EMC® Open Migrator/LM for Windows
Version 3.12

PRODUCT GUIDE
P/N 300-001-081
REV A07

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As part of its effort to continuously improve and enhance the performance and capabilities of the EMC product line, EMC periodically releases new versions of the EMC Open Migrator/LM for Windows software. Therefore, some functions described in this document may not be supported by all revisions of the software or hardware currently in use. For the most up-to-date information on product features, refer to your product release notes.

If an EMC Open Migrator/LM for Windows feature does not function properly or does not function as described in this document, please contact the EMC Customer Support Center for assistance.

Audience This document describes the functionality and use of EMC Open Migrator/LM for Windows version 3.12.

This document is intended for system administrators who are tasked with a large data migration effort where system availability and data integrity is critical. Prerequisite knowledge includes familiarity with your Window server operating environment.

Related Documentation Related documents include:

◆ *EMC Open Migrator/LM for Windows Release Notes*

◆ *EMC TimeFinder/Integration Modules Product Guide*

Conventions used in this document

EMC uses the following conventions for special notices.

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

⚠️ **CAUTION**

A caution contains information essential to avoid data loss or damage to the system or equipment. The caution may apply to hardware or software.

Typographical conventions

EMC uses the following type style conventions in this document:

Normal	Used in running (nonprocedural) text for: • Names of interface elements (such as names of windows, dialog boxes, buttons, fields, and menus) • Names of resources, attributes, pools, Boolean expressions, buttons, DQL statements, keywords, clauses, environment variables, filenames, functions, utilities • URLs, pathnames, filenames, directory names, computer names, links, groups, service keys, file systems, notifications
Bold:	Used in running (nonprocedural) text for: • Names of commands, daemons, options, programs, processes, services, applications, utilities, kernels, notifications, system call, man pages Used in procedures for: • Names of interface elements (such as names of windows, dialog boxes, buttons, fields, and menus) • What user specifically selects, clicks, presses, or types
Italic:	Used in all text (including procedures) for: • Full titles of publications referenced in text • Emphasis (for example a new term) • Variables
`Courier:`	Used for: • System output, such as an error message or script • URLs, complete paths, filenames, prompts, and syntax when shown outside of running text.
`Courier bold:`	Used for: • Specific user input (such as commands)
`Courier italic:`	Used in procedures for: • Variables on command line • User input variables

< >	Angle brackets enclose parameter or variable values supplied by the user
[ ]	Square brackets enclose optional values
|	Vertical bar indicates alternate selections - the bar means "or"
{ }	Braces indicate content that you must specify (that is, 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 for information about EMC products, licensing, and service, go to the EMC Powerlink website (registration required) at:

http://Powerlink.EMC.com

Technical support — For technical support, go to EMC Customer Service on Powerlink. To open a service request through Powerlink, you must have a valid support agreement. Please contact your EMC sales representative for details about obtaining a valid support agreement or to answer any questions about your account.

Your comments

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

techpub_comments@EMC.com

1

Product overview

This chapter provides a functional overview of EMC Open Migrator/LM for Windows, describes the data migration process, and introduces the graphical user interface (GUI).

Overview

EMC® Open Migrator/LM for Windows provides online data migration for high availability data centers. Open Migrator/LM operates at the filter-driver level to manage and move Windows data from a source to a target volume with minimal disruption to the server or applications. Open Migrator/LM requires one potential restart of the server to install the application.

Note: This product was previously called the EMC Data Relocation Utility (DRU).

Note: The name EMC Open Migrator/LM as used throughout this guide refers only to the Windows operating system version of this software product. For information on EMC Open Migrator/LM for a UNIX or Linux operating system environment, refer to the *EMC Open Migrator/LM for UNIX and Linux CLI Product Guide*.

Open Migrator/LM supports a maximum of 10 concurrent migrations while allowing full read and write access to the source volume. It does this by performing a byte-by-byte copy of the source volume to the target volume in a granularity based on the size of a track on the source volume. During and after migration, Open Migrator/LM captures all I/O to the source volume and writes it to both the source and the target volumes. Open Migrator/LM synchronizes the source volume and target volume until the final reboot or when you select "Complete migration…" by filtering I/O requests to the volume manager (FTDisk or LDM).

After the source and target volumes are synchronized, you can choose to verify the migration operation. To verify, the software checks to make sure that the source and target volumes are identical at the physical level.

After you have completed data movement for all volumes, the migrations in a standalone environment (not clustered) can either be completed by a reboot of the server, or selecting "Complete migration" for every migration from the OM GUI. The migrations of

clustered disks can only be completed by selecting "Complete migration" .

Note: You can decide when to schedule the required brief outage or "Complete migration…" to complete the migrations.

Note: Before selecting "Complete migration", all the applications or services, which are accessing the source volume, must be closed by the user.

Open Migrator/LM uses a client/server model where the server is installed on the system hosting the volumes to be migrated. The source and target volumes *must* be on the same system. The client can run locally on the server or be located anywhere in the network, on any system in the same domain or in a trusted domain. Volumes are not migrated across the network.

Requirements and considerations

Open Migrator/LM software is based on the functionality and features of associated hardware and software in an EMC Enterprise Storage environment managed in a Microsoft Windows environment.

Requirements

The requirements for EMC Open Migrator/LM are:

◆ You must have the minimum operating environment of one of the following:

- Windows Server 2003

- Windows Server 2008, 2008 R2

- Hyper-V Server 2008, 2008 R2

Note: Both x86 and x64 Editions of the above Windows platforms are supported.

Note: For detailed information on supported Windows operating systems and the available Service Packs, refer to EMC Open Migrator/LM in the E-Lab™ Interoperability Navigator at http://Powerlink.EMC.com. Accessed from the Powerlink home page, mouse over the **Support** > **Interoperability** > **E-Lab Interoperability Navigator**, and click **Launch E-Lab Interoperability Navigator**.

◆ The connection can be to any storage platform and can be direct, through the Enterprise Storage Network, or on the SAN, operating over SCSI or Fibre Channel.

◆ Open Migrator/LM has no dependencies on the versions of the EMC Enginuity™ operating environment.

◆ Open Migrator/LM has no dependencies on CLARiiON® Navisphere® software.

◆ If you plan to use Open Migrator/LM with EMC PowerPath®, PowerPath must be at version 3.0.2 or later.

Considerations

Note the following considerations for Open Migrator/LM:

◆ Both source and target volumes remain synchronized until the the migration is completed.

◆ Windows NT file system (NTFS) can be migrated from smaller to larger volumes, or between equal-sized volumes. Open Migrator/LM adjusts the NTFS file systems automatically for the target volumes.

◆ Open Migrator/LM does not support migration of FAT and FAT32 file systems.

◆ Data migration for Microsoft Cluster Servers (MSCS) is supported. Open Migrator/LM can only be installed on a single node of a cluster.

◆ Open Migrator/LM cannot be used with the following:

  • Microsoft Terminal Server

  • EMC Celerra® systems

◆ Open Migrator/LM does not support boot or system volume migration.

Open Migrator/LM functions

Open Migrator/LM allows you to perform various types of data migration operations.

Concurrent migrations

Open Migrator/LM supports concurrent migrations of source and target volumes for up to 10 volume pairs. This is the maximum number of volume pairs you can execute at one time. To adjust the number of concurrent migrations, use the right-click menu on the computer node. The default maximum number of migrations is five.

Remote client migrations

For remote migrations, you can launch, monitor, and verify migrations from the remote system. You can configure the server to allow launch and access privileges to desired security principals that are able to access the server from a remote client. When accessing Open Migrator/LM remotely, you must be logged into a system in the same domain or a trusted domain as the target server. If the client is connecting remotely to an Open Migrator/LM server, and that server is rebooted, the client will hang until it times out (60 seconds). This time-out value is determined by the remote procedure call (RPC) running on the Windows server, not Open Migrator/LM.

Note: For other restrictions and usage details on remote access, refer to "Configuring the service for remote access" on page 71. For information on best practices for remote migration, refer to "Remote migrations" on page 63.

Migration persistence

Open Migrator/LM persists migrations across system reboots. If, in the course of copying data from the source to the target, the system experiences an outage, the software continues the migration from the place it left off prior to the disruption. Open Migrator/LM does not require any user intervention to continue after reboot. The Open Migrator/LM service and filter drivers automatically work together to complete the migration once the operating system (OS) loads and the respective disks become available to the system. The number of migrations in process does not affect the software's ability to persist after system failure.

