Appendix A  Deleting the DDBMA for SQL Server Expired Backups

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As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

Contact your EMC technical support professional if a product does not function properly or does not function as described in this document.

Note: This document was accurate at publication time. Go to EMC Online Support (https://support.emc.com) to ensure that you are using the latest version of this document.

Purpose

This document describes how to install and configure EMC Data Domain Boost for Microsoft Applications, and back up and restore Microsoft applications.

Audience

This document is intended for the host system administrator, system programmer, or operator who will be involved in installing and configuring EMC Data Domain Boost for Microsoft Applications and backing up and restoring Microsoft applications.

Related documentation

The following EMC publications EMC Online Support (https://support.emc.com) provide additional information:

- **EMC Data Domain Boost for Microsoft Applications Release 1.0 Release Notes**
- **EMC Data Domain Boost for Databases and Applications Release 1.0 Administration Guide**
- **EMC Data Domain Boost for Databases and Applications Release 1.0 Release Notes**
- **EMC Data Domain Operating System Administration Guide**
- **EMC Data Domain Operating System Initial Configuration Guide**
- **EMC Data Domain Operating System Command Quick Reference**
- **EMC Data Domain Operating System Release Notes**
- **EMC DD Boost for Enterprise Applications Software Compatibility Guide**
Conventions used in this document

EMC uses the following conventions for special notices:

**NOTICE**

**NOTICE** is used to address practices not related to personal injury.

*Note:* A note presents information that is important, but not hazard-related.

**Typographical conventions**

EMC uses the following type style conventions in this document:

**Bold**

Use for names of interface elements, such as names of windows, dialog boxes, buttons, fields, tab names, key names, and menu paths (what the user specifically selects or clicks).

**Italic**

Use for full titles of publications referenced in text and for variables in body text.

**Monospace**

Use for:
- System output, such as an error message or script
- System code
- Pathnames, file names, prompts, and syntax
- Commands and options

**Monospace italic**

Use for variables.

**Monospace bold**

Use for user input.

[ ] Square brackets enclose optional values
| Vertical bar indicates alternate selections — the bar means “or”
{} Braces enclose content that the user must specify, such as x or y or z
...

Ellipses indicate nonessential information omitted from the example

**Where to get help**

EMC support, product, and licensing information can be obtained as follows:

**Product information** — For documentation, release notes, software updates, or information about EMC products, go to EMC Online Support at:

https://support.emc.com

**Technical support** — Go to EMC Online Support and click Service Center. You will see several options for contacting EMC Technical Support. Note that to open a service request, you must have a valid support agreement. Contact your EMC sales representative for details about obtaining a valid support agreement or with questions about your account.

**Online communities** — Visit EMC Community Network https://community.EMC.com/ for peer contacts, conversations, and content on product support and solutions. Interactively engage online with customers, partners, and certified professionals for all EMC products.

**Your comments**

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of this document to:

DPAD.Doc.Feedback@emc.com
Email your clarifications or suggestions for this document to:

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The following table presents the revision history of this document.

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CHAPTER 1
Overview

This chapter includes the following sections:

- Introduction to EMC Data Domain Boost for Microsoft Applications ....................... 10
- Features of DDBMA .................................................................................................. 10
- Architecture of DDBMA ....................................................................................... 11
- Supported system requirements ........................................................................... 12
- Recommendations for better performance of backups and restores ...................... 13
- Recommendations for better performance of backups and restores ...................... 13
- Unsupported features and capabilities.................................................................... 13
Introduction to EMC Data Domain Boost for Microsoft Applications

EMC® Data Domain® Boost for Microsoft Applications (DDBMA) is an application direct product that leverages an enterprise application data protection framework to provide an application centric data protection. The DD Boost modules integrate with the following technologies:

- The framework by using DD Boost
- Data Domain, a purpose build backup appliance

DDBMA enables database and application administrators to efficiently back up and restore their applications by using the applications’ native tools. The users do not need much expertise to use the product.

DDBMA 1.0 supports only Microsoft SQL Server. The DDBMA for SQL Server module integrates with the SQL Virtual Device Interface (VDI). The interface enables the user to configure the module by using a plug-in in the Microsoft SQL Server Management Studio (SSMS). The plug-in is similar to the SQL native backup and restore Graphical User Interface (GUI). Therefore, the database administrators (DBAs) can use the Microsoft native tools to backup and restore the SQL data.

**NOTICE**

DD Boost devices do not distinguish TCP/IP network types (LAN, WAN, or MAN), and can successfully operate where packet loss is strictly 0% and latency is less than 20 ms.

Features of DDBMA

DDBMA 1.0 provides the following features:

- A plug-in for SSMS to perform backups and restores
- An interface to perform backups and restores by using GUI and Command Line Interface (CLI)
- Scripting capability to back up and restore databases which can be scheduled

DDBMA 1.0 provides the following capabilities:

- Backups and restores of databases in SQL standalone, cluster, and AlwaysOn configurations
- Backups and restores by using the Data Domain Boost technology
- Full, incremental, and differential backups and restores
- Multi-stripe backups and restores
- Backups and restores over Fibre Channel (FC)
- Parallel backups and restores of databases by using the scripting option
- Point-in-time restore
- Restores from a secondary Data Domain device if the secondary device is configured by using the Data Domain MTree Replication technology
Architecture of DDBMA

The following diagram illustrates the architecture of DDBMA for SQL Server.

Figure 1  DDBMA for SQL Server Architecture

The following are the important components of DDBMA for SQL Server:

- **SQL Server Management Studio plug-in**: DDBMA for SQL Server has a GUI which is a SSMS plug-in. The plug-in is similar to the SQL native backup and restore GUI.

- **Virtual Device Interface**: DDBMA for SQL Server utilizes VDI, which is an API provided by SQL Server, to integrate with the SQL Server and enables DDBMA to back up and restore SQL Server data. The Microsoft documentation provides information about the VDI technology. Run DDBMA on the same host that has SQL Server to perform as a SQL Server with direct device control.

- **DD Boost library**: Performs source-based deduplication and sends the backup data to the Data Domain Server.
Overview

Supported system requirements

DDBMA for SQL Server supports the following system requirements:

◆ Operating systems:
  • Microsoft Windows Server 2012 R2 (x64)
  • Microsoft Windows Server 2012 (x64)
  • Microsoft Windows Server 2008 R2 (x64)
  • Microsoft Windows Server 2008 (x64 and x86)
◆ SQL Server versions:
  • Microsoft SQL Server 2014 RTM
  • Microsoft SQL Server 2012
  • Microsoft SQL Server 2008 R2
  • Microsoft SQL Server 2008
  • Microsoft SQL Server 2005
  
  **Note:** The DDBMA 1.0 supports the Express editions of all these supported SQL Server versions.

◆ SQL Server configurations:
  • Standalone
  • Cluster
  • AlwaysOn Availability Groups on SQL Server 2012
◆ SQL Server Management Studio versions:
  • Microsoft SQL Server Management Studio 2012
  • Microsoft SQL Server Management Studio 2008 R2
  • Microsoft SQL Server Management Studio 2008
◆ Data Domain versions:
  • Data Domain Operating System 5.5.0
  • Data Domain Operating System 5.4.0 or later
  • Data Domain Operating System 5.3.0 or later
  • DD Boost library 2.6.2.5
◆ File systems:
  • NTFS
  • ReFS
Recommendations for better performance of backups and restores

Review the following recommendations for better performance of backups and restores of databases by using DDBMA for SQL Server:

- The backup operation uses Data Domain backup write streams to back up a database to a Data Domain Server. The number of backup write streams that a Data Domain Server supports depends on the model of the server and the version of Data Domain operating system. If the total number of requested backup write streams exceeds the number of backup write streams available on Data Domain, the backup will be slow. EMC recommends you to ensure that the number of requested backup streams is lesser than the number of backup write streams that are available on Data Domain before starting the backup. Therefore, you must limit the number of streams to lesser than or equal to 60 for a better performance of database backups. If you do not set a limit, the limit defaults to 60.

Create the DDBackupStreamLimit.ini file with the following variables to set a limit for the Data Domain streams:

- [DDBackupStreamLimit]
  - <IP>=<User_Specified_Limit> if you have specified an IP address for a Data Domain Server in the DDBMA GUI
  - <HostName>=<User_Specified_Limit> if you have specified a hostname for a Data Domain Server in the DDBMA GUI

- The target storage unit saves the metadata of each backup. The metadata size increases with the number of backups. When the metadata size is large, the DDBMA GUI requires more time to browse and display the backups to perform restores. Use a different storage unit instead of the same storage unit for backups in case the performance of the browse operation is slow.

