

DESCRIPTION

The `RMSql listbackup` command displays all virtual copies being backed up via Symantec NetBackup or HP Data Protector.

PARAMETERS

The following options are supported:

`-s <SQL server>`	SQL server to which the database belongs.
`-i <SQL instance>`	Optional. SQL server instance to which the database belongs. If not specified, MSSQLSERVER (local) is used as the default.
`-d <database>`	Optional. Database for which to display virtual copies. If not specified, Recovery Manager for SQL displays virtual copies being backed up at the instance and database level.
`-t <timestamp>`	Optional. The timestamp of a specific virtual copy to display. If not specified, Recovery Manager displays all virtual copies being backed up.

NOTE: When you specify a timestamp, Recovery Manager for SQL displays detailed information about the virtual copy being backed up.

RMSql mount

SYNTAX

```
RMSql mount -s <SQL server> -t <timestamp> [-m <mount point>] [-ts <host
name>]
```

DESCRIPTION

The `RMSql mount` command mounts a virtual copy created by the `RMSql create` command.

To mount a virtual copy, you must create an available mount point on the NTFS volume before you execute the command.

PARAMETERS

The following options are supported:

`-s <SQL server>`	The SQL server associated with the database.
`-t <timestamp>`	The timestamp for the virtual copy to be mounted.
`-m <mount point>`	Optional. The mount point for virtual copy devices. If not specified, `%SystemDrive%\3parSnapshot` is used as the default mount point.
`-ts <hostname>`	Optional. The name of the host on which to mount the virtual copy. If not specified, the local host is used as the default mount point.

⚠ **WARNING!** If you mount a volume with the `RMSql mount` command, you **must** unmount the volume with the `RMSql unmount` command. Do not manually unmount a volume that was mounted with the `RMSql mount` command.

NOTE: When mounting in read-write mode, the system uses VDS API to make the volume read-writeable. However if there is another operation on the disk and the device is locked, you cannot unmount the volume. If you attempt to unmount a locked volume, the system displays the following error message:

```
ERROR: COM call "pVolumeMF->Dismount(TRUE,FALSE)" failed.
Returned HRESULT = 0x80042413
Error text: <Unknown error code>
Error: There was an expected HRESULT error catched: 0x80042413 <Unknown
 error code>
```

This error message indicates the same issue as VDS_E_DEVICE_IN_USE.

To resolve the issue, restart the VDS service or reboot the machine.

NOTE: Recovery Manager for SQL only supports snapshot exposure to a host.

RMSql policy

SYNTAX

```
RMSql policy -s <SQL server> [-i <SQL instance>] [-q] [-exp
<time>{h|H|d|D}] [-in <instance virtual copy limit>][-n <database virtual
copy limit>] [<-r>] [-retain <time>{h|H|d|D}] [-f]
```

DESCRIPTION

The `RMSql policy` command sets the Recovery Manager policy at the instance and database level.

PARAMETERS

The following options are supported:

`-s <SQL server>`
SQL server to which the database belongs.

`-i <SQL instance>`
Optional. The SQL server instance to which the database belongs. If not specified, MSSQLSERVER (local) is used as the default.

`-r`
Optional. Retain the oldest virtual copy even when the number of virtual copies exceeds the limit set by the Recovery Manager policy. If you specify this option, Recovery Manager cannot create new virtual copies after the maximum copies allowed is reached (unless you manually remove one or more older virtual copies). If not specified, Recovery Manager removes virtual copies.

`-q`
Optional. Query current policy status. If not specified, the current policy status is not displayed.

`-n <database virtual copy limit>`
Optional. The maximum number of database-level virtual copies to retain. If not specified, a maximum of 10 is used as the default.

`-in <instance virtual copy limit>`
Optional. The maximum number of instance-level virtual copies to retain. If not specified, a maximum of 10 is used as the default.

NOTE: The sum of the values used for the `-n` and `-in` options cannot exceed 500.

`-exp <time>{h|H|d|D}`
Optional. If the policy is expiration-based, set the expiration time to the specified time and time unit. Valid values are:

- To set the expiration time in hours: 1-43800h (or H)
- To set the expiration time in days: 1-1825d (or D)

If not specified, the expiration time does not change.

`-retain <time>{h|H|d|D}`	Optional. Set or extend the retention time for the specified virtual copy to the specified time. The virtual copy cannot be removed during this time period. **NOTE:** Retention time restrictions are: • You must have a Virtual Lock license to use the -retain option. • The minimum retention period is 1 hour; the maximum is 43,800 hours/1,825 days (5 years). • The default retention time is 336 hours (14 days). • This option cannot be used with -rc. • The retention time cannot exceed the value of the InServ's VVRetentionTimeMax. • You can set a retention time regardless of whether the policy is numeric- or expiration-based. • The retention time cannot be longer than the expiration time (if the policy is expiration-based). • If you create a remote virtual copy and Remote Copy is set up in asynchronous periodic mode, the retention time is applied to the remote copy on the Remote Copy backup server only. If Remote Copy is set up in synchronous mode, the retention time is applied to both the remote copy on the Remote Copy backup server and the virtual copy on the Remote Copy primary server. • The retention time cannot be removed or reduced after it is set. • To set no retention time for this virtual copy, use a value of 0h.
`-f`	Optional. When used with the -retain option, does not request confirmation for the retention time modification.

EXAMPLE

The following command sets the maximum number of virtual copies to 5 at all times for the default SQL instance:

```
RMSql policy –n 5 -s <SQL server>
```

The following command sets the expiration time of virtual copies to 30 days for the default SQL instance:

```
RMSql policy -exp 30d -s <SQL server>
```

NOTE: By default, the Recovery Manager for SQL policy is set to a maximum of 10 virtual copies each for the instance level and the database level. In addition, the option to delete the oldest virtual copy is by default set to 'No'; therefore, when the virtual copy limit is reached, Recovery Manager for SQL retains the oldest virtual copy.

You can use the above example command either to expand the policy limit (by specifying a larger value for the `-n` option) or to enable removal of the oldest virtual copy if the limit has already been reached (by **not** using the `-r` option).

RMSql portconfig

SYNTAX

```
RMSql portconfig [-n <number>] [-s <WindowsHost>]
```

DESCRIPTION

After Recovery Manager for SQL is installed, by default the port used for communication between the backup server and production server is 9932. If necessary, you can specify an alternate port.

PARAMETERS

The following options are supported:

`-n <number>`	Optional. The port number. If not specified, 9932 is used as the default.
`-s <WindowsHost>`	Optional. Name of the Windows host on which to change the port. If not specified, the current host name is used as the default.

EXAMPLES

The following command changes the local port to 9999.

```
RMSql portconfig -n 9999
```

The following command changes the port on the specified SQL server to 9999.

```
RMSql portconfig -n 9999 -s <WindowsHost>
```

NOTE: After you execute the `portconfig` command, you must restart Recovery Manager Services.

NOTE: If you change the port value on one server, you must update the port value for every Recovery Manager for SQL system (including the Recovery Manager backup server) managed by the same Recovery Manager backup server.

RMSql remove

SYNTAX

```
RMSql remove -s <SQL server> -t <timestamp>
```

DESCRIPTION

The `RMSql remove` command removes a virtual copy from the system and the Recovery Manager repository. The virtual copy must not be mounted; if the virtual copy is mounted, Recovery Manager for SQL does not remove it.