Note: This functionality is not available if you access the **Last known good configuration** boot option. This functionality is also not available if migrating data using the sparse copy option.

Migration persistence with MSCS

Migration persistence across reboot is not guaranteed for cluster migrations.

It highly recommended to keep all the cluster nodes up during MSCS migration. MSCS provides fail-over capability. When other cluster nodes are running while data is being migrated and the system is disrupted or restarted, migrations will fail immediately, and all participating devices are automatically failed-over to their designated nodes.

Note: Do not reboot the migrating node before all cluster migrations are manually completed.

Open Migrator/LM must maintain exclusive control over all devices involved throughout the duration of the migration. Migrations will fail immediately when any migrating disks (source or target) are no longer online.

Target volume file system extension

Open Migrator/LM migrates NTFS data from a source volume to a destination volume that is the same size or larger. When the migration completes, the software expands the file system on the target volume to match the size of the new volume.

Data migration to a different volume type

Open Migrator/LM supports migration of both basic and dynamic disks, as well as any fault-tolerant type. Source and destination volumes can be of dissimilar types and fault-tolerance levels. For example, Open Migrator/LM allows migration from a basic to a dynamic disk or from a striped disk to a spanned disk.

Mount point migration

When you reboot to complete the migration (at system boot time), the software's filter driver transfers the source volume's drive letter to the target volume. At system startup time, the Open Migrator/LM Service maps the mount points previously associated with the source volume to the target volume.

To ensure that all mount points are properly reassigned from the source volume to the target volume before users access them, you must add the Open Migrator/LM Service to the DependOnService list of any Windows Services using the source's mount points. For example, if the source volume has a mount point that is shared out, you must make the Lanmanager Service dependent on the Open Migrator/LM Service before this volume is migrated.

Note: The above operation is not needed if the migration is completed manually by selecting "Complete migration". All mount points are moved to the target volume during the completing process.

Note: For more information on best practices for mount point migration, refer to "Mount point migrations" on page 62.

Data synchronization

Open Migrator/LM's data synchronization provides high availability during data migration operations. While a migration is in progress, the source volume remains fully available for both reads and writes. The software captures all writes to the source and copies them to the target during the migration process.

Data migration to a different volume size

Open Migrator/LM can migrate data from a source volume residing on a Symmetrix® hypervolume, metavolume, or CLARiiON storage array to a hypervolume or metavolume of a different size.

As an example, to grow a metavolume from 50 GB to 100 GB without Open Migrator/LM, you would create a 50 GB volume set in Windows 2003 Disk Management and concatenate an additional 50 GB to the first metavolume. However, after doing this operation, you would have to restart the Windows 2003 server. Windows 2003 will not start until the volume is rebuilt. For a large volume set, this could translate into an extended outage.

With Open Migrator/LM, you can migrate from a 50 GB to a 100 GB metavolume and plan when you want to complete the migration.

Microsoft Windows Cluster Server migration

Data can be migrated in Microsoft Cluster Server (MSCS) environments. Volumes within a cluster group can be viewed from the Open Migrator/LM client and migrated to cluster-capable and available volumes. Open Migrator/LM must be installed on only one cluster node, preferably the primary node or group node owner of the volumes to be migrated. The clustered volumes must be assigned a single drive letter or mount point. Multiple mount points are not supported. Only disks with a single partition and volume can be migrated. The selected target volumes for MSCS migrations must be available to all nodes in the cluster and cannot be a cluster resource.

Note: Open Migrator/LM does not support migrating Veritas dynamic disks within an MSCS environment.

Data migration using sparse copy

The Open Migrator/LM sparse copy option allows you to migrate only those block clusters of data that are marked as used by NTFS. The sparse copy option is selectable from the *Select Target Volume Dialog Box*.

Specific files

Open Migrator/LM sessions are supported by log and debug files to examine and troubleshoot data migration activities.

You must choose the path for the log and debug files at installation time. Once you select the log filepath, you cannot change the path. The default path displayed in the install dialog box is the system root.

Log file   Open Migrator/LM creates two log files for each migration on the system on which the Service is installed, in the path you choose at installation time. The form of the log filenames are `SourcevolumeGUID.txt` and `TargetvolumeGUID.txt`, where the text `SourcevolumeGUID` is replaced by the source volume's actual GUID, and the text `TargetvolumeGUID` is replaced by the target volume's actual GUID. The migration log files and debug file are created in the same location.

The log file records all the volume properties (both visible and hidden) that display in the right pane of the GUI for the volume node for both the source and target volume. The log file contains information concerning each migration, such as the start and completion time of the migration and verification, whether a verification was scheduled for a pair, and disruption and error information. For example, if the system crashes during a migration, upon reboot, the log file detects the crash and notes the software's success or failure at recovery. The log file also notes if Open Migrator/LM was terminated at the user's request.

Debug file   Open Migrator/LM generates a file used for debugging purposes if a site problem is escalated to EMC Customer Support. As mentioned previously, you must choose a path for the debug file at installation time and you cannot change the path after installation. Migration and debug log files are placed in the same folder. You can choose from four different levels for the debug file: **None**, **Low**, **Medium**, and **High**. At installation, the default level is **Low**. You can modify the level of the debug file from the GUI through the right-click menu on the computer node.

Open Migrator/LM architecture

Open Migrator/LM consists of the following components:

◆ A Windows service

◆ A Microsoft Management Console (MMC) Snap-in user interface

◆ A filter driver

◆ A volume expand utility that expands the original source file system to utilize the entire size of the target volume

The MMC Snap-in user interface is a COM component. The MMC interface provides a graphical presentation of a server's data, captures user input, and displays critical error information.

The filter driver copies data from the source to the target volume, synchronizes I/O from the source to the target volume, and verifies that the target is an identical copy of the source volume.

The volume expand utility expands the target volume's file system to the end of the new target volume and copies the drive letter and mount points.

Data migration process

When a migration request is posted to the Open Migrator/LM driver, the driver spawns a thread to synchronize the target volume with the source volume. The thread reads the source volume track by track and writes to the target volume. The driver synchronizes between migration thread writes and original write requests, as shown in .
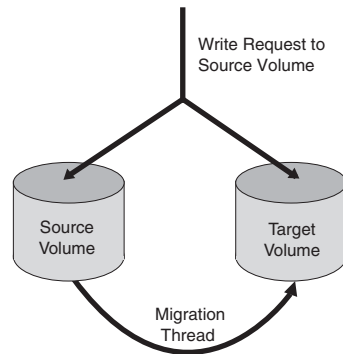
Figure 1   Migration request

After volume migration, the source and target volumes are synchronized until the synchronization is complete or cancelled. Refer to Figure 2.
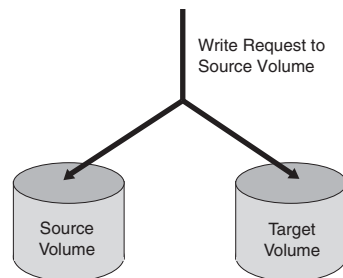
Figure 2   After volume migration

Drive letter assignments

Open Migrator/LM updates drive assignments so that the target volume gets the source volume drive letter(s) and/or mount point(s). The target volume is assigned the drive letter(s) and/or mount point(s) when the migration is completed. During the completing process, the migrated file system extends to the target volume size.

Note: For MSCS migrations, multiple mount points are not supported, and all clustered volumes must be assigned a drive letter or mount point.

Windows Disk Management concepts

This section describes concepts used in the Microsoft Windows Disk Management utility, which is a graphical tool for managing basic and dynamic disks.

Note: For more information, refer to the Windows Disk Management online help. The definitions presented in this section are the definitions used in the Windows Disk Management online help.

Types of disks

Basic Disk — A physical disk that contains primary partitions, extended partitions, or logical drives.

Dynamic Disk — A physical disk that contains dynamic volumes created using Windows Disk Management. Dynamic disks can contain an unlimited number of volumes, so you are not restricted to four volumes per disk. Dynamic disks cannot contain partitions or logical drives, and dynamic disks are not supported on portable computers.

You should use dynamic disks if you want to use more than four volumes per disk, create fault-tolerant volumes such as RAID 5 and mirrored volumes, or extend volumes onto one or more disks.

Types of volumes

Basic volume — A volume on a basic disk. Basic volumes include primary partitions, extended partitions, and logical drives.