- Do not perform backups from the same client to either multiple Data Domain hosts or multiple paths on the same Data Domain host. Performing this recommendation avoids time collisions of backups. Time collisions of backups disable migrating the DDBMA backups to NetWorker in future.

Unsupported features and capabilities

DDBMA for SQL Server does not support the following features and capabilities:

- Functionality on multiple locales except English
- Coexistence with EMC NetWorker®, the NetWorker Module for Microsoft Applications (NMM), and the NetWorker Module for SQL Server (NMSQL)
- Migration to NetWorker and NMM
- Selection of multiple databases during a backup or a restore in the GUI
- User-initiated Copy-Only backups
- SQL instance level backups and restores
- Redirected restore or copy restore to another host by using GUI
- Storage Spaces in cluster configurations for Windows Server 2012 or later
Overview

- A Data Domain user on the secondary Data Domain Server in a different group in which the primary Data Domain Server does not exist
CHAPTER 2
Installation and Configuration

This chapter includes the following sections:

◆ Prerequisites ................................................................. 16
◆ Installing Data Domain Boost for Microsoft Applications .................. 16
◆ Uninstalling Data Domain Boost for Microsoft Applications ............... 17
◆ Preparing the Data Domain System ........................................ 18
Prerequisites

Ensure that you meet the following prerequisites before you install Data Domain Boost for Microsoft Applications (DDBMA):

- You have installed the following applications on the host:
  - Microsoft SQL Server
    “Supported system requirements” on page 12 provides information about the SQL versions that DDBMA supports.
  - .NET Framework 4.0
    The EMC DD Boost for Enterprise Applications Software Compatibility Guide provides more information about the supported software and operating system versions.

- You have obtained one of the following software licenses:
  - Data Protection Suite for Enterprise Applications Capacity license
  - Data Protection Suite Capacity license
    Contact the EMC sales representative for more details about the license for the environment.

  Note: You receive a password with the software license. You must use the password when you uncompress the downloaded software package.

- You have downloaded the DDBMA software package from EMC Online Support (https://support.emc.com) to the Windows DDBMA host.

- You have added the user to the Administrators group in the Computer Management window.

- You have set the User Account Control to Never notify in the Control Panel > User Accounts > Change User Account Control settings window.

Installing Data Domain Boost for Microsoft Applications

Perform the following steps to install DDBMA:

1. Use WinZip to uncompress one of the following downloaded files on the DDBMA host:
   - ddbma_win_x86.zip, if you use an x86 host
   - ddbma_win_x64.zip, if you use an x64 host
   When you are prompted for a password, type the password that you received with the software license.

2. Use WinZip again to uncompress the resulting zip file.

3. Double-click one of the following setup files to start the installation:
   - EMCDDDBMA.msi, if you use a 32-bit host
   - EMCDDDBMA64.msi, if you use a 64-bit host
Uninstalling Data Domain Boost for Microsoft Applications

Use one of the following methods to uninstall DDBMA:

- “Using the setup file” on page 17
- “Using the Windows uninstall program” on page 18

Using the setup file

Perform the following steps to uninstall DDBMA:

1. Double-click one of the following setup files to start the uninstallation process:
   - EMDDBMA.msi if you use a 32-bit host
   - EMDDBMA64.msi if you use a 64-bit host

2. On the Welcome to EMC Data Domain Boost for Microsoft Applications Setup Wizard page, click Next.

3. On the Change, repair, or remove installation page, click Remove.

4. On the Ready to remove EMC Data Domain Boost for Microsoft Applications page, click Remove.

5. On the Completed the EMC Data Domain Boost for Microsoft Applications Setup Wizard page, click Finish.
Using the Windows uninstall program

Perform the following steps to uninstall DDBMA:

1. On the Windows desktop, click **Start > Control Panel > Programs > Uninstall a program**.
2. In the **Uninstall or change a program** window, perform one of the following steps:
   - Select **EMC Data Domain Boost for Microsoft Applications**, and click **Uninstall**.
   - Double-click **EMC Data Domain Boost for Microsoft Applications**.
     A confirmation message to uninstall DDBMA appears.
3. Click **Yes**.

Preparing the Data Domain System

Preparing the Data Domain System mainly includes the following tasks:

- “Creating storage units” on page 18
- “Configuring replication” on page 19

“Data Domain System Configuration” on page 21 provides detailed information about features, upgrading, configuring, and validating the Data Domain System.

Creating storage units

Perform the following steps to create storage units on DD Server to perform DDBMA backups and recoveries:

1. Log in to **datadomain Enterprise Manager**.
2. Click **Data Management > DD Boost > Storage Units**.
3. Click **Create**.
4. In the **Create Storage Unit** dialog box, perform the following steps to create a storage unit:
   a. In the **Name** field, specify the name of the storage unit that you want to create.
      Each storage unit name must be unique and can contain 50 characters maximum
      with only 0-9, a-z, A-Z, n dash (-), and underscore (_).
   b. Click **OK**.
5. Repeat **step 3** and **step 4** to create multiple storage units.

“Creating storage units” on page 29 provides information about how to create storage units by using the command line interface.

The **EMC Data Domain Operating System Administration Guide** provides detailed information about storage units.
Configuring replication

Replicate data to remote Data Domain systems by using Data Domain Replicator to perform disaster recoveries.

The EMC Knowledgebase Article number 182294, titled Configuration of DDBoot Users on Source and Destination DDRs for MTree Replication, provides more information. The article is available on EMC Online Support (https://support.emc.com).

The Configuring replication section in the *EMC Data Domain Operating System Administration Guide* provides information about creating, enabling, disabling, and deleting replication pairs.
Installation and Configuration
CHAPTER 3
Data Domain System Configuration

This chapter includes the following sections:

◆ Features of Data Domain Boost ................................................................. 22
◆ Installing and upgrading the Data Domain operating system .................. 25
◆ Configuring the Data Domain system ..................................................... 26
◆ Validating the Data Domain system ....................................................... 37
Features of Data Domain Boost

DD Boost provides the following features:

◆ “Distributed segment processing” on page 22
◆ “Advanced load balancing and link failover” on page 23
◆ “Encrypted managed file replication” on page 25

“Configuring the Data Domain system” on page 26 provides information on how to configure these features.

Distributed segment processing

Distributed segment processing uses the DD Boost library on the database server and the Data Domain software on Data Domain Replicator. DDBMA loads the DD Boost library during backup and restore operations.

Distributed segment processing allows DDBMA to perform parts of the deduplication process, which avoids sending duplicate data to the Data Domain system that you configured as a storage server.

The distributed segment processing feature provides the following benefits:

◆ Increases throughput because the DD Boost library sends only unique data instead of all the data to the Data Domain system. The throughput improvements depend on the redundant nature of the data that you back up, the overall workload on the database server, and the database server capability. In general, greater throughput is attained with higher redundancy, greater database server workload, and greater database server capability.

◆ Decreases the network bandwidth requirements by sending the unique data to the Data Domain system through the network.

Manage distributed segment processing by using the `ddboost` command options. Data Domain recommends that you use distributed segment processing if the network connection is 1 Gb Ethernet. “Configuring distributed segment processing” on page 31 provides information on how to configure the distributed segment processing.

Distributed segment processing supports the following modes of operation for sending backup data to a Data Domain system:

◆ Distributed segment processing enabled
◆ Distributed segment processing disabled

Set the operation mode on the Data Domain system. DDBMA negotiates with the Data Domain system for the current setting of the option and accordingly performs backups.
Distributed segment processing enabled mode

When you enable the distributed segment processing feature, the DD Boost library performs the following tasks:

1. Segments the data.
2. Computes IDs for the data segments.
3. Checks with the Data Domain system for duplicate segments.
4. Compresses unique segments that the Data Domain system does not contain.
5. Sends the compressed data to the Data Domain system, which writes the unique data to disk.

You must configure the local compression algorithm that the DD Boost library uses on the Data Domain system. The EMC Data Domain Operating System Administration Guide provides more information about local compression and its configuration.

Distributed segment processing disabled mode

When you disable the distributed segment processing feature, the DD Boost library sends the data directly to the Data Domain system through the network. The Data Domain system then segments, deduplicates, and compresses the data before writing the data to the disk.

Note: You cannot disable the distributed segment processing feature on an Extended Retention Data Domain system.