PARAMETERS

The following options are supported:

`-s <SQL server>`	The SQL server to which the database belongs.
`-t <timstamp>`	The timestamp of the virtual copy to remove.

NOTE: After a virtual copy is removed, it cannot be used to restore data from the Recovery Manager for SQL repository. However, you can restore a removed virtual copy from the backup media if the virtual copy was backed up with the `RMSql backup` command and the backup entry is still available.

RMSql report

SYNTAX

```
RMSql report -s <WindowsHost> -output <OutputDirectory>
```

DESCRIPTION

The `RMSql report` command collects the environmental information from a specified Windows host and creates a report for diagnostic purposes.

PARAMETERS

The following options are supported:

`-output <OutputFolder>`	Full path to the folder in which to generate the report.
`-s <WindowsHost>`	Name of the Recovery Manager for SQL host.

EXAMPLE

The following command retrieves platform information from the host `Grampus` and saves the report in `c:\MyReport`.

```
RMSql report -s Grampus -output c:\MyReport
```

RMSql repository

SYNTAX

```
RMSql repository [-a <alter location>] [-r]
```

DESCRIPTION

After Recovery Manager for SQL is installed, by default the repository directory is located under the Recovery Manager install directory. To provide the highest level access to the repository, you can change the repository destination to the location of the HP 3PAR virtual volume.

PARAMETERS

The following options are supported:

`-a <alternateLocation>` Optional. Alternate location in which to store data. If not specified, Recovery Manager for SQL retains the current repository location.

NOTE: If you use the CLI to move the repository to an alternate location, you must restart the Recovery Manager for Microsoft SQL Server GUI in order to view the repository in its new location.

`-r` Optional. Retain the current repository location and only make changes to the registry values. Use this option when Recovery Manager for SQL is reinstalled after operating under an alternate location. Note that if you use this option, you cannot move the repository path back to the alternate location.

EXAMPLE

The following command moves the repository directory to `d:\3parvv` and updates the registry database as well.

```
RMSql repository –a d:\3parvv
```

RMSql restore

SYNTAX

```
RMSql restore -s <SQL server> [-i <instance>] [-d <database>]-t
<timestamp> [-ts <target server>] [-M <masterServer>] [-a <altLocation>]
[-snap] [-noemail] [-norecovery] [-clonedb] [-dp]
```

DESCRIPTION

You can use the `RMSql restore` command to perform 3 different types of restore:

- **Media Restore** - Using an existing backup entry, Recovery Manager for Microsoft SQL Server issues a restore request to the backup software in use (Symantec NetBackup or HP Data Protector). The image associated with this backup entry is then restored to the location you specify. If you do not specify an alternate location, data is restored to *SystemDrive*`:\3parSnapshot` by default.
- **File Copy Restore** - Using an existing virtual copy, Recovery Manager for Microsoft SQL Server mounts the copy, extracts the database files, and copies the files back to their original locations. Because the files are copied over one by one, File Copy Restore is a relatively slow but reliable way of restoring data.
- **Volume Restore** - Using an existing virtual copy, Recovery Manager for Microsoft SQL Server removes the existing VLUNs, promotes the virtual copy back to its base volume, and re-creates the VLUNs back to the host. Volume Restore is relatively fast. However, you should not perform this restore if the base volumes you are promoting contain data from other instances or databases.

NOTE: For more information about performing an instance-level file copy restore in an MSCS environment, see *Restoring a SQL Instance in an MSCS Environment Using File Copy Restore*.

NOTE: For more information about performing a volume restore in an MSCS environment, see *Restoring a Volume in an MSCS Environment Using Volume Restore*.

PARAMETERS

The following options are supported:

`-s <SQL server>`	The SQL server to which the database belongs.
`-i <SQL instance`	Optional. The SQL server instance to which the database belongs. If not specified, MSSQLSERVER is used as the default.
`-d <database>`	Optional. The database from which to create a virtual copy. If not specified, an instance-level restore is performed by default.
`-t <timestamp>`	The timestamp for the virtual copy to restore.
`-ts <target server>`	Optional. (Symantec NetBackup Media Restore only) The target server for the restore request. If not specified, the current server name is used as the default.
`-M <masterServer>`	Optional. (Media Restore only) The Symantec NetBackup master server name. Valid only if the backup software in use is Symantec NetBackup. Optional: If not specified, the current server name is used as the default.
`-a <altLocation>`	Optional. An alternate location to which to restore the data. If not specified, data is restored to `<SystemDrive>:\3parSnapshot` by default.

`-snap`	Optional. (Volume Restore only) Promotes the virtual copy back to the base volume for a faster restore. You can only promote a base volume that is exposed to a host. If not specified, the virtual copy is not promoted to the base volume.
`-noemail`	Optional. Do not send an email notification even if configured for this operation. If not specified, Recovery Manager sends an email notification of the restore if configured. For more information, see *Configuring Email Notifications*.
`-norecovery`	Restore database with the SQL Server `norecovery` option. For more information, see *Recovering All Data with Point-of-Failure Recovery*.
`-clonedb <database name>`	Optional. Restore the database to a different database name. If not specified, Recovery Manager for SQL restores the database to the original database name.
`-dp`	Specifies that HP Data Protector is to be used for the restore. Optional: If not specified, Recovery Manager proceeds as if the backup software used is Symantec NetBackup.

NOTE: If you are restoring a volume that is part of a Remote Copy target system, you must restore the virtual copy to the Remote Copy volume group that is part of the same Remote Copy target system as the virtual copy.

EXAMPLES

The following command performs a media restore of virtual copy `020405162103` from media backup to drive `j:\`.

```
RMSql restore -s server1 -d test_db -t 020405162103 -M server1 -a J:\
```

The following command performs a file copy restore of virtual copy `020405162103`.

```
RMSql restore -s server1 -d test_db -t 020405162103
```

The following command performs a volume restore of virtual copy `020405162103`.

```
RMSql restore -snap -s server1 -d test_db -t 020405162103
```

NOTE: Use quotes ("") when an option value includes spaces.

RMSql setvc

SYNTAX

```
RMSql setvc
-s <SQL server> [-i <instance>] [-d <database>] -t <timestamp> -exp
<time>{h|H|d|D} [-retain <time>{h|H|d|D} [-f]]
```

DESCRIPTION

The `RMSql setvc` command sets time constraints for an existing virtual copy. To use this command, the policy must be expiration-based.

PARAMETERS

The following options are supported:

`-s <SQL Server>`	The SQL server to which the existing virtual copy belongs.
`-i <SQL instance>`	Optional. The SQL server instance to which the existing virtual copy belongs. If not specified, MSSQLSERVER is used as the default.
`-d <database>`	Optional. The database of the existing virtual copy. If not specified, the timestamp is assumed to be at the instance level.
`-t <timestamp>`	The timestamp of the virtual copy for which you are changing the expiration time.
`-exp <time>{h|H|d|D}`	Set the expiration time for this virtual copy to the specified time and time unit. Valid values are: • To set the expiration time in hours: 1-43800h (or H) • To set the expiration time in days: 1-1825d (or D)
`-retain <time>{h|H|d|D}`	Optional. Set or extend the retention time for the specified virtual copy to the specified time. The virtual copy cannot be removed during this time period.