Dynamic volume — A logical volume that is created using Disk Management. Dynamic volumes include simple, spanned, striped, mirrored, and RAID 5. You must create dynamic volumes on dynamic disks.

Simple volume — A volume made up of disk space from a single disk. It can consist of a single region on a disk or multiple regions of the same disk that are linked together. You can extend a simple volume within the same disk or onto additional disks. If you extend a simple volume across multiple disks, it becomes a spanned volume. Simple volumes are not fault-tolerant, but can be mirrored.

Extended volume — A portion of a basic disk that can contain logical drives. Use an extended partition if you want to have more than four volumes on your basic disk. Only one of the four partitions allowed per physical disk can be an extended partition, and no primary partition needs to be present to create an extended partition. Extended partitions can be created only on basic disks.

Spanned volume — A volume consisting of disk space on more than one physical disk. You can add more space to a spanned volume by extending it at any time. You can create spanned volumes only on dynamic disks. Spanned volumes are not fault-tolerant and cannot be mirrored.

Striped volume — A volume that stores data in stripes on two or more physical disks. Data in a striped volume is allocated alternately and evenly (in stripes) to these disks. Striped volumes offer the best performance of all volumes available in the Windows operating system, but they do not provide fault tolerance. If a disk in a striped volume fails, the data in the entire volume is lost. You can create striped volumes only on dynamic disks.

Mirrored volume — A fault-tolerant volume that duplicates data on two physical disks. It provides data redundancy by using a copy (mirror) of the volume to duplicate the information contained on the volume. The mirror is always located on a different disk. If one of the physical disks fails, the data on the failed disk becomes unavailable, but the system continues to operate using the unaffected disk.

A mirrored volume is slower than a RAID 5 volume in read operations but faster in write operations. You can create mirrored volumes only on dynamic disks.

RAID 5 volume — A fault-tolerant volume with data and parity striped intermittently across three or more physical disks. Parity is a calculated value that is used to reconstruct data after a failure. If a portion of a physical disk fails, you can re-create the data that was on the failed portion from the remaining data and parity. You can create RAID 5 volumes only on dynamic disks, and you cannot mirror or extend RAID 5 volumes.

Other related concepts

Fault tolerance — The ability of a computer or operating system to ensure data integrity when hardware failures occur. In Disk Management, mirrored volumes and RAID 5 volumes are fault-tolerant.

NTFS — The Windows NT file system is an advanced file system designed for use specifically within the Windows operating system. It supports file system recovery, extremely large storage media, long filenames, and various features for the POSIX subsystem. It also supports object-oriented applications by treating all files as objects with user-defined and system-defined attributes.

Logical drive — A volume you create within an extended partition on a basic disk. A logical drive can be formatted and assigned a drive letter. Only basic disks can contain logical drives, and a logical drive cannot span multiple disks.

RAID — A method used to standardize and categorize fault-tolerant disk systems. Six levels gauge various mixes of performance, reliability, and cost. The Windows operating system provides three of the RAID levels: Level 0 (striping), Level 1 (mirroring), and Level 5 (RAID 5). Redundant array of independent disks is also called RAID.

MSCS — Microsoft Cluster Servers are a group of two or more servers organized to work together to provide high availability, reliability, and scalability of software applications and data. Organizing servers in a cluster configuration provides failover support through network and component load balancing.

Windows Disk Management and Open Migrator/LM

In Disk Management, *Disk n* corresponds to *Disk n* in the Open Migrator/LM graphical user interface (GUI). Figure 3 presents a side-by-side comparison of the disk information displayed in the Disk Management Console and in the Open Migrator/LM GUI. As shown in the figure, the disk information shown in Disk Management for Disks 0 through 24 corresponds to the information shown in the Open Migrator/LM GUI.

Disk information in the Open Migrator/LM GUI is obtained by double-clicking the **Physical Disks** icon in the left pane of the GUI; the corresponding disk information displays in the right pane of the GUI.

Note: For more information on the data that Open Migrator/LM presents for each disk, refer to "Disk node" on page 43.
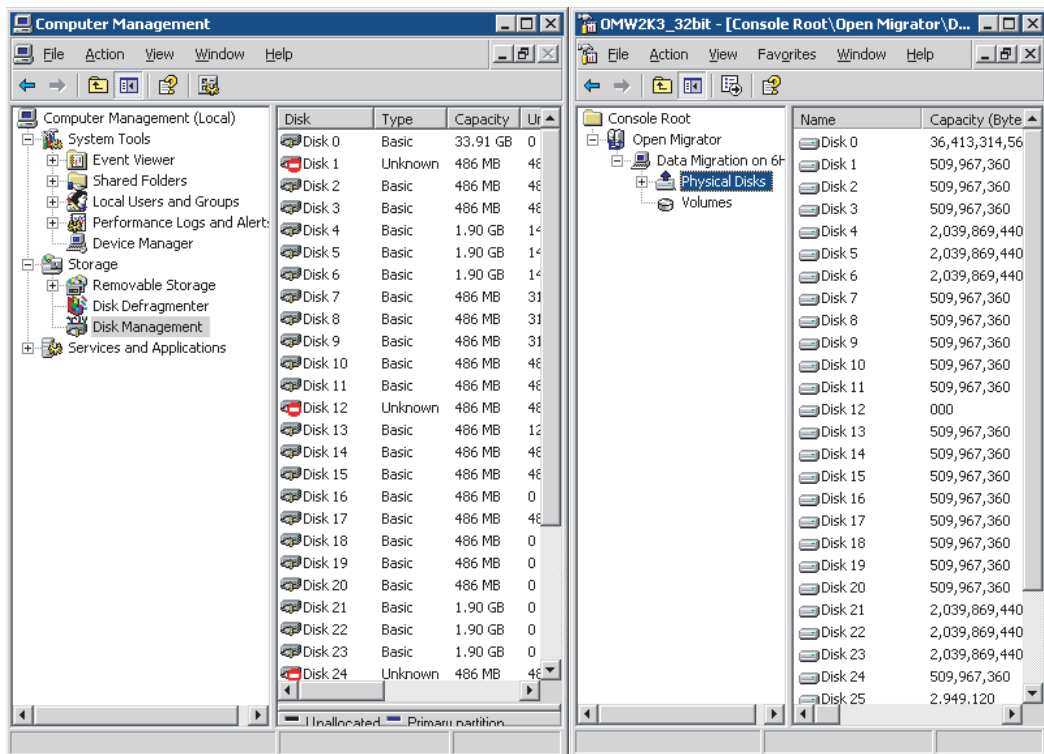
Figure 3   Comparing disk information

Figure 4 presents a side-by-side comparison of the volume information displayed in the Disk Management Console and the Open Migrator/LM GUI. Open Migrator/LM indicates simple, extended, mirrored, spanned, striped, and RAID 5 volumes with the default colors used by Disk Management.

As stated previously, in Disk Management, *Disk n* corresponds to *Disk n* in the Open Migrator/LM GUI. As an example, Figure 4 shows that the first partitions of Disk 7 and Disk 8 in Disk Management are part of a dynamic striped volume that has the drive letter J: assigned to it. The right pane of the GUI shows that the volume J: is a dynamic striped volume that consists of two partitions: `\Disk7\Extent1` and `\Disk8\Extent1`.
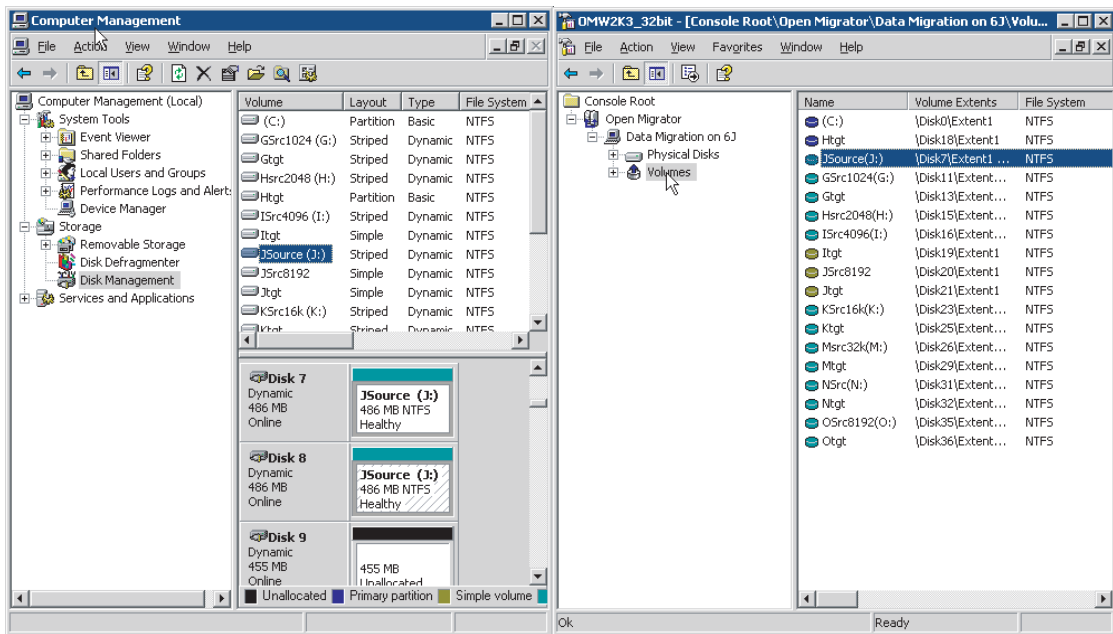
Figure 4   **Comparing volume information**