Advanced load balancing and link failover

Note: This topic applies only if you use an Ethernet connection, not Fibre Channel, for backup and restore operations with DDBMA.

The advanced load balancing and link failover feature enables the following capabilities:

- Combination of multiple Ethernet links into a group
- Registration of only one interface on the Data Domain system with DDBMA.

If you configure an interface group, the DDBMA negotiates with the Data Domain system on the registered interface to send the data. When the Data Domain system receives the data, the data transfer is load balanced and distributed on all the interfaces in the group.

The load balancing feature provides greater physical throughput to the Data Domain system as compared to configuring the interfaces into a virtual interface using Ethernet level aggregation.

The Data Domain system load balances the connections from multiple database servers on all the interfaces in the group. Advanced load balancing and link failover works at the DD Boost software layer. The feature is seamless to the underlying network connectivity, and supports both physical and virtual interfaces.

The feature balances the load of the data transfer depending on the number of the connections that are outstanding on the interfaces. The feature balances the load of only connections for backup and restore jobs.
The file replication connection between Data Domain systems is not part of the load balancing. You must use only one IP address for the target Data Domain system.

You must exclude one interface from the interface group (ifgroup) and reserve that interface for the file replication path between the source and target Data Domain systems.

Every installation of DDBMA must be able to connect to every interface that is a member of the interface group on the Data Domain system.

You can use the advanced load balancing and link failover feature with other network layer aggregation and failover technologies. You can put the links that connect the database servers and the switch that connects to the Data Domain system in an aggregated failover mode. This configuration provides end-to-end network failover functionality. You can use any of the available aggregation technologies between the database server and the switch.

The advanced load balancing and link failover functionality also works with other network layer functionality on the Data Domain systems, including VLAN tagging and IP aliasing. This functionality provides additional flexibility in segregating traffic into multiple virtual networks that run through the same physical links on the Data Domain system.

The EMC Data Domain Operating System Administration Guide provides more information about how to configure VLAN tagging and IP aliasing on a Data Domain system.

The advanced load balancing and link failover feature provides the following benefits:

◆ Eliminates the need to register one storage server for each host that runs DDBMA, which potentially simplifies the installation management.

◆ Routes the subsequent incoming backup jobs to the available interfaces if one of the interfaces in the group goes down while the Data Domain system is still operational.

◆ Increases link utilization by balancing the load of the backup and restore jobs on multiple interfaces in the group.

◆ Performs a transparent fail over of all in-flight jobs to healthy operational links when an interface fails. The process does not interrupt the jobs.

“Configuring advanced load balancing and link failover” on page 32 provides information on how to configure advanced load balancing and link failover.

Configuration restrictions

The Advanced load balancing and link failover feature has the following restrictions:

◆ You can add interfaces only to groups by using IP addresses.

◆ You must use the interfaces that have the same link speed in a group.

◆ You need a switch to connect multiple database servers because a Data Domain system supports one interface group only.
Encrypted managed file replication

By default, the database servers set up file replication jobs between two Data Domain systems without encryption after authenticating them by using the preconfigured username and password of DD Boost. If you enable the encrypted file replication feature, then when the database servers set up a replication job, the session between the source and destination Data Domain systems uses Secure Sockets Layer (SSL) to encrypt all image data and metadata sent over the WAN.

Enabling this feature on the Data Domain system is transparent to DDBMA. When DDBMA requests that the Data Domain system perform a file replication job, the source and destination systems negotiate to perform encryption without involving DDBMA. Encrypted file replication uses the ADH-AES256-SHA cipher suite. You cannot configure a different suite in Data Domain operating system. Enabling this feature does not require restarting the file system on a Data Domain system.

Encrypted file replication requires you to install a replicator license on both the source and the destination Data Domain systems that run DD OS 5.0 or later, and applies to all file replication jobs on the system.

You can use encrypted file replication along with the encryption of data-at-rest feature available on Data Domain operating system with the optional encryption license. When you use encrypted file replication with the encryption of data-at-rest feature, the backup process uses SSL to encrypt the encrypted backup image data over a WAN.

“Enabling encrypted file replication” on page 37 provides information on how to enable encrypted file replication. The EMC Data Domain Operating System Administration Guide provides more information about encrypted file replication.

Installing and upgrading the Data Domain operating system

The EMC Data Domain Operating System Installation Guide provide information on how to install and upgrade the Data Domain (DD) operating system.

You require a license to operate many of the features on a Data Domain system.

Note: You require the EMC DD Boost license to use the Data Domain Boost for Microsoft Applications (DDBMA) software. You also require a replication license for both the source and destination Data Domain systems to use the replication feature.

Contact the EMC Data Domain representative for more information and to purchase licensed features.

The EMC Data Domain Operating System Administration Guide provides details about all the licensed features and how to display and enable Data Domain licenses.
Configuring the Data Domain system

Perform the following tasks to configure the Data Domain system:

- “Opening ports in a firewall to enable Data Domain backups” on page 26
- “Enabling Data Domain Boost on a Data Domain system” on page 26
- “Configuring the Data Domain Boost server” on page 29

The *EMC Data Domain Operating System Command Reference Guide* provides complete descriptions of the commands used in these sections.

Opening ports in a firewall to enable Data Domain backups

*Note:* This topic applies only if you use an Ethernet connection, not Fibre Channel, for backup and restore operations with DDBMA.

Ensure that the following ports are open on the firewall to enable the DD Boost backups and optimized duplication.

- TCP 2049 (NFS)
- TCP 2051 (Replication)
- TCP 111 (NFS portmapper)
- TCP xxx (select a port for NFS mountd, where the default MOUNTD port is 2052)

Enabling Data Domain Boost on a Data Domain system

Every Data Domain system that supports DD Boost must have a unique name. You can use the DNS name of the Data Domain system, which is always unique.

Enable DD Boost on a Data Domain system by using one of the following methods:

- The `ddboost enable` command
- *EMC Data Domain System Manager* on the Data Management > DD Boost page that the *EMC Data Domain Operating System Administration Guide* describes

The following procedure includes commands that you can run at the operating system command line to enable DD Boost. The *EMC Data Domain Operating System Command Reference Guide* provides details about the commands.
Perform the following steps to enable Data Domain Boost:

1. On the Data Domain system, log in as an administrative user.

2. Run the following command to verify whether you have enabled the file system, and the file system is running:

   ```bash
   # filesys status
   ```

   If the file system is disabled, run the following command to enable the file system:

   ```bash
   # filesys enable
   ```

3. Run the following command to verify whether you have enabled the DD Boost license:

   ```bash
   # license show
   ```

   If the DD Boost license is disabled, run the following command to add the DD Boost license by using the license key that Data Domain provided:

   ```bash
   # license add license-key
   ```

4. Establish the DD Boost username and password for the Data Domain system.

   You can configure only one user for DD Boost access on a Data Domain system at a time. The username and password are case-sensitive.

   Run the following commands to establish the username and password:

   ```bash
   # user add username password password
   # ddboost set user-name username
   ```

5. Run the following command to enable Data Domain Boost:

   ```bash
   # ddboost enable
   ```

Changing Data Domain Boost access rights

When you enable the Data Domain Boost service for the first time on a Data Domain system, all the database servers can access the service by default. Use the `ddboost access` command to override this default, and restrict the access to specific database servers.

For example, you can run the following commands to remove the default access permission for all servers and add new access permissions for two specific database servers, `dbserver1.datadomain.com` and `dbserver2.datadomain.com`. The `EMC Data Domain Operating System Command Reference Guide` provides details about the commands.

- # ddboost disable
- # ddboost access del clients *
- # ddboost access add clients dbserver1.datadomain.com
  dbserver2.datadomain.com
- # ddboost enable
These commands establish the access controls that enable DD Boost access only to the two database servers—dbserver1.datadomain.com and dbserver2.datadomain.com.

**Note:** You must add the database server host that contains the DDBMA software to a host access group before you configure backups.

If the commands do not establish any access controls, run the `ddboost enable` command to configure the default access control that enables all hosts to access the DD Boost service. If the commands have established any access controls, running the `ddboost enable` command enables the access controls. The `ddboost enable` command does not modify the access control list.

Consider the following guidelines when you change the Data Domain Boost access rights:

- Ensure that no backup operations are running to the Data Domain system. Run the `ddboost disable` command to prevent the backup operations.

  **Note:** When you disable DD Boost, you disable the data access to all database servers.

- Specify only a fully qualified domain name, IP address, or resolvable DNS name for the client.