NOTE: Retention time restrictions are:

- You must have a Virtual Lock license to use the -retain option.
- The minimum retention period is 1 hour; the maximum is 43,800 hours/1,825 days (5 years).
- The default retention time is 336 hours (14 days).
- The retention time cannot exceed the value of the InServ's VVRetentionTimeMax.
- You can set a retention time regardless of whether the policy is numeric- or expiration-based.
- The retention time cannot be longer than the expiration time (if the policy is expiration-based).
- If you create a remote virtual copy and Remote Copy is set up in asynchronous periodic mode, the retention time is applied to the remote copy on the Remote Copy backup server only. If Remote Copy is set up in synchronous mode, the retention time is applied to both the remote copy on the Remote Copy backup server and the virtual copy on the Remote Copy primary server.
- The retention time cannot be removed or reduced after it is set.

`-f` Optional. When used with the -retain option, does not request confirmation for the retention time modification.

EXAMPLE

The following command sets the expiration time for virtual copy `020409162103` to 2 hours:

```
RMSql setvc -s server1 –t 020409162103 -exp 2h
```

The following command sets the expiration time for virtual copy `020409162103` to 30 days:

```
RMSql setvc -s server1 –t 020409162103 -exp 30d
```

NOTE: Use quotes ("") when an option value includes spaces.

RMSql timeconfig

SYNTAX

```
RMSql timeconfig [-s <WindowsHost>] [-prt <promotetime>][-bkt
<backuptime>] [-ai <analyzeinterval>]
```

DESCRIPTION

After you install Recovery Manager for SQL, by default the wait time for snap volume restore is 30 seconds, the wait time for backup is 5 minutes, and the wait time for analysis of the repository with the HP 3PAR Storage System is 60 minutes. You can use this command to change these values.

PARAMETERS

`-prt <promotetime>`	Optional. The time in seconds to wait for volume promotion. If not specified, 30 seconds is used as the default wait time.
`-bkt <backuptime>`	Optional. The time in minutes to wait for backup. If not specified, 5 minutes is used as the default wait time.
`-a <WindowsHost>`	Optional. The Windows host on which Recovery Manager is installed. If not specified, the local host is used as the default.
`-ai <analyzeinterval>`	Optional. The time in minutes to wait for automatically analysis of the repository against the system. Valid values are 10-1440 (10 minutes to 24 hours). If not specified, 60 minutes is used as the default.

NOTE: If you use the `-ai` command to modify the analyze interval, you must restart Recovery Manager for SQL for the change to take effect.

EXAMPLES

The following command queries the time value for each setting.

```
RMSql timeconfig
```

The following command changes the promote time to 50 seconds.

```
RMSql timeconfig -prt 50
```

The following command changes the backup time to 7 minutes.

```
RMSql timeconfig -bkt 7
```

The following command will change the analyze interval to 30 minutes

```
RMSql timeconfig -ai 30
```

NOTE: In most cases, there is no need to change these values unless the backup and/or volume restore are taking an unusually long time to complete.

RMSql unmount

SYNTAX

```
RMSql unmount -s <SQL server> -t <timestamp>
```

DESCRIPTION

The `RMSql unmount` command unmounts a currently mounted virtual copy that was mounted by the `RMSql mount` command. Recovery Manager for SQL can only unmount a virtual copy if its mounted status is not "Available."

PARAMETERS

The following options are supported:

`-s <SQL server>` The SQL server to which the database belongs.

`-t <timestamp>` The timestamp of the virtual copy to unmount.

NOTE: During an unmount operation, Recovery Manager for SQL removes the mount point from the mounted volumes and then removes the mount point folder.

Running Recovery Manager as a Scheduled Job

In addition to creating virtual copies using the Command Line Interface, you can also use Windows Scheduled Tasks (or Windows Task Scheduler, depending on your Windows OS) to schedule automatic creation of virtual copies for a specific database.

NOTE: You can also use the Recovery Manager for SQL GUI to schedule automatic virtual copies. For more information, see *Scheduling Automatic Virtual Copies*.

Scheduling an Automated Task in Windows 2003

To set up Windows Scheduled Tasks to automatically create virtual copies:

1. Click **Start→Programs→Accessories→System Tools**
2. Click **Scheduled Tasks**.
3. Double-click **Add Scheduled Tasks**.

   Result: The **Scheduled Task Wizard** opens.
4. Click **Browse** and navigate to Recovery Manager's install location.

   The default location is:

   `C:\Program Files\3PAR\RM\SQL`
5. Click `RMSql.exe`.
6. Select the frequency of this task.
7. Click **Next**.
8. Select time and date to start this task.
9. Click **Next**.
10. Enter the user name, password, and password confirmation.
11. Click **Next**.
12. Select the **Open advanced properties** check box.
13. Click **Finish** to access advanced setup for the scheduled task.
14. On the **Task** tab, at the end of the path displayed in the **Run** field, add:

    `RMSql.exe create –s <SQL Server> –i <SQL Instance> -d <SQL database>`

    If the name has spaces, use double-quotes ("") to surround the name.

    For more information, see the `RMSql CREATE` command.

For example:

```
"C:\Program Files\3par\RM\SQL\RMSql.exe" create –i inst01–d test -s
SQLserver
```

15. On the **Schedule** tab, further refine the scheduled task by selecting the frequency and start time of the task.
16. Click **Apply** and **OK** when finished.

    Result: Virtual copies are created as you have scheduled. Depending on the policy set with the Recovery Manager for SQL GUI or CLI command, older virtual copies on the system might automatically be removed if the number of virtual copies exceeds your specified maximum threshold (see "Setting the Recovery Manager Policy" (page 29)).

Scheduling an Automated Task in Windows 2008

To set up Windows Task Scheduler to automatically create virtual copies:

1. Click **Start** > **Programs** > **Accessories** > **System Tools** > **Task Scheduler**.
2. Click **Create Task**.
3. In the **Name** text box on the **General** tab, enter a name for the task.
4. Select the desired options in the **Security options** area.
5. Select the **Triggers** tab.
6. Click **New**.
7. Enter scheduling information for the automatic creation of virtual records.
8. Select the **Actions** tab.
9. Click **New**.
10. In the **New Action** dialog box, click **Browse**.
11. Navigate to the Recovery Manager install location. The default location is:

    ```
    C:\Program Files\3PAR\RM\SQL
    ```

12. In the **Add arguments** text box, enter:

    ```
    RMSql.exe create –s <SQL Server> –i <SQL Instance> -d <SQL database>
    ```

    If the name has spaces, use double-quotes ("") to surround the name.

    For more information, see the `RMSql CREATE` command.

    For example:

    ```
    "C:\Program Files\3par\RM\SQL\RMSql.exe" create –i inst01–d test -s
    SQLserver
    ```

13. In the **Conditions** and **Settings** tabs, refine the scheduled task as desired.
14. Click **OK**.

    Result: Virtual copies are created as you have scheduled. Depending on the policy set with the Recovery Manager for SQL GUI or CLI command, older virtual copies on the system might automatically be removed if the number of virtual copies exceeds your specified maximum threshold (see "Setting the Recovery Manager Policy" (page 29)).