Volume information in the Open Migrator/LM GUI is obtained by double-clicking the **Volumes** icon in the left pane of the GUI; the volume icons and corresponding volume information display in the right pane of the GUI.

Note: For more information on the data that the Open Migrator/LM presents for each volume, refer to "Volume node" on page 45.

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Installation

This chapter describes how to install the EMC Open Migrator/LM software.

Before you begin

Before you run the installation program, be sure to do the following:

❑ Review the requirements listed in Chapter 1, "Product overview," and in the *EMC Open Migrator/LM for Windows Release Notes*.

❑ Verify that you have administrative privileges, as they are required to install and run the Open Migrator/LM client and server software.

❑ Un-install earlier versions of the software (if applicable), according to the instructions later on this page.

> **Note:** Do not update Open Migrator/LM software over any previously installed versions. Please un-install the older versions first.

❑ Review "Installation options" on page 27.

❑ Install the software according to the instructions in the "Installing the Open Migrator/LM" on page 29.

❑ If installing Open Migrator/LM in a Microsoft Server Cluster (MSCS) environment, be sure to install the software on only one node of the cluster node set.

❑ When installing Open Migrator/LM on Windows Server 2008 systems, you must run the installation with the **Run as an administrator** option for the software to install successfully.

❑ If installing Open Migrator/LM in a Microsoft Server Cluster environment, the cluster service must be running in the migrating node.

Un-installing earlier versions of the software

This version of Open Migrator/LM cannot be installed over earlier versions. If the installation program detects that an earlier version of the software is on the system, it will prompt you to remove it, and abort the installation.

To uninstall an earlier version of the software, use **Add/Remove Programs** in the Windows **Control Panel**.

> **Note:** If the driver from the previous version was attached to any volumes, a reboot is necessary to complete the uninstall.

> **Note:** Before uninstalling Open Migrator/LM in Windows Server 2008 or 2008 R2 environment, Open Migrator/LM service must be stopped by user.

> **Note:** In Hyper-V Server 2008 or 2008 R2 environment, there is no Windows Control Panel. Please run the installation program of the same version to remove it.

Installation options

The software installation performs the routine tasks common to most Windows installation programs. It allows you to set a destination folder for the program components, creates and populates those folders with the requisite files, and writes to the necessary registry keys.

The software installation performs the COM registration for `OMProperties.dll`, `OMClient.dll`, and `EmcOMSrv.exe`.

There are two installation options for the Open Migrator/LM:

◆ **Client package** — Installs the user interface elements and allows you to access a remote system to launch, monitor, and manage migrations on that system.

   The client install places a shortcut to the GUI and help files in the Windows **Start** menu at **Programs**, **EMC Open Migrator/LM**.

◆ **Server package** — Installs the Open Migrator/LM Service, the filter driver, the volume expand utility, and associated `dlls`. This package allows you to launch, monitor, and manage migrations on the local server and on remote servers, which have the Open Migrator/LM server software installed.

   When installing the server package, the install program prompts for a path to place the debug and migration log files.

   Additionally, the server install automatically installs the filter driver. However, it does not attach the filter to any volumes.

> **Note:** Installing both the client and server packages allows you to perform migrations on the local system and on remote systems, which have the Open Migrator/LM server software installed.

Setting access permissions

Open Migrator/LM host access permissions can be configured in the `dcomcnfg.exe` file for both locally and remotely attached hosts.

Security principals and specific user permissions can be set in the `dcomcnfg.exe` file. The system sometimes automatically grants access and launch permission to the principal that installs the Open Migrator/LM **Server Package** option and the **Interactive** user. The **Interactive** user should never have access or launch permission. The security privileges of the user who installed the software should be removed unless you want that account to have access to the Open Migrator/LM server.

For instructions on how to set permissions for a Windows client, refer to "Configuring the service for remote access" on page 71.

Installing the Open Migrator/LM

Perform the following steps to install the Open Migrator/LM:

1. Log on as host system administrator.

2. Insert the Open Migrator/LM CD in the CD-ROM drive. If autorun is enabled, the installation script starts automatically.

   If autorun is not enabled, run one of the following programs as applicable to your operating system environment:

   • If installing on 32-bit Windows run
     `<CD-ROM drive>:\WIN32\setup.exe`

   • If installing on Windows Server 2003/2008 x64 Editions run
     `<CD-ROM drive>:\X64_32\setup.exe`

   The **Welcome** dialog box opens.

   Note: When installing Open Migrator/LM on Windows Server 2008 or 2008 R2 systems, you must run the installation with the **Run as an administrator** option for the software to be installed successfully.

3. Click **Next**.

   The **Choose Destination Location** dialog box opens, prompting for an installation directory.

4. Select an installation directory, and then click **Next**.

   The **Select Features** dialog box opens, allowing you to select the software package(s) to install.

   Select the software package(s), according to the following:

   • **Client Package** — Installs the user interface elements and allows you to access a remote system to launch, monitor, and manage migrations on that system.

   • **Server Package** — Installs the Open Migrator/LM Service, the filter driver, the volume expand utility, and associated dlls. This package allows you to launch, monitor, and manage migrations on the local server and on remote servers, which have the Open Migrator/LM server software installed.

   Note: Installing both the client and server packages allows you to perform migrations on the local system and on a remote system, which has the Open Migrator/LM server software installed.

> **Note:** In MSCS environments, be sure to install the software on only one node of the cluster node set.

5. Click **Next**.

   The **Start Copying Files** dialog box opens, asking you to verify the installation information.

6. Verify the information, and click **Next**.

   The installation program begins copying the files to the specified directory.

   The **Select log filepath** dialog box opens, prompting for a directory to place the debug and migration log files.

   > **Note:** You will NOT be able to change the directory path once the installation is complete.

7. Specify a directory, and click **Next**.

   > **Note: A Security Alert - Driver Installation** pop-up will appear, explaining that the driver software has been properly signed by EMC Corporation. Click **Yes** (for Windows 2003) or **Install** (for Windows 2008 and 2008 R2) to continue installing the driver..

   The Open Migrator/LM installation is complete.

8. Click **Finish**.

3

Using EMC Open Migrator/LM

This chapter describes how to use the Open Migrator/LM software.

The Open Migrator/LM GUI

This section explains the components of the Open Migrator/LM graphical user interface (GUI).

Add/Remove Snap-in

The Open Migrator/LM GUI is a fully compliant MMC Snap-in. The GUI may be accessed from any `.msc` file to which the Open Migrator/LM Console was saved or by running `mmc.exe`. To access Open Migrator/LM from a `.msc` file, double-click the file.

To access Open Migrator/LM from MMC, perform the following steps:

1. From **Console Root**, select **File**, **Add/Remove Snap-in**, which generates an **Add/Remove Snap-in** property sheet.

2. From the **Standalone** tab, click **Add…**, which produces the **Add Standalone Snap-in** dialog box containing all MMC Snap-ins registered with the system, refer to Figure 5.