- If you have changed or deleted a username, the change in access rights does not affect any current operations. For example, deleting the current clients from the Data Domain Boost access list by running the `ddboost access del clients` command does not stop a backup that is in progress. All operations that are in progress continue. The current operations do not fail because of the change in access rights.

- After you change the access rights, run the `ddboost enable` command to reenable Data Domain Boost and permit operations that are relevant to the changed access rights.

You can run the `ddboost access show` command to verify which database servers have DD Boost access rights. If the command output is `*`, all database servers have the access rights. For example:

```
# ddboost access show
DD Boost access allowed from the following clients
*

# ddboost access show
DD Boost access allowed from the following clients:
aehdb2
aehdb2.datadomain.com
aehdb3
aehdb3.datadomain.com
aehdb4
aehdb4.datadomain.com
aehdb5
aehdb5.datadomain.com
```

You can run the `ddboost show connections` command to verify the active client connections. For example:

```
# ddboost show connections
```
Configuring the Data Domain Boost server

Perform the following tasks to configure the Data Domain Boost server:

- “Creating storage units” on page 29
- “Configuring distributed segment processing” on page 31
- “Configuring advanced load balancing and link failover” on page 32
- “Configuring the DD Boost-over-FC service” on page 33
- “Enabling encrypted file replication” on page 37

Creating storage units

Create one or more storage units on each Data Domain system that you use with DDBMA. Ensure that you use a unique storage unit name on a single Data Domain system. However, you can use the same storage unit name on more than one Data Domain system.

Note: Storage unit names are case-sensitive.

You must provide the storage unit name when you perform the backup and restore operations with DDBMA.

You can create a storage unit by using one of the following methods:

- The `ddboost storage-unit` command
- EMC Data Domain System Manager on the Data Management > DD Boost page that the EMC Data Domain Operating System Administration Guide describes

Run the following command on the Data Domain system for each storage unit that you want to create:

1. Run the following command on the Data Domain system:
   
   ```
   # ddboost storage-unit create storage_unit_name
   ```

2. Repeat step 1 for each Boost-enabled Data Domain system.

3. Run the following command to list the status of the storage units:
You must create at least one storage unit on each Data Domain system that you will use with DDBMA. You can share a storage unit on a Data Domain system with more than one client system.

Deleting storage units

You can run the following command to delete a specified storage unit and its contents, and any DD Boost associations:

```
# ddboost storage-unit delete storage_unit_name
```

The `ddboost destroy` command deletes all storage units from the Data Domain system and permanently removes all the data files contained in the storage units.

The *EMC Data Domain Operating System Command Reference Guide* provides details about the ddboost commands.

Configuring quotas for storage units (optional)

Provision the storage on a Data Domain system through optional quota limits for a storage unit. You can specify quota limits either when you create a storage unit or later by using separate commands. You can specify quota limits at the storage unit level or the MTree level. The *EMC Data Domain Operating System Command Reference Guide* provides details about the quota and ddboost commands.

- Run the following command to enable quota limits on the Data Domain system:

  ```
  # quota enable
  ```

- Run the following command to verify the quota status:

  ```
  # quota status
  ```

- Run the following command to configure quota limits when you create a storage unit:

  ```
  # ddboost storage-unit create storage_unit_name
  [quota-soft-limit n (MiB|GiB|TiB|PiB)] [quota-hard-limit n (MiB|GiB|TiB|PiB)]
  ```

- Run the following command to configure quota limits after you create a storage unit:

  ```
  # quota set storage-units storage_unit_list (soft-limit n (MiB|GiB|TiB|PiB)) (hard-limit n (MiB|GiB|TiB|PiB))
  ```

  For example:

  ```
  # quota set storage-units SU_AEHDB5 soft-limit 10 GiB hard-limit 20 GiB
  ```

  SU_AEHDB5: Quota soft limit: 10240 MiB, hard limit: 20480 MiB

  Alternately, you can set the quota limits at the MTree level. For example:
# quota set mtrees /data/coll/SU_AEHDB5 soft-limit 10 GiB hard-limit 20 GiB
/data/coll/SU_AEHDB5: Quota soft limit: 10240 MiB, hard limit: 20480 MiB

- Run the following command to verify the quota limits of a storage unit:

  # quota show storage-units storage_unit_list

  For example:

  # quota show storage-units SU_AEHDB5

  Alternately, you can verify the quota limits at the MTree level. For example:

  # quota show mtrees /data/coll/SU_AEHDB5

Configuring distributed segment processing

You must configure the distributed segment processing option on the Data Domain system. The option setting applies to all the database servers and all the software that uses DD Boost.

You can manage the distributed segment processing by using one of the following methods:

- The `ddboost` command

- **EMC Data Domain System Manager** on the Data Management > DD Boost page that the *EMC Data Domain Operating System Administration Guide* describes

Run the following command to configure the distributed segment processing option:

# ddboost option set distributed-segment-processing {enabled | disabled}

Enabling or disabling the distributed segment processing option does not require a restart of the Data Domain file system.

A host on which you have installed the Data Domain Operating System (DD OS) release 5.2 or later enables the distributed segment processing feature by default. If you upgrade a host from DD OS release 5.0.x or 5.1.x to DD OS release 5.2 or later, the distributed segment processing feature remains in its previous state—enabled or disabled.
Configuring advanced load balancing and link failover

The advanced load balancing feature balances the load of data transfer and distributes the load in private network when the Data Domain system receives data from the DD Boost client. The process provides greater throughput especially for customers who use multiple 1 GbE connections.

The following restrictions apply to the configuration of the advanced load balancing and link failover feature:

◆ You can add Interfaces only to a group by using an IP address.
◆ You must not use the advanced load balancing and link failover feature with mixed 1GbE interfaces and 10 GbE interfaces in a group. Use interfaces with the same link speed in a group.

You can manage advanced load balancing and link failover by using one of the following methods:

◆ The `ddboost ifgroup` command
◆ EMC Data Domain System Manager on the Data Management > DD Boost page that the EMC Data Domain Operating System Administration Guide describes

Perform the following steps to create an interface group on the Data Domain system by adding existing interfaces to the group and registering the Data Domain system with DDBMA. After setting up the interface group, you can add or delete interfaces from the group. You must create the interfaces by using the `net` command before you create the interface group.

1. Run the `ddboost ifgroup` command to add the interfaces into the default group. For example:

   ```
   # ddboost ifgroup add interface 192.168.1.1
   # ddboost ifgroup add interface 192.168.1.2
   # ddboost ifgroup add interface 192.168.1.3
   # ddboost ifgroup add interface 192.168.1.4
   ```

   You can create only one interface group and you cannot rename this group.

2. Select one interface on the Data Domain system to register with the DDBMA. Create a failover aggregated interface and register that interface with the DDBMA. The EMC Data Domain Operating System Administration Guide describes how to create a virtual interface for link aggregation.

   It is not mandatory to use an interface in the ifgroup to register with the DDBMA. You can use an interface that is not part of the ifgroup to register with DDBMA. You must register the interface with a resolvable name by using either DNS or any other name resolution mechanism.

3. Run the following command to enable the interface group on the Data Domain system:

   ```
   # ddboost ifgroup enable
   ```
4. Run the following command to verify the configuration:

```
# ddboost ifgroup show config interfaces
```

<table>
<thead>
<tr>
<th>Group Name</th>
<th>Status</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>default</td>
<td>enabled</td>
<td>192.168.1.1</td>
</tr>
<tr>
<td>default</td>
<td>enabled</td>
<td>192.168.1.2</td>
</tr>
<tr>
<td>default</td>
<td>enabled</td>
<td>192.168.1.3</td>
</tr>
<tr>
<td>default</td>
<td>enabled</td>
<td>192.168.1.4</td>
</tr>
</tbody>
</table>

5. Add or delete interfaces from the group.

Configuring the DD Boost-over-FC service

**Note:** If you do not use Fibre Channel (FC) for backup and restore with DDBMA, skip this topic.

DD OS release 5.3 and later supports the Fibre Channel mechanism of communication between the Data Domain Boost library and the Data Domain system.

Before DD OS release 5.3, the user used IP networking for communications between the DD Boost library and any Data Domain system. DDBMA specifies the Data Domain system by using the hostname or IP address. The Data Domain Boost library uses TCP/IP connections to transmit requests to and receive responses from the Data Domain system.