8 Recovery for Microsoft SQL Server

Microsoft SQL Server Recovery Models

Microsoft SQL Server offers three disaster-recovery models:

- **Simple Recovery Model** - The Simple Recovery model enables you to restore a database to the point at which a virtual copy or backup was created; it does not enable you to restore a database to a specific point in time. Therefore, any data modifications made between the time of the most recent backup and the time of the failure are lost. This recovery model uses circular logging to minimize the amount of space used for transaction logs.
- **Full Recovery Model** - The Full Recovery model enables you to restore a database to a specific point in time; either to a virtual copy created before an error occurred or to the point just before which a system failure occurred. Under this recovery model, transaction logs are saved until a failure occurs, and therefore no data is lost.
- **Bulk-Logged Recovery Model** - The Bulk-Logged Recovery model is used for high-performance operations such as bulk copying and bulk data modification.

NOTE: If you are recovering data from SQL servers across multiple domains, ensure you have stored the login and password for each domain on your backup server. For more information, see "Configuring Recovery Manager Policies" (page 20).

Recovering Data with HP 3PAR Recovery Manager

HP 3PAR Recovery Manager for Microsoft SQL Server supports both recovery from virtual copy and recovery from media. However, only recovery from virtual copy enables you to perform a point-in-time or point-of-failure recovery.

Therefore, if you are running SQL Server under the Full Recovery model, you must perform a restore from a virtual copy.

Preparing for the Recovery Process

Before recovery begins, you must ensure the database can be taken offline.

1. Check whether database ID 9 is full.

   When the SQL server takes a database offline, it writes a checkpoint record to database ID 9. After this log file becomes full, the SQL server cannot write the checkpoint record and therefore cannot take the database offline.

2. If database ID 9 is full, either:
   - Back up the transaction log for the database
   - Detach the database

Recovery Manager uses the Volume Shadow Copy Service (VSS) framework to restore data. Because the VSS framework takes a database offline before it allows you to restore it, you do not need to place the database in single-user mode.

Recovering from Logical Errors with Point-in-Time Recovery

Point-in-time recovery is useful for recovering from logical errors. For example, if you accidentally altered an entry or deleted a table, you can use a virtual copy to restore your instance or database back to a consistent, known prior state. Point-in-time recovery restores the instance or database to the state it was in at the time the virtual copy was created.

To perform a point-in-time recovery, use Recovery Manager to perform a file copy restore or a volume restore. The restore steps depend on whether your SQL servers are in a clustered or non-clustered environment.

1. Schedule downtime before performing the restore.
2. If you are performing a restore on a standalone SQL production server in a non-clustered environment:
   - If you are performing a file copy or volume restore on an instance: Stop the SQL Server service for the instance, perform a standard file copy restore or volume restore, and start the SQL Server service.
   - If you are performing a volume restore on a database: Stop the SQL Server service, perform a standard volume restore, and start the SQL Server service.
   - If you are performing a file copy restore on a database: Perform a standard file copy restore. (Do NOT stop and start the SQL Server service.)

     For more information about performing a standard restore using the Recovery Manager GUI, see "Using the Recovery Manager GUI" (page 27). For more information about performing a standard restore using the CLI `RMSql restore` command, see "Using the Recovery Manager CLI" (page 42).

   If you are performing the restore in an MSCS (clustered) environment, you must follow the instructions provided in one of the following sections, depending on the type of restore you are performing:
   - "Restoring a SQL Instance in an MSCS Environment Using File Copy Restore" (page 69)
   - "Restoring a Volume in an MSCS Environment Using Volume Restore" (page 69)

Restoring a SQL Instance in an MSCS Environment Using File Copy Restore

To perform a file copy restore on a SQL instance in an MSCS environment:

1. Schedule downtime. Recovery Manager automatically takes the SQL Server Agent and SQL Instance Service offline.
2. Locate the instance-level virtual copy you want to use to restore the SQL instance.
3. Run the `RMSql restore` command on this virtual copy. For more information on Recovery Manager CLI commands, see "Using the Recovery Manager CLI" (page 42).

Restoring a Volume in an MSCS Environment Using Volume Restore

To perform a volume restore on a SQL server in an MSCS environment:

1. Schedule downtime. Recovery Manager automatically takes the relevant SQL services offline.
2. Log onto your backup server and perform a volume restore. To perform a volume restore, use either the `RMSql restore` command or the Recovery Manager GUI.

   For more information about performing a restore using the Recovery Manager GUI, see "Using the Recovery Manager GUI" (page 27). For more information about performing a restore using the CLI `RMSql restore` command, see "Using the Recovery Manager CLI" (page 42).

Recovering All Data with Point-of-Failure Recovery

Point-of-failure recovery is useful if you cannot afford to lose any data in the event of a system failure.

NOTE: Point-of-failure recovery only supports a file copy restore at the database level.

Determining Whether You Can Perform a Point-of-Failure Recovery

You can perform a point-of-failure recovery, in which a database is completely recovered up to the point of the failure, if the following are all true:

- You have performed a full backup of the SQL database.
- You have subsequently used the SQL backup utility to perform one or more transaction log backups.
- You have access to undamaged transaction log backups and active transaction logs (i.e., even if one or more transaction log backups are damaged, undamaged copies of these backups exist).

NOTE: A transaction log backup is a copy of all the log records written to the live transaction log after the last full database backup or the last transaction log backup. If any transaction log backups within the sequence are missing, the database can only be restored to the last consecutive backup that exists in the sequence, and you cannot perform a full recovery.

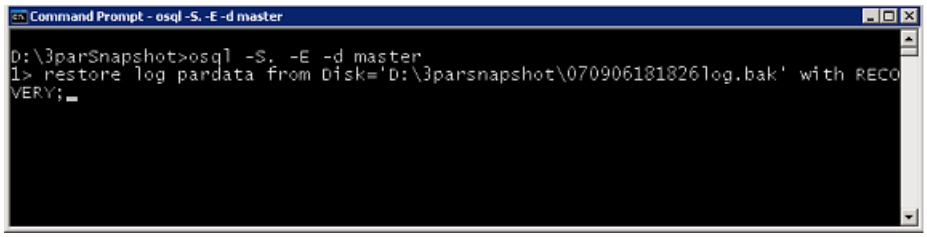
For more information on how to roll a database forward using a transaction log, see:

http://msdn.microsoft.com/en-us/library/ms189596.aspx

Performing a Point-of-Failure Recovery

When you apply the backed-up transaction log to a database that has been restored using a virtual copy, the system uses the `STOPAT` option to roll forward the database to a specific point in time.