   Note: On a Windows Server 2003/2008 x64 host, MMC must be launched using the "`mmc /32`" option for the Snap-in to be available for selection.
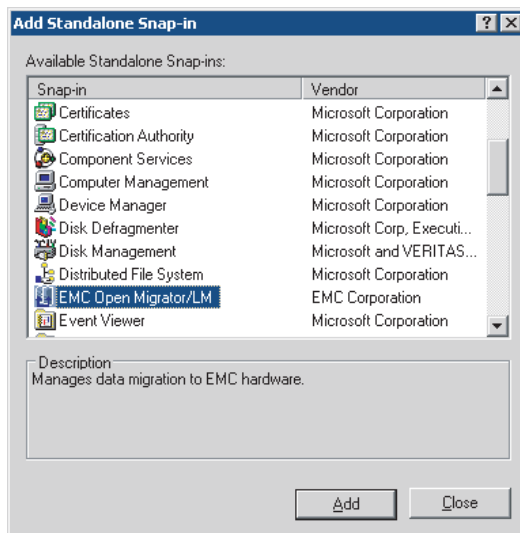
Figure 5   Add Standalone Snap-in dialog box

3. Double-click the **EMC Open Migrator/LM** icon; or with **EMC Open Migrator/LM** highlighted, click **Add** in the dialog box, and then click **OK** on the property sheet. MMC loads the EMC Open Migrator/LM Snap-in to the console.

Snap-in overview

The Open Migrator/LM Snap-in consists of four constant icons in the left pane of the GUI:

- **Open Migrator** (*Static node*)
- **Data Migration On** (*Computer node*)
- **Physical Disks** (*Disk node*)
- **Volumes** (*Volume node*)

These four icons are shown in Figure 6. In Figure 6, the computer node on which the Open Migrator/LM runs is **6J**. The **Physical Disks** icon in the left pane, or the disk node, expands to the number of disks on the system. Each disk similarly expands to the partitions that compose the disk. The **Volumes** icon in the left pane, or the volume node, expands to the number of volumes on the system. Each node is explained in the sections following.
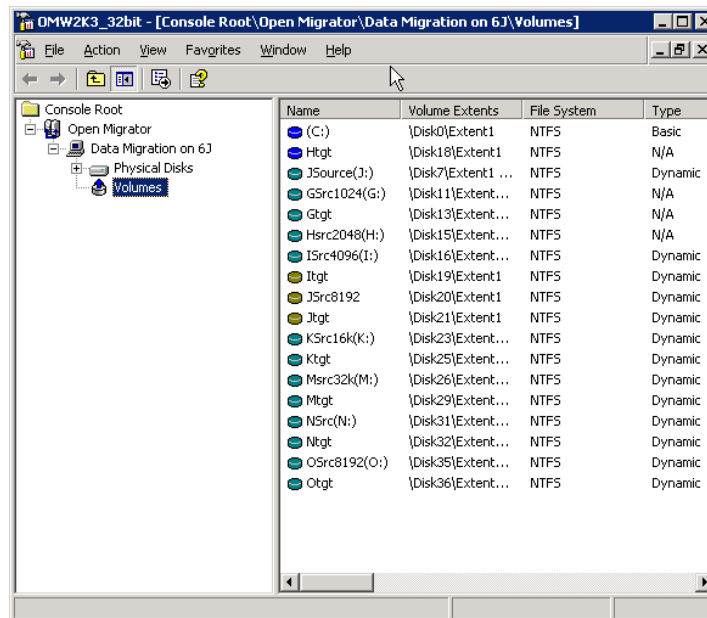
Figure 6   The Open Migrator/LM GUI

You can also customize the right pane by hiding columns or rearranging their order. To change a column in the right pane, click the appropriate component in the left pane, and select **View, Add/Remove Columns** to generate the **Add/Remove Columns** dialog box.

Figure 7 shows the **Add/Remove Columns** dialog box for the **Volumes** component in the left pane.
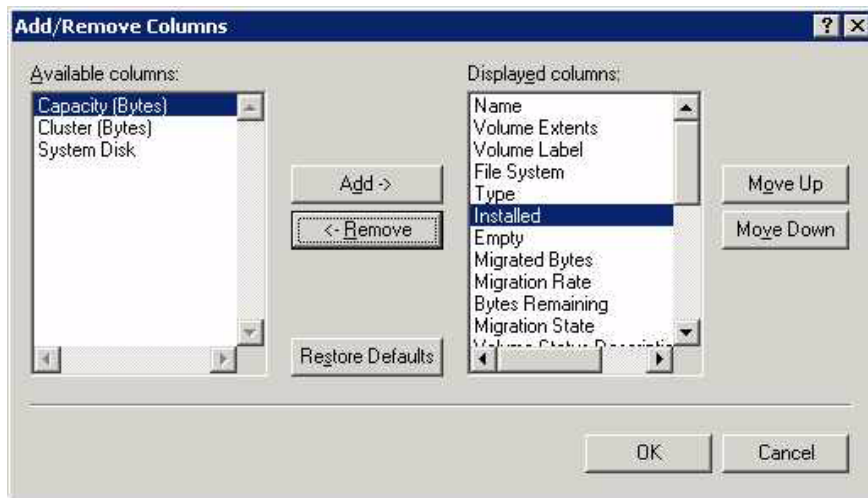
Figure 7   Add/Remove Columns dialog box

Refer to Table 3 on page 45 for a description of the data that is displayed under each column heading.

Open Migrator/LM complies with all other MMC-provided actions, for example **Delete** and **Export List**.

Static node

The static node is the top-level component in the Console Root folder located in the left pane of the Open Migrator/LM Snap-in and is graphically represented by the **Open Migrator/LM** icon. Double-clicking this icon produces left-pane items that display all the servers attached to the console.

By default, no computers display. On first use, you must configure the desired servers to the console. If you save the console and exit the console, all the attached servers are available the next time the console opens.

The **Attach to server…** right-click menu item is available from the static node and is described next.

Attach to server…

You can connect a remote server to the console file via this action. When you select **Attach to server…**, the **Add Server Dialog** box appears, refer to Figure 8.
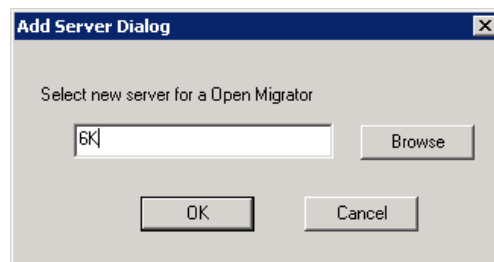
Figure 8   Add server dialog box

You can type the name of the remote server, a remote server's IP address, or click the **Browse** button to locate a target machine on the network. Clicking **Browse** produces the dialog box shown in Figure 9 on page 36.
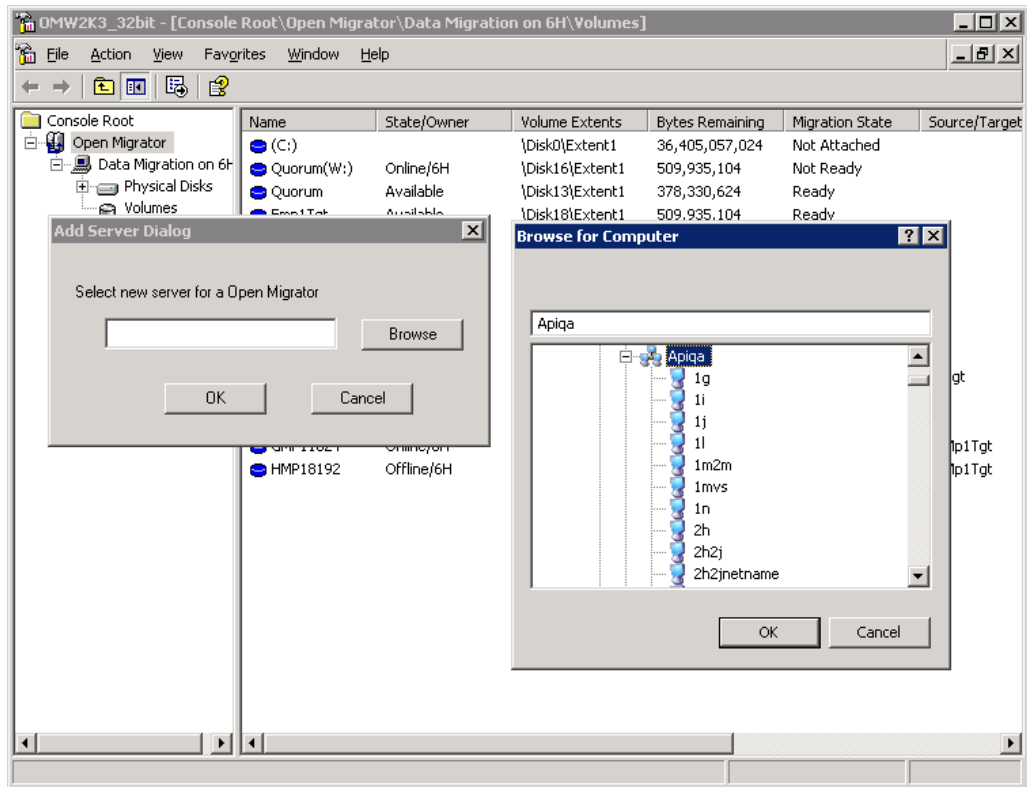
Figure 9   Browse for computer dialog box