DD OS release 5.3 introduces the alternative transport mechanism through Fibre Channel. Certain installations prefer or require the use of Fibre Channel as the data transfer mechanism between the Data Domain Boost library and Data Domain system. The Data Domain Boost over Fibre Channel transport (DD Boost-over-FC) enables such installations to access the features that the DD Boost technology provides.

Although Fibre Channel is specified as a general-purpose data transport mechanism, you can use Fibre Channel solely as a transport for SCSI device access in practice. Fibre Channel hardware and drivers reside solely within the SCSI protocol stacks in host operating systems. The DD Boost-over-FC transport must use SCSI commands for all communication.

To request access to a Data Domain system, DDBMA specifies the Data Domain system by using the special string **DFC-dfc_server_name. dfc_server_name** is the DD Boost-over-FC server name that is configured for the Data Domain system. The DD Boost-over-FC transport logic within the DD Boost library examines the set of generic SCSI devices available on the database server and uses SCSI commands to identify a catalog of devices which are pathnames of the SCSI devices that the database server operating system discovers.

The DD Boost-over-FC transport logic issues SCSI commands to the identified generic SCSI devices, to transfer Data Domain Boost protocol requests and responses between the library and the Data Domain system.

Most Data Domain Boost features are independent of transport. One notable exception is the DD Boost-over-IP advanced load balancing and link failover feature and its associated ifgroups. This feature is specific to the IP transport. You can achieve load balancing and link-level high availability for the DD Boost-over-FC transport through different means.

The DD Boost-over-FC communication path applies only between the database server/Data Domain Boost library and the Data Domain system, and does not apply to communication between two Data Domain systems.
To enable the support of the DD Boost-over-FC service, you must install the supported fibre Channel target HBAs on the host. The *EMC Data Domain Operating System Command Reference Guide* and *EMC Data Domain Operating System Administration Guide* provide information about using the `scsitarget` command for managing the SCSI target subsystem.

Perform the following steps to configure the DD Boost-over-FC service:

1. Run the following command to enable the DD Boost-over-FC service:

   ```bash
   # ddboost option set fc enabled
   ```

2. Optionally, run the following command to set the `dfc-server-name`:

   ```bash
   # ddboost fc dfc-server-name set server_name
   ```

   Alternatively, accept the default name, which is the base hostname of the Data Domain system. A valid `dfc-server-name` consists of one or more of the following characters:

   - lowercase letters (a–z)
   - uppercase letters (A–Z)
   - digits (0–9)
   - underscore (_)
   - dash (–)

   **Note:** The dot or period character (.) is not valid within a `dfc-server-name`. You cannot use the fully qualified domain name of a Data Domain system as the `dfc-server-name`.

3. Run the following command to create a DD Boost FC group:

   ```bash
   # ddboost fc group create group_name
   ```

   For example:

   ```bash
   # ddboost fc group create lab_group
   ```

4. Run the following command to configure the device set of the DD Boost FC group:

   ```bash
   # ddboost fc group modify group_name device-set count count endpoint (all | none | endpoint_list)
   ```

   For example:

   ```bash
   # ddboost fc group modify lab_group device-set count 8 endpoint all
   ```

5. Run the following command to add initiators to the DD Boost FC group:

   ```bash
   # ddboost fc group add group_name initiator initiator_spec
   ```

   For example:

   ```bash
   # ddboost fc group add lab_group initiator "initiator-15,initiator-16"
   ```

6. Verify that the DFC devices are visible on the client.

7. Ensure that the user who performs the backups and restores has the required permission to access the DFC devices.
Managing the DD Boost-over-FC path

The ifgroup-based advanced load balancing and link failover mechanism does not apply to the Fibre Channel transport. The feature provides a different path mechanism for the DD Boost-over-FC solution.

The Data Domain system advertises one or more Processor-type SCSI devices to the database server over one or more physical paths. The database server operating system discovers the devices and makes them available to applications through a generic SCSI mechanism (SCSI Generic driver on Linux, SCSI Pass-Through Interface on Windows).

Consider the following example:

- The database server has two initiator HBA ports—A and B
- Data Domain System has two FC target endpoints—C and D
- You have configured Fibre Channel Fabric zoning so that both initiator HBA ports can access both FC target endpoints
- You have configured Data Domain system with a DD Boost FC group that contains the following components:
  - Both FC target endpoints on the Data Domain system
  - Both initiator HBA ports
  - Four devices (0, 1, 2, and 3)

In this example, the media server operating system might discover up to 16 generic SCSI devices; one for each combination of initiator, target endpoint, and device number:

/dev/sg11: (A, C, 0)
/dev/sg12: (A, C, 1)
/dev/sg13: (A, C, 2)
/dev/sg14: (A, C, 3)
/dev/sg15: (A, D, 0)
/dev/sg16: (A, D, 1)
/dev/sg17: (A, D, 2)
/dev/sg18: (A, D, 3)
/dev/sg19: (B, C, 0)
/dev/sg20: (B, C, 1)
/dev/sg21: (B, C, 2)
/dev/sg22: (B, C, 3)
/dev/sg23: (B, D, 0)
/dev/sg24: (B, D, 1)
/dev/sg25: (B, D, 2)
/dev/sg26: (B, D, 3)

When DDBMA requests the Data Domain Boost library to establish a connection to the server, the DD Boost-over-FC transport logic within the DD Boost library uses SCSI requests to build a catalog of these 16 generic SCSI devices. The SCSI devices are paths to access the DD Boost-over-FC service on the Data Domain System. As part of establishing the connection to the server, the DD Boost-over-FC transport logic provides the catalog of paths to the server.
Selecting the initial path

The server maintains statistics about the DD Boost-over-FC traffic over the various target endpoints and known initiators. During the connection setup procedure, path management logic in the server considers these statistics and then selects the path that the server uses to establish the connection, based on the following criteria:

- Distribute the connections across different paths evenly for queue-depth constrained clients. “Queue-depth constraints” on page 37 provides more information.
- Select the least busy target endpoint
- Select the least busy initiator from among paths to the selected target endpoint

Dynamic rebalancing

The server periodically performs dynamic rebalancing when the statistics reveal the following situations:

- For queue-depth constrained clients as described in “Queue-depth constraints” on page 37, connections are distributed unequally across available paths
- Workload across target endpoints is out of balance
- Workload across initiators is out of balance

When the server finds one of these situations, the server marks one or more connections for server-directed path migration. In a future data transfer operation, the server requests that the DD Boost library start using a different available path from the catalog for subsequent operations.

Client path failover

The server dynamic rebalancing logic directs the client to use a different path. However, the client can also decide to use a different available path if the client receives errors while using the connection’s current path.

For example, assume the path catalog for a connection consists of eight paths:

/dev/sg21: (A, C, 0)
/dev/sg22: (A, C, 1)
/dev/sg23: (A, D, 0)
/dev/sg24: (A, D, 1)
/dev/sg25: (B, C, 0)
/dev/sg26: (B, C, 1)
/dev/sg27: (B, D, 0)
/dev/sg28: (B, D, 1)

The server selects the (A, C, 0) path during an initial path selection. The DFC transport logic in the DD Boost library starts sending and receiving data for the connection by using SCSI commands to /dev/sg21.

Later, the link from the target endpoint C to the switch becomes unavailable due to a cable disconnect or some hardware failure. Any subsequent SCSI request that the DFC transport logic submits to /dev/sg21 fails with an error code which indicates that the process could not deliver the SCSI request to the device.
In this case, the DFC transport logic looks in the catalog of devices for a path with a different physical component and a different combination of initiator and target endpoint. The DFC transport logic retries the SCSI request on the selected path, and repeats the process until the DFC transport logic finds a path that can successfully complete the SCSI request.

Queue-depth constraints

The specific SCSI device which receives a request is irrelevant for the DD Boost-over-FC solution. All SCSI devices are identical destination objects for SCSI commands as required by the SCSI protocol. When processing a SCSI request, the server logic gives no consideration to the specific device on which the SCSI request arrived.

Certain operating systems on clients impose a restriction on the number of outstanding I/O requests that the operating systems can process simultaneously over a SCSI device. For example, the Windows SCSI Pass-Through Interface mechanism conducts only one SCSI request at a time through each of its generic SCSI devices. This impacts the performance of the DD Boost-over-FC solution when multiple connections (for example, backup jobs) try to use the same generic SCSI device.

The Data Domain system also imposes a limit on the number of outstanding I/O requests for each advertised SCSI device. You must advertise multiple SCSI devices on the Data Domain system to overcome performance issues in case of heavy workloads. The term queue-depth describes the system-imposed limit on the number of simultaneous SCSI requests on a single device. Client systems such as Windows, the queue depth of which is so low as to impact performance, are considered to be queue-depth constrained.