To roll forward the transaction log, you can use either SQL Server Management Studio or a command line tool such as OSQL. For example:



To perform a point-of-failure recovery:

1. Locate the most recent consistent full backup and determine the following information:
   - Timestamp (e.g., *010106000000*)
   - Server name (e.g., *SQLserver01*)
   - SQL instance name (e.g., *SQLInstan01*)
   - Database name (e.g., *northwind*)
2. At the command prompt, enter the following:

   ```
   RMSql.exe restore -s server name -i SQL instance name -d database
   name -t timestamp -norecovery
   ```

   For example:

   ```
   RMSql.exe restore -s SQLserver01 -i SQLInstan01 -d northwind -t
   010106000000 -norecovery
   ```

3. To apply the transaction logs as well as to recover the database to the point in time desired, enter the following `restore` commands at the command prompt:
   a. Enter the following command for the first to the penultimate backed-up transaction logs in the sequence:

      ```
      RESTORE log database name from transaction log backup media with
      norecovery;
      ```

      The database is still in “no recovery” mode. You can now apply the backed-up transaction logs to update the database to the point of failure.
   b. Enter the following command for the last backed-up transaction log:

      ```
      RESTORE log database name from transaction log backup media with
      recovery; -stopat “timestamp"
      ```

      For example:

      ```
      RESTORE log northwind from Disk='G:\log1.bak' with norecovery;
      RESTORE log northwind from Disk='G:\log2.bak' with norecovery;
      RESTORE log northwind from Disk='G:\log3.bak' with recovery;
      -stopat "Jun 28, 2006 5:44 PM"
      ```

9 Remote Copy for Recovery Manager

Overview

HP 3PAR Remote Copy Software helps you safeguard against disasters that might occur at one location by allowing you to keep copies of data on a separate server, which can be placed at a remote location. For example, if there were a fire or earthquake at one location, all of the data stored there could be lost unless a backup copy can be recovered from a separate location not affected by the disaster.

To maintain updated copies of data at a remote location, Remote Copy uses two HP 3PAR Storage Systems: a primary server (used for production) and a backup server, which can be located anywhere. Therefore, when disaster strikes in one location, there is always a backup of your data at the backup site.

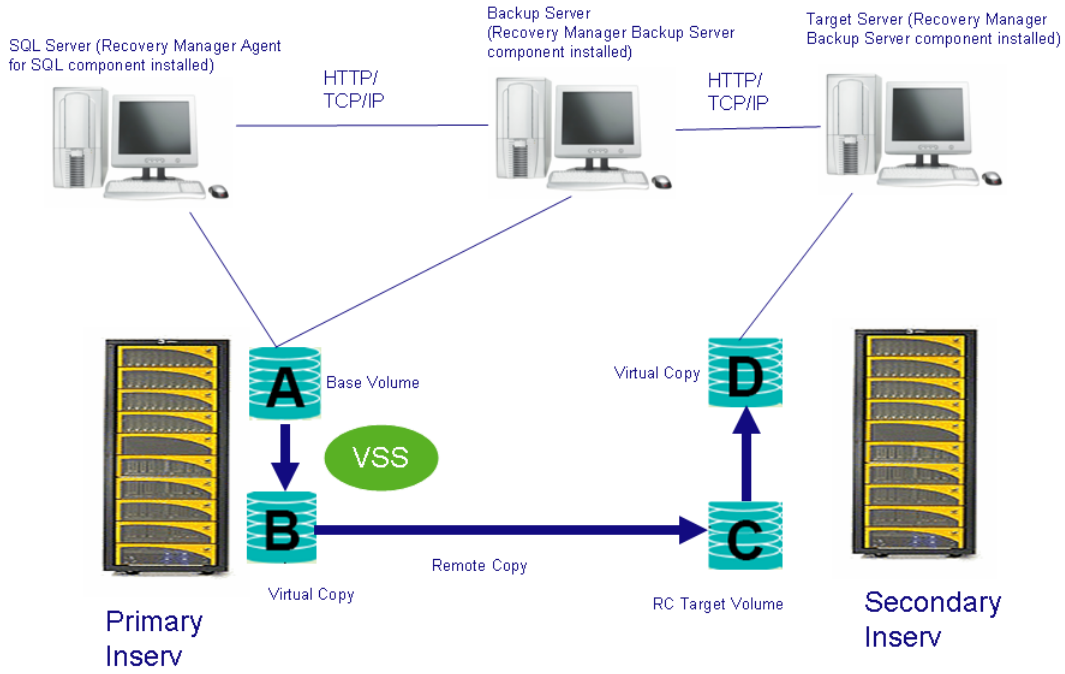
For more information, see the *HP 3PAR Remote Copy Software User's Guide*.

How Remote Copy Works

When you synchronize data between a production system (the Remote Copy primary system) on one site and the backup server at another site, the systems involved perform the following steps in sequence:

- Recovery Manager leverages the VSS framework to freeze the I/O at the application level.
- For asynchronous periodic mode Remote Copy, the VSS provider creates a virtual copy of the database and log volumes.
- Remote Copy synchronizes the data on the primary server with the data on the Remote Copy backup server (thus updating the backup server).
- After synchronization is complete, Remote Copy creates a virtual copy (aka a snapshot) on the Remote Copy backup server.
- The Remote Copy backup server saves the virtual copy in its repository at the remote site.
- For asynchronous periodic mode Remote Copy, Recovery Manager removes the virtual copy created on the production system (the Remote Copy primary system).

NOTE: For the Recovery Manager GUI to manage virtual copies on the Remote Copy backup server, you must configure Recovery Manager with the precise server and instance names for the supported SQL servers. For more information, see "Configuring Recovery Manager" (page 19).



Setting Up Remote Copy

1. Install and configure Remote Copy. For more information, see the *HP 3PAR Remote Copy Software User's Guide*.

   NOTE: Be sure to configure the Remote Copy backup server with the same names, structure, and Windows authentication mode settings as the primary server.

2. After you have set up Remote Copy on two HP 3PAR Storage Systems, create a Remote Copy volume group for testing purposes.
3. Configure the Remote Copy volume group for synchronization either in synchronous mode or in asynchronous periodic mode with a period value of zero.

Support for Remote Copy Modes and Policies

Recovery Manager supports Remote Copy in synchronous and asynchronous periodic mode.

- If you are using synchronous Remote Copy, the policies on the production system (the Remote Copy primary system) and the Remote Copy backup system must match. If the policies do not match, Recovery Manager cannot create virtual copies on a synchronous Remote Copy system.

  However, if you manually specify an expiration value, a retention value, or both when you create a virtual copy, Recovery Manager creates the virtual copy on a synchronous Remote Copy system even if the policies on the Remote Copy primary and backup servers do not match.

  NOTE: For more information on specifying values at the time you create virtual copies, see the description of the `RMSql create` command in "Using the Recovery Manager CLI" (page 42).

- If you are using asynchronous periodic Remote Copy, you can create Recovery Manager virtual copies even if policies on the servers do not match. If policies do not match, the virtual copies use the policies on the Remote Copy backup server.
- If you are running Remote Copy in a Synchronous Long Distance configuration, the virtual copies on the synchronous and asynchronous periodic Remote Copy backup servers do not have the exact same timestamp.

Support for GeoCluster for Microsoft Windows

Recovery Manager for SQL supports the use of both Remote Copy and HP 3PAR GeoCluster Software for Microsoft Windows:

- When synchronous mode Remote Copy is used with Recovery Manager for SQL and GeoCluster, you can use Recovery Manager to create virtual copies on both the production system (the Remote Copy primary system) and the Remote Copy backup system.
- When Synchronous Long Distance Remote Copy is used with Recovery Manager for SQL and GeoCluster, you can use Recovery Manager to create virtual copies on all three systems: the production system (the Remote Copy primary system), the synchronous mode Remote Copy backup system, and the asynchronous periodic mode Remote Copy backup system.

Setting Up Remote Copy Volume Groups

Setting Up a Remote Copy Volume Group for Databases

1. Identify the virtual volumes that contain the database and log files to be copied.
2. Create one (and only one) primary Remote Copy volume group per database.

   NOTE: Recovery Manager supports multiple databases in one Remote Copy volume group if all the databases in the group belong to the same instance.