You can double-click the desired domain and double-click a server within a domain. The server name appears in the edit box. When you click the **OK** button, the console attempts to attach the server to itself. If the attempt fails, the software reports the error through a dialog box. If the attempt succeeds, the software loads a computer node representing the remote server into the console. Figure 10 shows a console with two attached servers.
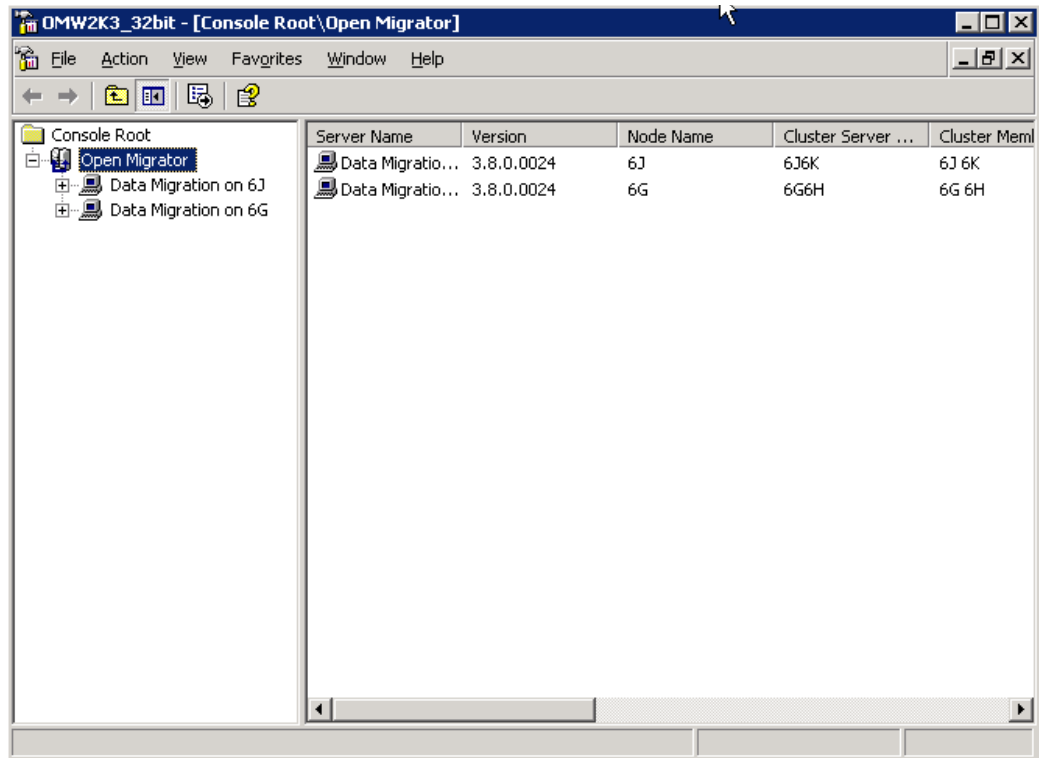
Figure 10   Two servers attached to the Open Migrator/LM console

Computer node

The name of the computer node is the computer's name preceded with **Data Migration on**. For example, in Figure 6 on page 33, the computer node **6J** shows up in the left pane as **Data Migration on 6J**. A server icon designates the computer node, which is accessed by double-clicking the static node (that is the **Open Migrator/LM** icon). All servers attached to the console appear at the same level in the hierarchy presented in the left pane. Selecting the icon in the left pane, displays the properties listed in Table 1 in the right pane.

Table 1   Computer node properties

Computer node property	Definition
# of migrations	The number of migrations currently in progress
Build number	Build number of the Windows OS
Cluster members	The names of all nodes participating in the MSCS cluster
Cluster server name	The name of the MSCS cluster
Debug log file	Path to the debug log file
Log level	Currently selected debug file level
Maximum # of migrations	Currently selected maximum number of migrations
Server name	User-defined name of the host machine
Service pack	Service Pack level of the Windows OS
Version	Version and build number of Open Migrator/LM
Windows version	Version number of the Windows operating system (OS)
Maximum rate bandwidth for migrations	Currently selected maximum migration rate (MB/sec) used for migrations

You can access four right-click menu options through the computer node: **Rescan disks and volumes**, **Max migrations**, **Max migration rate**, and **Display and Debug file level**.

Rescan disks and volumes

The **Rescan disks and volumes** right-click menu option on the computer node enables you to update disks, disk partitions, and volumes to reflect any changes made to the system configuration from the Disk Management Console (refer to Figure 11).

Note: For more information on best practices for this rescan function, refer to "Migration with Windows Volume Manager" on page 61.

Note: Volume names are changed when dismounted and remounted (for example, take the disk offline then bring it back online) in Windows server 2008 or 2008 R2. Please rescan disks and volumes before an OM command is issued.
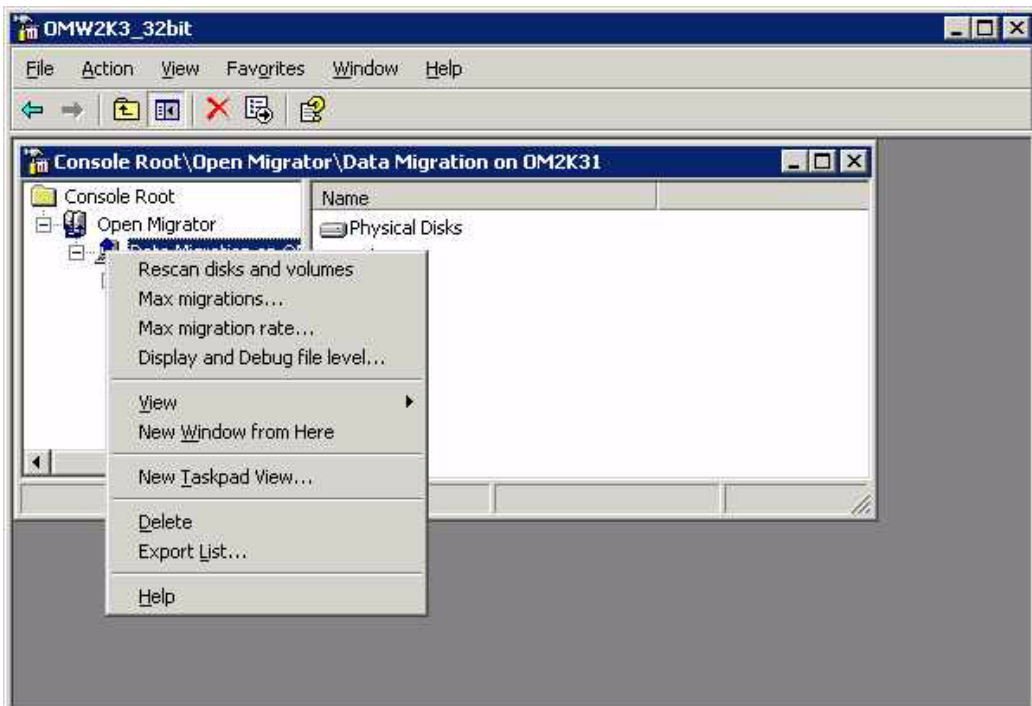
Figure 11   Right-click menu for the computer node

Max migrations…

The **Max migrations…** right-click menu option on the computer node enables you to increase or decrease the number of migrations that Open Migrator/LM runs concurrently. You can set the maximum number of migrations through the dialog box shown in Figure 12. You can use this feature to calibrate the software's performance based on the server's response. Open Migrator/LM migrates a maximum of 10 source/target volume pairs concurrently.
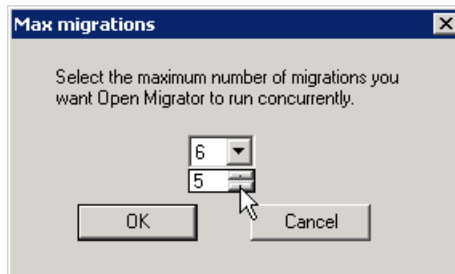
Figure 12   **Setting the maximum number of migrations**

The default maximum number of migrations is 5. If multiple servers are attached to the GUI, you must set the number for each computer separately. If you discover that Open Migrator/LM is not consuming a prohibitive amount of critical resources, you may increase the number of migrations that the software runs concurrently. Conversely, if the number of migrations overloads those resources, you can lower the number of concurrent migrations.