Enabling encrypted file replication

Run the following command to enable the encrypted file replication option:

```
# ddboost file-replication option set encryption enabled
```

Enabling encrypted file replication requires additional resources—CPU and memory on the Data Domain system, and does not require a restart of the Data Domain file system. The EMC Data Domain Operating System Administration Guide provides information on encrypted file replication.

Validating the Data Domain system

Run the following commands to validate the status of the Data Domain system:

- `filesys status`
- `ddboost status`
- `ddboost ifgroup show config interfaces`
- `ddboost show connections`
- `ddboost storage-unit show compression`
- `ddboost storage-unit show`

The EMC Data Domain Operating System Command Reference Guide provides details about these commands and their options.
Data Domain System Configuration

Run one of the following commands. The command that you use to validate the communication between the database server and the Data Domain system depends on the type of the network connection that you use.

- If you have a DD Boost-over-IP system, then log in to the database server, and run the following command:

  ```
  # rpcinfo -p Data_Domain_system_hostname
  ```

  The command output must include the ports listed in “Opening ports in a firewall to enable Data Domain backups” on page 26.

- If you have a DD Boost-over-FC system, then log in to the database server, and run the relevant command to verify whether the DFC devices are visible on the client.

  The *EMC Data Domain Operating System Command Reference Guide* provides details about the supported commands.

Use the `ddbmadmin -G` command to verify the username, password, and valid access permissions for the Data Domain system.
CHAPTER 4
Backup

This chapter includes the following sections:

◆ Backing up databases in SQL standalone and cluster environments .................. 40
◆ Performing scheduled backups by using Task Scheduler ................................. 48
◆ Backing up databases to a Data Domain Server over Fibre Channel ................. 48
Using SQL Server Management Studio

If you have not installed SQL Server Management Studio (SSMS), double-click the DDSSMSAddinApp.exe file in the <DDBMA installed folder>\EMC DD Boost Modules\DDBMA\bin folder to start DDBMA. The EMC Data Domain Boost for Microsoft Applications window appears as shown in Figure 3 on page 41.

Perform the following steps to back up a database by using SSMS:

1. On the Windows desktop, click Start > Microsoft SQL Server Management Studio. The Microsoft SQL Server Management Studio window appears as shown in Figure 2 on page 40.
2. Click **EMC Data Domain Boost for Microsoft Applications**.

The **EMC Data Domain Boost for Microsoft Applications** window appears as shown in Figure 3 on page 41. The **Backup** tab is selected by default.

![Backup window](image)

**Figure 3** EMC Data Domain Boost for Microsoft Applications window

3. On the **General** page, perform the following steps:

   a. Under **Source**, specify the following fields:

      - **SQL Server Instance**: Select the name of the SQL Server instance—standalone or cluster, where the database that you want to back up exists.
      - **Databases**: Select the database that you want to back up.
      - **Recovery model**: Displays the restore model of the database that you have selected.
      - **Backup type**: Select the type of the backup that you want to perform.

   b. Under **Backup set**, specify the following fields:

      - **Name**: Specify a name for the backup that you are performing.
      - **Description**: Briefly describe the backup that you are performing.
Backup

- **Expires after (days):** Specify the number of days after which the backup must expire.

c. Under **Destination**, perform one of the following tasks:
- From the **DataDomain Server** list, select the Data Domain Server to which you want to back up the database.
- If the **DataDomain Server** list does not contain the Data Domain Server to which you want to back up the database, click Add.

The **Add Data Domain Server details** dialog box appears as shown in Figure 4 on page 42.

![Add Data Domain Server details](image1.png)

**Figure 4** Add Data Domain Server details

Specify the following fields and click OK to add the Data Domain Server to the **DataDomain Server** list:

- **DataDomain Server:** Specify the name of the Data Domain Server to which you want to back up the database.

- **Communication Protocol:** Select the medium—Ethernet or Fibre channel, through which you want to back up the database to the Data Domain Server. Ethernet is selected by default.

- **FC Service Name:** Specify the name of the Data Domain Server, which appears as shown in Figure 5 on page 42, as the FC service name if you have selected Fibre Channel from the **Communication Protocol** list.

![Data Domain Server](image2.png)

**Figure 5** Data Domain Server name
Backing up databases in SQL standalone and cluster environments

- **User Name**: Specify the username of the DD Boost user.
- **Password**: Specify the password of the DD Boost user.
- **Storage Unit**: Specify the name of the storage unit to which you want to back up the database.

**Note**: Ensure that you have specified valid values in these fields because there is no dynamic validation to ensure the correctness of the values.

If you want to remove a Data Domain server from the DataDomain Server list, click **Remove**.

4. [Optional] You can click **Script** to generate the CLI equivalent script. You can use the script to create a .bat file that you can use to perform scheduled backups, automation, and other tasks.

5. [Optional] From the left pane, click **Options** to select the options that you require to perform the backup.

The page appears as shown in **Figure 6 on page 43**.

![Backup Options](image-url)

**Figure 6** Backup-Options page
Select any of the following options:

- **Perform checksum before writing to media:** To perform a checksum operation with the backup and save the information to the backup media. DDBMA performs another checksum before a restore to ensure that the checksum matches the backup.

- **Continue on error:** To use a checksum to detect a partial backup or restore state. The SQL Server verifies the checksum by calculating a local result and comparing the result with the stored value. If the values do not match and you encounter errors, you can select this option to continue the backup or restore operation.

- **Truncate the transaction log:** To truncate the transaction logs before a backup. DDBMA enables this option if you have selected Transaction log as the backup type on the General page.

- **Backup the tail of the log and leave database in restoring state:** To perform a tail-log backup of the database and leave the database in the restoring state.

- **Create a striped backup:** To create a striped backup. Also, you can specify the number of stripes. The maximum limit is 32. If you specify a value beyond 32, the value defaults to 32.

- **Select a debug level:** To generates detailed logs that you can use to troubleshoot the backup issues.

- **Data Domain over FC:** To back up the database to the Data Domain Server through Fibre Channel. You can back up to fibre channel only when you have properly configured the target Data Domain Server with FC, and correctly specified the information about the connection in the corresponding fields of the Add Data Domain Server details dialog box (Figure 4 on page 42).

6. [Optional] You can click Script to generate the CLI equivalent script and create a .bat file with the script which you can use to perform scheduled backups, automation, and other tasks.

7. Click Run.

   The Monitor page displays the backup information and status as shown in Figure 7 on page 45.
The **Backup completed** message appears if the backup succeeds. Otherwise, the **Backup failed** message appears.

**Note:** Review the log files that are available in the `<DDBMA_Install_Folder>EMC DD Boost Modules\DDBMA\logs` folder for information about the success or failure of the backup.
DDBMA for SQL Server uses the following command to back up databases:

ddbmsqlsv [<options>] {path}

Key options

The following are the key options:

- \[-N\ <Backup\_Set\_Name>\]
- \[-b\ <Backup\_Set\_Description>\]
- \[-S\ <Number\_of\_Stripes>\]
- \[-l\ <Backup\_Level>\]
- \[-A\ <Virtual\_Server>\]
- \[-c\ <Client\_or\_Hostname>\]
- \[-y\ <Backup\_Retention\_Period>\]
- \[-a\ "NSR\_DFA\_SI={TRUE | FALSE}"\]
- \[-a\ "NSR\_DFA\_SI\_USE\_DD={TRUE | FALSE}"\]
- \[-a\ "NSR\_DFA\_SI\_DEVICE\_PATH=<Storage\_Unit\_Name>"\]
- \[-a\ "NSR\_DFA\_SI\_DD\_HOST=<Data\_Domain\_Server\_Name>"\]
- \[-a\ "NSR\_DFA\_SI\_DD\_USER=<DDBoost\_Username>"\]

Sample command to back up databases in a SQL standalone environment

ddbmsqlsv.exe -c SQLX86.adesc.com -l full -a "NSR_DFA_SI=TRUE" -a "NSR_DFA_SI_USE_DD=TRUE" -a "NSR_DFA_SI_DD_HOST=10.31.196.90" -a "NSR_DFA_SI_DD_USER=ost" -a "NSR_DFA_SI_DEVICE_PATH=/sqlserver" "MSSQL$INST2005:d2"

Sample command to back up databases in a SQL cluster environment

ddbmsqlsv.exe -c SQLcluster1.adesc.com -A SQLcluster1.adesc.com -l full -a "NSR_DFA_SI=TRUE" -a "NSR_DFA_SI_USE_DD=TRUE" -a "NSR_DFA_SI_DD_HOST=10.31.196.90" -a "NSR_DFA_SI_DD_USER=ost" -a "NSR_DFA_SI_DEVICE_PATH=/sqlserver" "MSSQL$INST2005:d2"
Additional options

The following table presents the additional backup command options.