3. Add the virtual volumes belonging to the database and log files to the primary Remote Copy volume group, and add the associated secondary virtual volumes to the secondary volume group on the Remote Copy backup server.

   CAUTION: Do not disperse files from one database over multiple primary Remote Copy volume groups. Recovery Manager does not support database and log files from one database existing in any location other than the one primary Remote Copy volume group created for that database.

4. Synchronize the Remote Copy primary and secondary volume groups.

Setting Up a Remote Copy Volume Group for Instances

1. Identify the virtual volumes that contain all database(s) and log files to be copied.
2. Create one primary Remote Copy volume group for this instance.
3. Add all virtual volumes that belong to this instance (all database and log files) to the primary Remote Copy volume group, and add the associated secondary virtual volumes to the secondary volume group on the Remote Copy backup server.

△ **CAUTION:** The relationship between instances and Remote Copy volume groups is 1:1.

- You must add files from only one instance to a primary Remote Copy volume group.
- You must add files from only one instance to one primary volume group.
  - Do not disperse files from one instance over multiple primary Remote Copy volume groups.
  - Do not add files from multiple instances to the same Remote Copy volume group.

If you do not ensure your system meets these requirements, you run the risk of data corruption and loss.

4. Synchronize the Remote Copy primary and secondary volume groups.

Recovering a SQL Database from a Remote Copy Backup Server

If a SQL database crashes at the site that holds the primary servers, you can recover the data from the Remote Copy backup server at the remote site as long as it is set up in an identical manner to the original production server.

NOTE: If you are performing a promote restore for volumes in a Synchronous Long Distance Remote Copy relationship, you must manually stop Remote Copy before initiating the volume promote restore.

1. On the backup server, use Recovery Manager to mount the virtual copy to the production server.
2. Log onto the production server and stop the SQL instance and its dependent services.
3. From the mounted virtual copy, manually copy all necessary database and log files to the corresponding database location.
4. Restart the SQL instance and its dependent services.
5. Log back onto the backup server and unmount the virtual copy.

A Server Virtualization Environments

VMWare and Egenera

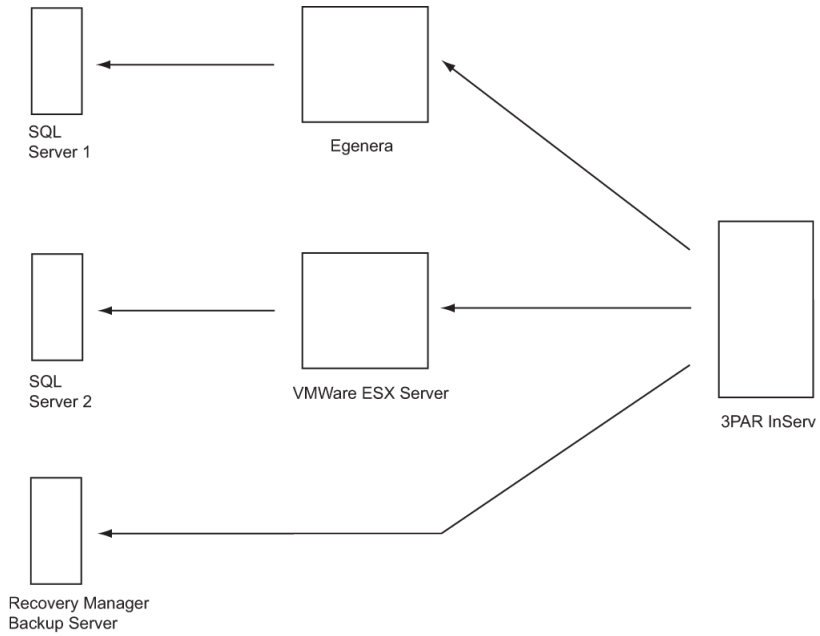
VMWare and Egenera environments are supported under specific conditions. For VMWare and Egenera support in a virtualization environment, the setup must meet the following requirements:

- The disks presented to the SQL servers must be raw devices.
- The backup server must be connected directly to the HP 3PAR Storage System. The backup server cannot be connected to the HP 3PAR Storage System through VMWare or Egenera.
- You cannot run the `RMSql mount` command against a VMWare or Egenera server.

NOTE: New volumes presented to VMWare and Egenera servers are not surfaced automatically; you must use the backup host to mount the servers with the `RMSql mount` command. Therefore, you cannot use either File Copy Restore or Volume Restore to directly restore a SQL server that resides in a virtualization environment.

Figure 2 (page 76) shows the relationships between the HP 3PAR Storage System and VMWare and Egenera servers in a virtualization environment.

Figure 2 Server Virtualization Environment



B Troubleshooting

This appendix is designed to be used like a Frequently Asked Questions section. It will help you find solutions to some of the common issues that might arise when running HP 3PAR Recovery Manager Software for Microsoft SQL Server.

Problem:

Recovery Manager displays error message “VSS_E_PROVIDER_VETO.”

Suggestion:

Check the application event log and VSS provider log from the production server. If you see “Maximum of 28 writable virtual copies per volume is allowed,” your virtual copy capacity might be full.

This error usually occurs when you mount a virtual copy. Unmount several virtual copies and continue the mount procedure.

Problem:

Even though Recovery Manager validated the configuration during operation, Recovery Manager exits without any messages during the check of the HP 3PAR Storage System.

Suggestion:

Validation might fail without proper notification. Restart the RMSql agent service on the backup and production servers.

Problem:

A restore of a backup, which was created using Symantec NetBackup via the Recovery Manager GUI, fails.

Suggestion:

When you use the Recovery Manager GUI to back up a virtual copy using Symantec NetBackup and a directory is specified for backup, you must enter the directory name and path precisely, including the upper- and lowercasing (e.g., MuTenFF). If the names do not match exactly, a restore of this backup will fail as Symantec NetBackup is case-sensitive.

When backing up a directory, specify the directory in exactly the same case as it exists on the file system.

Problem:

When you create a virtual copy on a SAN boot disk, the virtual copy creation fails with error “Error-VSS_E_HOLD_WRITES_TIMEOUT.” The in-box system writer that enumerates all operating system and driver binaries is included as well. The error usually occurs because the I/O cannot hold the system writer.

Suggestion:

HP does not recommend placing a database on the SAN boot disk. Place all important databases on separate SAN disks.

Problem:

As data blocks are copied per the copy-on-write technology, the space for virtual copies on the virtual volume might become 100% full either if virtual copy space was statistically allocated as a percentage of the virtual volume, or if there is no additional space available for the CPG to auto-grow. If the space for virtual copies on a virtual volume becomes 100% full, the virtual copies on the virtual volume may become invalid and subject to the Recovery Manager policy.

Suggestion:

Allocate more virtual copy space when creating virtual volumes during base volume creation, or use CPGs to manage the data generated by copy-on-write technology.

Problem:

You just installed Recovery Manager, but all GUI and CLI commands fail.

Suggestion:

If you install Recovery Manager via a remote desktop session, the newly added environment variables do not go into effect until you log out of the session. (If Recovery Manager is installed directly from the system console, these variables should be available immediately.)

Problem:

Symantec NetBackup takes a substantial amount of time to complete a backup process.

Suggestion:

Make sure you have the latest maintenance package installed for your NetBackup application.