Note: The maximum number of migrations that can be set is 10.

Max migration rate

The **Max migration rate…** right-click menu option on the computer node allows you to set the maximum I/O bandwidth (in megabytes per second) to be used for migrations. Refer to the dialog box shown in Figure 13. This option is used to throttle data transfer operations by keeping the aggregate bandwidth of all migrations currently running at or below the set value. You can use this feature to limit I/O bandwidth in certain production environments that require more bandwidth or are bandwidth sensitive.

Maximum Migration Rate

-1   MB/Sec (-1 = MAX)   OK   Cancel
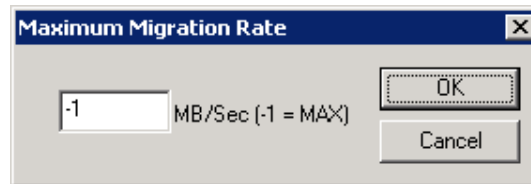
Figure 13   Setting the maximum migration rate

Normal behavior is to use a normal or low priority thread for migrating data in order to limit the impact on applications and resources. The recommended rate level is -1. A value of -1 does not limit the bandwidth. A value of 1 or greater does limit the bandwidth to that number of megabytes per second.

Display and Debug File Level…

The **Display and Debug File Level** right-click menu option on the computer node enables you to change the level of the display and debug file through the Set Display and Debug File Level dialog box shown in Figure 14 on page 42. The default setting is **Low**. If you encounter a problem that needs to be escalated to EMC Customer Support, you can increase the file level so that EMC Customer Support can expediently resolve the issue.

Note: Access to select certain Disk Node and Volume Property information may require that the **Display and Debug File Level** be set to **High**.
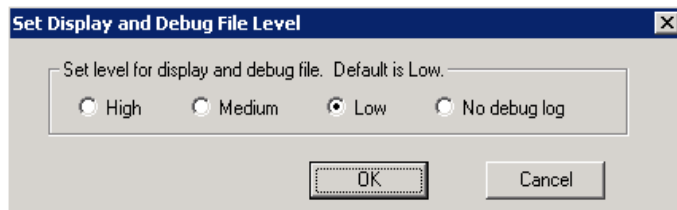
Figure 14   **Setting the display and debug file level**

Disk node

Double-clicking the **Physical Disks** icon in the left pane produces a view of all disks visible to Windows in the right pane. Open Migrator/LM presents relevant data for each disk, including, but not limited to, disk name, type, signature, capacity, number of cylinders, device ID, and serial number (refer to Table 2). Since Open Migrator/LM does not perform any of its functionality on disks, no actions, other than those provided by MMC, appear on the context menu generated by right-clicking a disk in the left or right pane.

Table 2   Disk node properties

Disk property	Definition
Bytes/sector	Number of bytes per sector
Capacity (bytes)	The total size of the disk, in bytes
Cylinders	Number of cylinders on the disk
Device ID	Disk's identification number if available
Disk microcode version	The microcode version of the disk's array
Name	Disk name, matches the Disk Management Snap-in
Product ID	The hardware system on which the disk resides (for example, Symmetrix, CLARiiON)
SCSI port number	Port on which the disk is attached to the host
Sectors/track	Number of sectors per track on the disk
Serial number	Manufacturer-supplied serial number for the disk
DiskID (signature/GUID)	Disk's signature (MBR disk) or GUID (GPT disk)
Tracks/cylinder	Number of tracks per disk cylinder
Type	Basic or dynamic, according to Windows volume manager
Vendor	Manufacturer of the array

Double-clicking on any disk in the left pane generates folder icons for each partition into which the disk is divided, refer to Figure 15 on page 44. The software displays no information beyond the partition name and no actions are available on partitions.

The software presents disk and disk partition data to assist you in properly mapping the physical layout of the system to the logical, or volume, view. This reduces the chance of choosing an improper source or target volume.
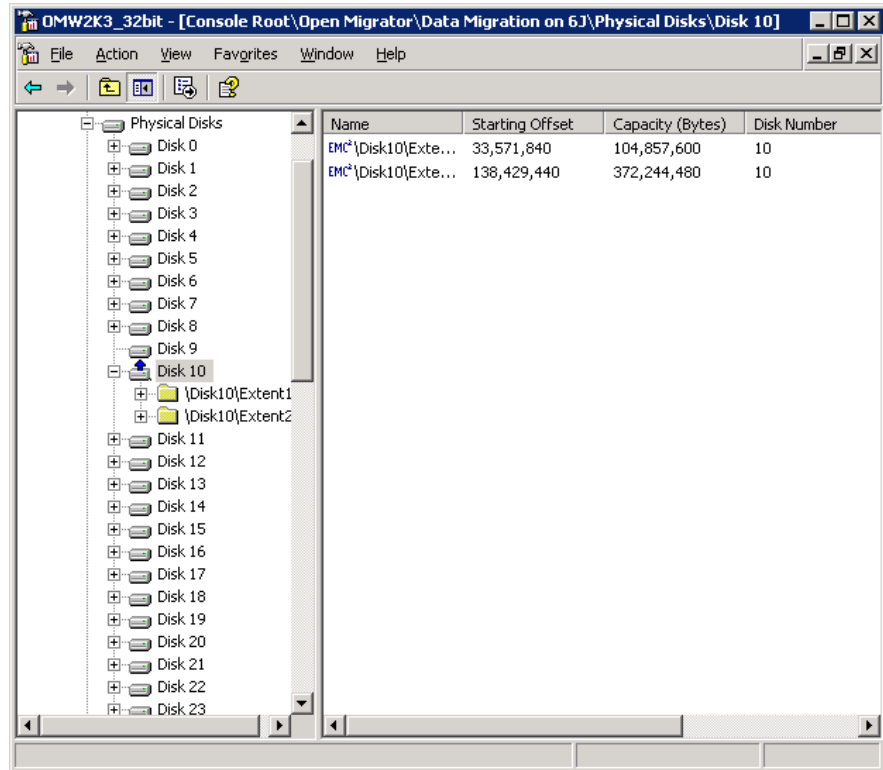
Figure 15   Disk information presented through the physical disks icon

Note: To select grayed-out columns for disk or volume properties, set the **Display and Debug File Level** to **High**.

Volume node

Double-clicking the **Volumes** icon in the left pane produces a view of all volumes visible to the operating system in the right pane. As installed, the software provides relevant data about each volume (refer to the *grayed-out* information in Table 3). You can add additional columns of information, but it may negatively impact your system's performance. A volume's icon color indicates its fault-tolerant level; the software uses the same colors as the Disk Management Snap-in to identify a volume's fault tolerance.

Table 3   **Definition of volume property column headings**

Volume property	Definition
Bytes remaining	Number of bytes remaining to be migrated from a volume.
Capacity (bytes)	Size of the volume in bytes.
Cluster (bytes)	Size of the NTFS cluster in bytes.
Drive letter	Volume's drive letter.
Empty	Whether the volume contains data.
File system	Type of file system resident on the volume.
Installed	Whether the filter driver is installed on the volume.
Log file path	Path for the volume's migration log file.
Migration state	State of the volume with regard to migration.
Mount points	The mount points on the volume.
Name	A name assigned to the volume by Open Migrator/LM.
Source/target	The source (if a volume is a target), or the target (if the volume is a source). A target is prepended with /; a source remains unchanged.
Source/target extents	Identifies source and target in the form by disk extents.
System disk	Whether the disk on which the volume resides is a system disk.
Type	Whether the volume resides on a basic or dynamic disk.
Volume extents	Breakdown of the volume's partitions.
Volume GUID	System-assigned GUID that uniquely identifies the volume.