Table 1  Additional backup command options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-G</td>
<td>Specifies a NO_LOG transaction log backup before backing up the database. This option is valid only for full backups on SQL Server 2005.</td>
</tr>
<tr>
<td>-j</td>
<td>Performs a database consistency check before starting the backup.</td>
</tr>
<tr>
<td>-q</td>
<td>Displays ddbmsqlsv messages in the quiet mode, that is, the option displays summary information and error messages only.</td>
</tr>
<tr>
<td>-R</td>
<td>Uses the NO_TRUNCATE option when backing up transaction logs.</td>
</tr>
<tr>
<td>-T</td>
<td>Performs a TRUNCATE_ONLY transaction log backup before backing up the database. This option is valid only for full backups on SQL Server 2005.</td>
</tr>
<tr>
<td>-V</td>
<td>Displays ddbmsqlsv messages in the verbose mode, that is, the option provides detailed information about the progress of the backup operation.</td>
</tr>
<tr>
<td>-k</td>
<td>Performs checksum before backing up the data to the device.</td>
</tr>
<tr>
<td>-u</td>
<td>Performs checksum and continues the operation even in case of errors.</td>
</tr>
<tr>
<td>-I incr</td>
<td>Performs transaction log backup.</td>
</tr>
<tr>
<td>-H</td>
<td>Performs a tail-log backup of the database and leave it in the restoring state.</td>
</tr>
<tr>
<td>-D &lt;debug_level&gt;</td>
<td>Generates detailed logs that you can use to troubleshoot the backup issues.</td>
</tr>
<tr>
<td>Data Domain interface=Fibre Channel</td>
<td>Backs up the database to the Data Domain Server through Fibre Channel.</td>
</tr>
</tbody>
</table>

Path

The path includes one of the following parameters:

- d-path which is MSSQL: or [MSSQL:]<s-path>[[MSSQL:]<s-path> [...]]
- i-path which is MSSQL$<Instance_Name>: or MSSQL$<Instance_Name>:<s-path> [...]  

where,

s-path is the database

Note: Use the Script option in the Backup page in the DDBMA GUI to generate the CLI equivalent script that you can use to perform scheduled backups, automation, and other tasks.
Performing scheduled backups by using Task Scheduler

Use the Task Scheduler to schedule backups.

1. On the Windows desktop, click **Start > All Programs > Accessories > System Tools > Task Scheduler**.
2. In the left pane in the **Task Scheduler** window, right-click **Task Scheduler Library** and select **Create Basic Task**.
   
   The Create Basic Task Wizard wizard appears.
3. On the Create a Basic Task page, specify a name for the task in the Name field and click **Next**.
4. On the Task Trigger page, select the appropriate option to start the task and click **Next**.
   
   The corresponding page of the selected option appears.
5. Specify or select all the fields that you require to perform the task and click **Next**.
6. On the Action page, select **Start a program** and click **Next**.
7. On the Start a program page, browse for the .bat file and specify its path in the Program/script field and click **Next**.

   **Note:** Step 3 to Step 6 in “Using SQL Server Management Studio” on page 40 provide information about how to create a .bat file.
8. On the Summary page, review the details of the task and click **Finish**.
   
   The process creates the task and adds it to your Windows schedule.

Backing up databases to a Data Domain Server over Fibre Channel

The procedure to back up a database to a Data Domain Server over Fibre Channel is same as the procedure described in “Using SQL Server Management Studio” on page 40. However, you must configure the Fibre Channel on the Data Domain Server. The Managing Fibre Channel Transport section in the EMC Data Domain Operating System Administration Guide provides information about how to configure the Fibre Channel.
CHAPTER 5
Restore

This chapter includes the following section:

◆ Restoring databases in SQL standalone and cluster environments ......................... 50
Restoring databases in SQL standalone and cluster environments

Use one of the following methods to restore a database:

- “Using SQL Server Management Studio” on page 50
- “Using command line interface” on page 56

**Note:** The procedures in this section apply to both the standalone and cluster environments of SQL.

**Using SQL Server Management Studio**

Perform the following steps to restore data by using SSMS:

1. On the Windows desktop, click **Start > Microsoft SQL Server Management Studio**.
2. Click **EMC Data Domain Boost for Microsoft Applications**.
3. Click the **Restore** tab.
The page appears as shown in Figure 8 on page 51.

4. On the **General** page, perform the following steps:
   a. Under **Sources**, specify the following fields:
      - **DataDomain Server**: Click the button beside the field to select the Data Domain Server from which you want to restore the database. In case of a remote (secondary) Data Domain Server which has the replicated database that you want to restore, select the relevant server.
        
        **Note**: A Data Domain user on the secondary Data Domain Server must be in the same group as the primary Data Domain Server.
      - **Data Domain over FC**: Select this option when you want to restore the database over Fibre Channel.
      - **SQL Server Instance**: Select the name of the SQL Server instance—standalone or cluster, where the database that you want to restore exists.
      - **Database**: Select the database that you want to restore.
b. **Under Destination**, specify the following fields:

- **SQL Server Instance**: Select the name of the destination SQL Server instance which must contain the database that you want to restore.
- **Database**: Select the destination database to which you want to restore the current database.
- **Restore to**: Click **Timeline** to specify the backup that you want to restore. The **Backup Timeline** dialog box appears as shown in Figure 9 on page 52.

![Backup Timeline](image)

**Figure 9**  Specifying the restore point

You can restore to either the last backup or any date and time.

Select the option and values, and click **OK**.

c. [Optional] Under **Restore**, you can select one of the backups that was performed within a specified timeline and perform restore.

From the **Browse time** list, select a date and time, and click **Show Versions**.

All the backups that were performed within the specified timeline appear in the **Backup sets to restore** list.

Select the backup set that you want to restore.

You can click << Older or Newer >> to browse for the backup set that you want to restore.

5. [Optional] From the left pane, click **Files** to change the default destination folders of the database files–data file (.mdf) and log file (.ldf).
The page appears as shown in Figure 10 on page 53.

![Figure 10 Restore-Files page](image)

The table on the page displays the locations of the database files when the database was backed up. If you do not want to restore the files to the same location, perform one of the following steps to change the destination paths:

- Select Relocate all files to folder and click the buttons on the right side of the Data file folder and Log file folder fields to specify the destination paths of the data files and the log file respectively. The operation restores all the data files to one folder, and the log file to another folder.

- Click the respective buttons on the extreme right side of the data files and the log file in the table to specify multiple folders to restore the files to.

6. [Optional] From the left pane, click Options to select the options that you require to perform the restore.

The page appears as shown in Figure 11 on page 54.
Figure 11  Restore-Options page

Select any of the following options:

- **Overwrite the existing database (WITH REPLACE)**: To overwrite the existing database with the current database that you restore, if the names of both the databases are same.

- **Recovery state**: To provide the following options and capabilities:
  - **RESTORE WITH RECOVERY**: To enable the ability to roll back uncommitted transactions and use the database to restore the latest or additional transaction logs.
  - **RESTORE WITH NO RECOVERY**: To disable the ability to roll back uncommitted transactions and use the database to restore the latest or additional transaction logs.
RESTORE WITH STANDBY: To enable the ability to undo committed transactions, saves the undo actions in a standby file that enables you to reverse the restore effects, and puts the database in a read-only mode. If you select this option, then specify the Standby file field by clicking the button on the right side of the field, browsing for the file, and selecting the file.

- **Select a debug level:** To generate detailed logs which you can use to troubleshoot the restore issues.
- **Take tail-log backup before restore:** To perform a transaction log backup of the data before performing restore. The tail-log backup ensures that DDBMA backs up the data that has changed from the previous backup.

7. **[Optional]** You can click **Script** to generate the CLI equivalent script. You can use the script to create a .bat file that you can use to perform tasks such as automation, and so on.

8. Click **Run.**

The restore information and status appear in the **Monitor page** as shown in **Figure 12 on page 55.**
The **Restore completed** message appears if the restore succeeds. Otherwise, the **Restore failed** message appears.