Problem:

Recovery Manager is running in a Windows cluster environment and the application event log displays the Volume Shadow Copy Service error: "Unexpected error querying for the IVssWriterCallback interface. Access is denied."

Suggestion:

Reconfigure the security settings for the cluster environment as follows:

1. Ensure that MSCS MS DTC is installed. MSCS MS DTC is required for the following procedure.
2. Click **Start→Run→dcomcnfg** or **Start→Administrative Tools→Component Services**.
3. Expand **Component Services** and click **Computers**.
4. Right-click **My Computer** and select **Properties**.
5. Select the **COM Security** tab.
6. Under **Access Permissions**, click **Edit Default**.
7. Add a **Cluster Service** account and select **Local Access** and **Remote Access**.
8. Reboot the machine.
9. Perform these steps on the second node.

Problem:

You attempt to perform a media restore using the Recovery Manager CLI `-ts` command and the attempt fails.

Suggestion:

If the restore log contains the error message: "client *<client>* peername *<peer name>* is invalid for restore request," the restore client is different from the backup client. Configure Symantec NetBackup to perform a redirected media restore as follows:

1. Create an **altnames** directory on the NetBackup master server in the directory containing the backup policy for other clients:

   ```
   Install_path\NetBackup\db\
   ```

2. Place an empty file named **No.Restrictions** in the **altnames** directory:

   ```
   Install_path\NetBackup\db\altnames\No.Restrictions
   ```

   Do not add a suffix to the files in the **altnames** directory.

3. Ensure the NetBackup client name on the requesting client matches the name of the client for which the backup was created. (The peer name of the requesting client does not need to match the NetBackup client name.)

Problem:

When using Symantec NetBackup, you see this message: 0x1: ERROR: Cannot connect to [NBU server name]; socket error.

Suggestion:

Check whether you are using a different version of the NBU master server and the NBU client. If so, upgrade the NBU client to the same version as the NBU master server.

C Event Messages

This appendix provides information for the event messages generated by HP 3PAR Recovery Manager Software for Microsoft SQL Server.

Table 3 HP 3PAR Recovery Manager Software for Microsoft SQL Server Event Messages

Event ID	Event Message	Description/Action
5312	RMS5312: ERROR: Some of your volumes are either non-3PAR volumes or unsupported types of disk drives.	Some of the target volumes are not HP 3PAR virtual volumes. All of the drives need to be HP 3PAR drives. • Verify that all database and log destinations belong to an HP 3PAR Storage System.
5313	RMS5313: ERROR: Couldn't find the Remote Copy group for the specified volume.	The Remote Copy volume group is not configured for the specified SQL database or instance. • Check the Remote Copy configuration and HP 3PAR Storage System setup. • Consult the *HP 3PAR InForm OS CLI Administrator's Manual* or the HP 3PAR InForm Management Console Help for details on setting up and checking Remote Copy functionality.
5314	RMS5314: ERROR: The number of virtual volumes used to create the virtual copy does not match the number of virtual volumes in the Remote Copy group.	To create a virtual copy of a SQL database or instance, the virtual volumes configured to store SQL database and log files must match the virtual volumes configured in the Remote Copy volume group. • Check the Remote Copy configuration and HP 3PAR Storage System setup. • Consult the *HP 3PAR InForm OS CLI Administrator's Manual* or the HP 3PAR InForm Management Console Help for details on setting up and checking Remote Copy functionality.
5319	RMS5319: ERROR: The virtual copy was not found in the repository.	The repository might be out of sync. • Run `rmsql analyze` to list the out-of-sync entries.
5321	RMS5321: ERROR: The specified mount directory does not exist.	To use an alternate (non-default) mount point directory in the `RMSql mount` command, you must first create the mount point directory. • Verify that the mount point directory exists. • Alternatively, do not specify a mount directory. If an alternate directory is not specified, Recovery Manager uses the default mount directory.

Table 3 HP 3PAR Recovery Manager Software for Microsoft SQL Server Event Messages *(continued)*

Event ID	Event Message	Description/Action
5325	RMS5325: ERROR: The virtual copy timestamp does not exist for the snapshotset ID.	When you created the virtual copy, Recovery Manager could not store the virtual copy timestamp in the repository for the specified snapshotset ID. • Wait a few minutes and then retry the operation.
5326	RMS5326: ERROR: Volume Restore failed.	A failure occurred when restoring data using the volume restore feature. The failure might leave the HP 3PAR Storage System in an inconsistent state. • If the VLUNs are missing, ensure that they are re-created.
5327	RMS5327: ERROR: One or more of your volumes are on dynamic disks. Dynamic disks are not supported.	Some of the database or log files are stored on volumes created on dynamic disks. • Ensure that the database and log files reside on volumes created on basic disks.
5328	RMS5328: ERROR: One or more of your databases are on the system volume. You cannot create virtual copies of system volumes.	Some of the database or log files are stored on the system volume. • Ensure that the database and log files are on HP 3PAR virtual volumes.
5329	RMS5329: ERROR: The destination file already exists. Please specify a different restore location and try the operation again.	Performing a restore from backup does not overwrite an existing copy of the same file. • Verify that the specified restore folder is empty and try the operation again.
5332	RMS5332: ERROR: Could not find the SQL Writer. Either the Writer is not installed or is currently not running.	SqlServerWriter was not found on the SQL Server. • Run the `vssadmin list writers` command and verify that SqlServerWriter is listed. • Ensure that the SQL Writer service is in the **Running** state.
5333	RMS5333: ERROR: Remote Copy groups are not configured. A Remote Copy group must be present in order to perform this operation.	There are no Remote Copy volume groups configured on the HP 3PAR Storage System. Ensure the Remote Copy volume group is configured before you create a remote virtual copy. • Check the Remote Copy configuration and HP 3PAR Storage System setup. • Consult the *HP 3PAR InForm OS CLI Administrator's Manual* or the HP 3PAR InForm Management Console Help for details on setting up and checking Remote Copy functionality.
5335	RMS5335: ERROR: Mount point drive letter is already in use.	The specified mount point drive letter is already in use. • Be sure to specify an unused drive letter as a mount point when you enter the `RMSql mount` command.
5336	RMS5336: ERROR: Mount point directory is not a valid directory.	The specified mount point is not a directory. • Be sure to specify a valid directory as a mount point when you enter the `RMSql mount` command.
5337	RMS5337: ERROR: Mount point directory is not empty.	The mount point directory specified already contains files. • Be sure to specify a valid directory as a mount point when you enter the `RMSql mount` command.
5339	RMS5339: ERROR: Failed to execute the InForm CLI.	The HP 3PAR Command Line Interface (CLI) command failed. • Check the error message for more details on the failed command. • Verify that you can connect to the required HP 3PAR Storage System from the CLI command window.

Table 3 HP 3PAR Recovery Manager Software for Microsoft SQL Server Event Messages *(continued)*

Event ID	Event Message	Description/Action
5341	RMS5341: ERROR: Could not find the header information in the command output.	Failed to parse the header information from the CLI command output. • Verify that you can connect to the required HP 3PAR Storage System from the CLI command window. • Wait a few minutes and try the operation again.
5347	RMS5347: ERROR: Failed to locate NetBackup installation. Please make sure NetBackup is correctly installed.	Symantec NetBackup installation information could not be retrieved from the registry. • Verify that NetBackup is properly installed and that you have access to the registry entry. • Use **Add/Remove Programs** to confirm that NetBackup is installed.
5348	RMS5348: ERROR: Could not find NetBackup start and end scripts.	The NetBackup start or end scripts could not be found in the Recovery Manager for SQL installation folder. • Ensure that the `bpstart_notify.bat` and `bpend_notify.bat` files are present in the Recovery Manager for SQL installation folder.
5349	RMS5349: ERROR: Failed to create or open backup include file for NetBackup.	Unable to open or create the NetBackup include file for the specified policy. You can run only one backup job per policy at a time on a NetBackup client. • Ensure that no other `RMSql backup` command is running. Wait for the prior backup command to complete and try again.
5351	RMS5351: ERROR: NetBackup restore process has failed.	The NetBackup restore failed. • On the NetBackup server, check the application event log and NetBackup logs.
5354	RMS5354: ERROR: The SQL database was not found in the SQL Writer database list.	SqlServerWriter could not find the specified database in its list of databases supported for backup. • Verify that the database is online and attached. • Ensure that the database is not a snapshot/mirrored database.
5356	RMS5356: ERROR: The expiration time is out of range (0h - 43,800h).	The expiration time for a virtual copy must be a value between 0 and 43,800 hours (or between 0 and 1825 days). • Try again, using a value within the range allowed.
5364	RMS5364: ERROR: Failed to back up the virtual copy. Please consult the backup progress logs for details.	The NetBackup backup process has failed. • For more details, check the application event log and NetBackup logs on the NetBackup server.
5367	RMS5367: ERROR: Unknown error encountered. Please look at the logs for more information.	An unexpected error occurred. • For more details, check the logs in the Recovery Manager for SQL installation folder and the event logs.
5370	RMS5370: ERROR: The specified policy does not exist in the NetBackup configuration database.	The policy was not found in the NetBackup database. • Verify that the policy is valid. • For more details, check the application event log and NetBackup logs on the NetBackup server.
5371	RMS5371: ERROR: The specified schedule does not exist in the configuration database.	The schedule was not found in the NetBackup database. • Verify that the policy is valid. • For more details, check the application event log and NetBackup logs on the NetBackup server.

Table 3 HP 3PAR Recovery Manager Software for Microsoft SQL Server Event Messages *(continued)*

Event ID	Event Message	Description/Action
5372	RMS5372: ERROR: Failed to connect to the NetBackup master server.	Recovery Manager could not connect to the NetBackup server. • Ensure that you can connect to the NetBackup master server. • For more details, check the application event log and NetBackup logs on the NetBackup server.
5373	RMS5373: ERROR: No storage units available for use.	The backup cannot be created because no storage units are available. • Ensure that the storage units are configured and available for use. • For more details, check the application event log and NetBackup logs on the NetBackup server.
5374	RMS5374: ERROR: The specified policy is not a valid client type.	The process cannot continue because the policy is not a valid client type. • Ensure that the policy is a valid client type. • For more details, check the application event log and NetBackup logs on the NetBackup server.
5375	RMS5375: ERROR: This operation is not allowed at this time.	The NetBackup server is not currently allowing this operation. • Wait some time and try the operation again. • For more details, check the application event log and NetBackup logs on the NetBackup server.
5376	RMS5376: ERROR: The specified client does not exist in the specified policy.	Recovery Manager cannot locate the client in the policy specified. • Verify that the client is correctly configured for the specified policy. • For more details, check the application event log and NetBackup logs on the NetBackup server.
5377	RMS5377: ERROR: The specified policy is not active.	To create backups, the policy used to create the backup must be active. • Verify that the specified policy is active. • For more details, check the application event log and NetBackup logs on the NetBackup server.
5378	RMS5378: ERROR: The current InForm OS does not support the specified command.	The command you entered is not supported in this version of the HP 3PAR InForm Operating System Software. • Ensure that the correct commands are used for the installed InForm OS. • Upgrade the InForm OS to a version that allows you to use the specified command.

Table 3 HP 3PAR Recovery Manager Software for Microsoft SQL Server Event Messages *(continued)*

Event ID	Event Message	Description/Action
5379	RMS5379: ERROR: Failed to mount virtual copy. Please check the application and system event logs for the most recent error.	Recovery Manager for SQL failed to mount the virtual copy. • Check the application and system event logs for the most recent error messages.
5380	RMS5380: ERROR: Failed to create virtual copy. Please check the application and system event logs on the SQL server for the most recent error.	Recovery Manager for SQL failed to create the virtual copy. • Check the application and system event logs on the SQL server for the most recent error messages.
5381	RMS5381: ERROR: Failed to locate Data Protector installation. Please make sure Data Protector is correctly installed.	The HP Data Protector installation information could not be retrieved from the registry. • Verify that Data Protector is properly installed and that you have access to the registry entry. • Use **Add/Remove Programs** to confirm that Data Protector is installed.
5382	RMS5382: ERROR: Could not find Data Protector post script.	The Data Protector post script could not be found in the Recovery Manager for SQL installation folder. • Ensure that the `dpend_notify.bat` file is present in the Recovery Manager for SQL installation folder.
5383	RMS5383: ERROR: Datalist not found or SYSTEM account does not permit backup from this client. Please select **<Any>** while configuring the client system.	The specified datalist could not be found or access was denied. • Ensure that the correct name is specified for the datalist. • Ensure that the **SYSTEM** account has permission to run backup processes from the specified client. • Use the Data Protector Manager GUI to configure client permissions.

Table 3 HP 3PAR Recovery Manager Software for Microsoft SQL Server Event Messages *(continued)*

Event ID	Event Message	Description/Action
5384	RMS5384: ERROR: Error encountered while running the Data Protector command.	Data Protector failed to execute the specified command. • For more details, check the Data Protector logs on the Data Protector Cell Manager server.
5385	RMS5385: ERROR: The Data Protector Session ID was not found in the repository for the given timestamp. Please ensure that the correct Vendor Type is specified.	The Data Protector Session ID to restore was not found for the timestamp specified. • Ensure that the backup timestamp does not belong to another backup vendor (for instance, Symantec NetBackup).
5386	RMS5386: ERROR The NetBackup policy was not found in the repository for the given timestamp. Please ensure that the correct Vendor Type is specified.	The NetBackup policy to restore was not found for the timestamp specified. • Ensure that the backup timestamp does not belong to another backup vendor (for instance, HP Data Protector).
5387	RMS5387: ERROR: Failed to set the disk in maintenance mode because the disk is offline.	Could not set the disk in maintenance mode because the disk is offline. • Ensure that the disk to be restored is online before you run the volume restore operation.
5388	RMS5388: ERROR: Failed to set the disk in maintenance mode.	Could not set the disk in maintenance mode. • Ensure the disk is online and can be put in maintenance mode. • Troubleshoot using the cluster command: `cluster res <resource-name> /maint:on`
5391	RMS5391: ERROR: The synchronous Remote Copy option is disabled in the 3PAR VSS Provider configuration.	A synchronous HP 3PAR Remote Copy Software operation was requested, but the `syncrc` option is disabled in the HP 3PAR VSS Provider configuration. • Enable the `syncrc` configuration for HP 3PAR VSS Provider Software using the following command: `provcfg conn -syncrc Yes`