**Note:** Review the log files that are available in the `<DDBMA_Install_Folder>\EMC DD Boost Modules\DDBMA\logs` folder for information about the success or failure of the restore.

### Using command line interface

DDBMA for SQL Server uses the following command to restore databases:

```
ddbmsqlrc [<options>] {path}
```

**Key options**

The following are the key options:

- `-t <Last_Backup_Time_Stamp>`
- `[c <Client_or_Hostname>]`
- `[l <level>]`
- `[d {<Destination_Database_Name>|MSSQL:<Destination_Database_Name>|MSSQL$<Instance_Name>:<Destination_Database_Name>}]`
- `[l $ {MSSQL:<database>|MSSQL$<Instance_Name>:<Database>}]`
- `[A <Virtual_Server>]`
- `[S {normal | norecover | standby:<filepath>\undo.ldf}]`
- `-a "NSR_DFA_SI={TRUE | FALSE}"`
- `-a "NSR_DFA_SI_USE_DD={TRUE | FALSE}"`
- `-a "NSR_DFA_SIDEVICE_PATH=<Storage_Unit_Name>"
- `-a "NSR_DFA_SI_DD_HOST=<Data_Domain_Server_Name>"
- `-a "NSR_DFA_SI_DD_USER=<DDBoost_Username>"

**Sample command to restore databases in a SQL standalone environment**

```
ddbmsqlrc.exe -c sqlx86.adesc.com -t "Monday, November 11, 2013 1:05:47 PM" -S normal -a "NSR_DFA_SI=TRUE" -a "NSR_DFA_SI_USE_DD=TRUE" -a "NSR_DFA_SI_DD_HOST=10.31.77.27" -a "NSR_DFA_SI_DD_USER=arti1" -a "NSR_DFA_SIDEVICE_PATH=/artrep2" "MSSQL$SQL2K8:testddr1"
```

**Sample command to restore databases in a SQL cluster environment**

```
ddbmsqlrc.exe -c sqlcluster1.adesc.com -A sqlcluster1.adesc.com -t "Monday, November 11, 2013 1:05:47 PM" -S normal -a "NSR_DFA_SI=TRUE" -a "NSR_DFA_SI_USE_DD=TRUE" -a "NSR_DFA_SI_DD_HOST=10.31.77.27" -a "NSR_DFA_SI_DD_USER=arti1" -a "NSR_DFA_SIDEVICE_PATH=/artrep2" "MSSQL$SQL2K8:testddr1"
```
Additional options

The following table presents the additional restore command options.

**Table 2 Additional restore command options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-C</td>
<td>Relocates the database files (.mdf and .ldf) to a different folder.</td>
</tr>
<tr>
<td>-f</td>
<td>Overwrites the existing database with the current database that you restore, if the names of both the databases are same.</td>
</tr>
<tr>
<td>-j</td>
<td>Performs a database consistency check between the SQL Server backed up data and the SQL Server restored data.</td>
</tr>
<tr>
<td>-q</td>
<td>Displays <code>ddbmsqlrc</code> messages in the quiet mode, that is, the option provides minimal information about the progress of the restore operation including error messages.</td>
</tr>
<tr>
<td>-k</td>
<td>Performs checksum before restoring the data from the device.</td>
</tr>
<tr>
<td>-u</td>
<td>Performs checksum and continues the operation even in case of errors.</td>
</tr>
<tr>
<td>-D &lt;debug_level&gt;</td>
<td>Generates detailed logs that you can use to troubleshoot the restore issues. The supported debug levels are 1 through 9.</td>
</tr>
</tbody>
</table>

Path

The path includes one of the following parameters:

- d-path which is `MSSQL` or `MSSQL:<s-path>`, where `s-path` is the database

- i-path which is `MSSQL$<Instance_Name>` or `MSSQL$<Instance_Name>:<s-path>`, where `s-path` is the database

**Note:** Use the `Script` option in the Restore page in the DDBMA GUI to generate the CLI equivalent script that you can use to perform tasks such as automation, and so on.

Performing the redirected restores

When you want to restore a database from a Data Domain device to a different host that is not the source host from which you backed up the database, run a command that is similar to the following command on the target host:

```powershell
ddbmsqlrc.exe -c SERVER1 -f -t "12/24/2013 11:58:52" -S normal -a "NSR_DFA_SI=TRUE" -a "NSR_DFA_SI_USE_DD=TRUE" -a "NSR_DFA_SI_DD_HOST=DDHost" -a "NSR_DFA_SI_DD_USER=BoostUser1" -a "NSR_DFA_SIDEVICE_PATH=/StorageUnit1" -d "MSSQL$MSSQL2:DB1" "MSSQL$MSSQL1:DB1"
```

where:

- `SERVER1` is name of the host from which you backed up the database
- `12/24/2013 11:58:52` is the point-in-time to restore which is optional
- `normal` is the type of the restore which is optional
- **/StorageUnit1** is the name of the storage unit from which you backed up the database
- **MSSQL2** and **DB1** in **MSSQL$MSSQL2:DB1** are the names of the SQL instance and the database respectively on the target host to which you want to restore the database
- **MSSQL1** and **DB1** in **MSSQL$MSSQL1:DB1** are the names of the SQL instance and the database respectively that you backed up from the source host

**Note:** To customize and use the redirected restore command syntax as required, use the necessary key options and additional options that “Using command line interface” on page 56 describes.

Alternatively, use the **Script** option in the **Restore** page in the DDBMA GUI to generate the CLI equivalent script on the actual host, modify the script according to the new host requirements, and run the script on the new host to perform the redirected restores.

**Note:** Use the same Data Domain device and DD Boost username that you used to back up the database to perform a redirected restore.
APPENDIX A
Deleting the DDBMA for SQL Server Expired Backups

This appendix includes the following sections:

- Prerequisites ........................................................................................................... 60
- Deleting the expired backups by using the expiry tool ............................................. 60
Prerequisites

Ensure that you meet the following prerequisites before you use the expiry tool to delete the DDBMA for SQL Server expired backups:

- You have maintained a log of the full and incremental backups that you performed.
  You have manually checked whether the expired backup that you want to delete has dependent non-expired backups. You must not delete an expired backup if the backup has dependent non-expired backups. The expiry tool does not check for the dependent backups.

- You have performed the following steps:

     
     For example, create the C:\ddconfig.cfg file with the following contents:
     
     ```
     DEVICE_PATH=/artitest
     DDBOOST_USER=ost
     DEVICE_HOST=10.31.192.10
     ```
     
     **Note:** Specify either the same hostname or the same IP address that you specified in the DataDomain Server field when you added or configured the Data Domain server, for the DEVICE_HOST variable.

     ```
     CLIENT=MW2K8X64SQL2.nmmdev.com
     DEBUG_LEVEL=0
     ```

  2. Create the lockbox folder in the C:\Program Files\EMC DD Boost Modules\DDBMA\config folder.

  3. Copy all the files from the config folder to the lockbox folder.

Deleting the expired backups by using the expiry tool

The following procedure enables you to delete the given save time from the backup history. The procedure does not check for the dependencies of the backup for deletion.

Perform the following steps to delete a backup, that is, a save set by using the expiry tool:

1. Run the following command to view backups:

   ```
   ddbmexptool [-v -c -b <start_time> -e <end_time> -a <saveset_name>] -n <application_id> -z <config_file_path>
   ```

   **Note:** If you do not specify the -b and -e options, the command displays all the expired backups.

2. Run the following command to delete the expired backups:

   ```
   ddbmexptool -r [-v -b <start_time> -e <end_time> -a <saveset_name>] -n <application_id> -z <config_file_path>
   ```
Deleting the expired backups by using the expiry tool

Note: If you do not specify the -b and -e options, the command deletes all the expired backups.

where:

◆ -v prints the verbose output on the console
◆ -c cleans up the corrupted or invalid catalogue information
◆ -r deletes the expired savesets
◆ -z specifies the configuration file path
◆ -n specifies the application type

Note: For SQL Server, application_id must be mssql.

◆ -b specifies the lower boundary of the expiry time of the save set
  If you do not specify the option, the command considers 1/1/1970 as the lower boundary.
◆ -e specifies the upper boundary of the expiry time of the save set
  If you do not specify the option, the command considers the current time as the upper boundary.
◆ -a specifies a filter on the save set name for display and deletes both.

Note: You must specify the time in the Hr (24 hour format):Min:Sec Month DD, YYYY format.
Deleting the DDBMA for SQL Server Expired Backups