Table 3 **Definition of volume property column headings (continued)**

Volume property	Definition
Volume name	Name assigned to the volume by the Windows volume manager.
Volume status description	Describes any error that may have occurred during the last operation.
Volume label	Volume's label.
Migrated bytes	Number of bytes migrated.
Migration rate	Current rate of migration.
Migration key	The migration key.
Disk group	Ientified disk group.
Serial number	Identified serial number.
Device name	Name of the device.
OM ID	Open Migrator's identification number.
Volume status	Current status of the volume.
Open handles	Identifies open handles.

Open Migrator/LM provides volume state information in the console's status bar at the bottom of the screen. When you highlight a volume, the left portion of the bottom status bar displays a description of the volume's state (in Figure 16 on page 47, the volume state description is displayed as OK in the bottom-left corner of the screen). In the middle portion of the bottom status bar, Open Migrator/LM displays the migration state. As shown in Figure 16 on page 47, if Open Migrator/LM is in the process of migrating a source volume, the middle portion of the bottom status bar becomes a progress bar that graphically presents the migration's completion percentage.
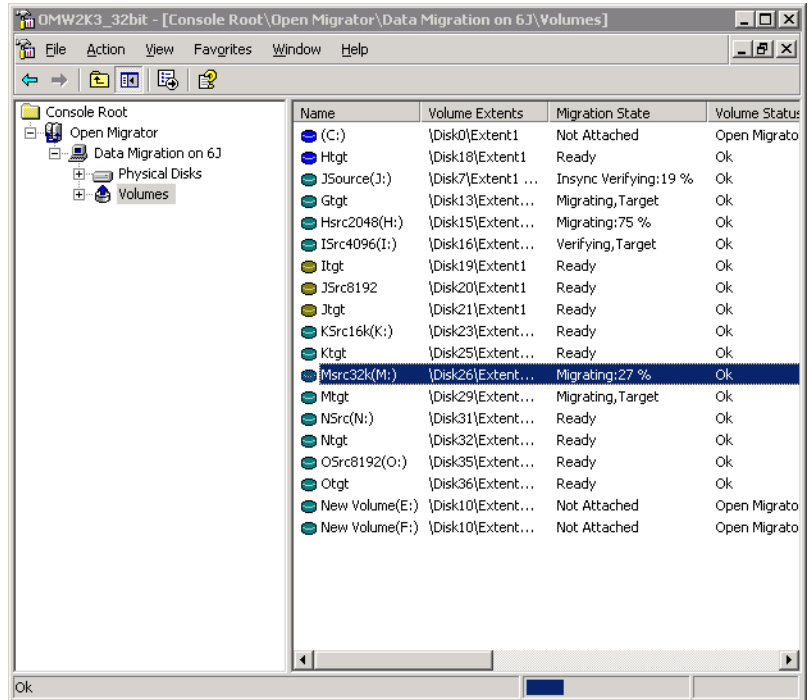
Figure 16   Volume properties of the volume node

Note: To select grayed-out columns for disk or volume properties, set the **Display and Debug File Level** to **High**.

Volume cluster state

Open Migrator/LM provides volume cluster state information for volumes being migrated in an MSCS environment. In Figure 17, the volume cluster state displays under the **State/Owner** column as Available or Online/owner node name. Open Migrator/LM is cluster aware so when an MSCS environment is detected, the **State/Owner** column displays by default.

Figure 17   Volume cluster state/owner

In Figure 17, all volumes displayed as Online/6H belong to a single MSCS cluster.

Open Migrator/LM allows a multitude of actions on volumes. You access the menu by right-clicking any volume in the right pane or by highlighting a volume (produced by left-clicking it) and selecting Action on the console menu. Available menu items are **Attach to volume…**, **Migrate volume…**, **Verify volume…**, **Cancel migration**, **Complete migration…**, and **Detach from volume**. Each of these menu items are described in the following sections.

When you place the mouse over a context menu item, the Open Migrator/LM places text in the left-hand portion of the bottom status bar providing a more detailed explanation of the action.

Open Migrator/LM automatically enables and disables menu items based on the state of a volume. For example, if the filter driver is not attached to a volume, the only action possible on the volume is **Attach to volume**.

Figure 18 shows a volume to which the filter is attached, but no migration has commenced.
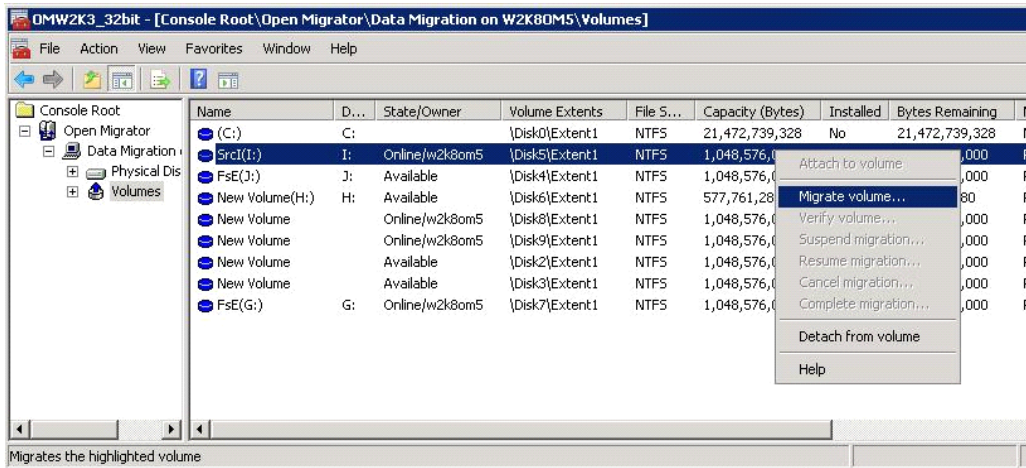
Figure 18   Volume right-click menu with filter attached

Attach to volume

For Open Migrator/LM to migrate a volume, the filter driver must be attached to the source and target. Highlighting a volume and choosing **Attach to volume** causes the software to attach the filter

driver to the specified volume. Depending on the state of the volume, the software may be able to attach the filter without a reboot.

You can first **Rescan disks and volumes** using the right-click menu option to update the volume status. If the filter driver is not attached to all required volumes after the rescan, you must reboot the system.

Note: To minimize system disruption, EMC strongly recommends that you perform a reboot after attaching the filter to all source and target volumes that you plan to use for migrations.

Note: The filter driver can only be attached to NTFS volumes.

Attaching the filter driver to multiple volumes

To attach the filter driver to multiple volumes, right-click the **Volumes** icon in the left pane, and select **Attach multiple volumes**. In the **Attach Multiple Volumes Dialog** box, refer to Figure 19, select the volumes to which you want to attach the filter driver, and then click **OK**.

Note: Press and hold **SHIFT** to select continuous volumes, or press and hold **CTRL** to select non-continuous volumes.

Attach Multiple Volumes Dialog		
Drive Letter	Volume partitions	Capacity (in bytes)
(S:)	\Disk38\Extent1	468808704
(R:)	\Disk40\Extent1	468808704
(Q:)	\Disk42\Extent1	468808704
(P:)	\Disk44\Extent1	468808704
(O:)	\Disk46\Extent1	468808704
(N:)	\Disk48\Extent1	468808704

OK   Cancel
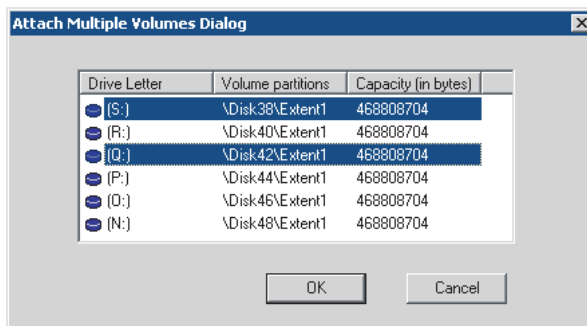
Figure 19   **Attach multiple volumes dialog box**

⚠ **CAUTION**

Should an error occur during the process, it is up to you to confirm to which volumes the filter driver was attached.

Migrate volume…

Selecting the **Migrate volume…** option produces a **Select Target Volume Dialog** box, as shown in Figure 20.

Drive Letter	Volume partitions	Capacity (in bytes)	
⬤	\Disk40\Extent1	3216052224	
⬤ O:	\Disk12\Extent1	4515646464	
⬤ P:	\Disk13\Extent1	4515646464	
⬤	\Disk14\Extent1	4515646464	
⬤ Q:	\Disk15\Extent1	4515646464	

Migration Type

◉ Migration with Verify   ○ Migration Only   ○ Sparse Copy

[OK]   [Cancel]
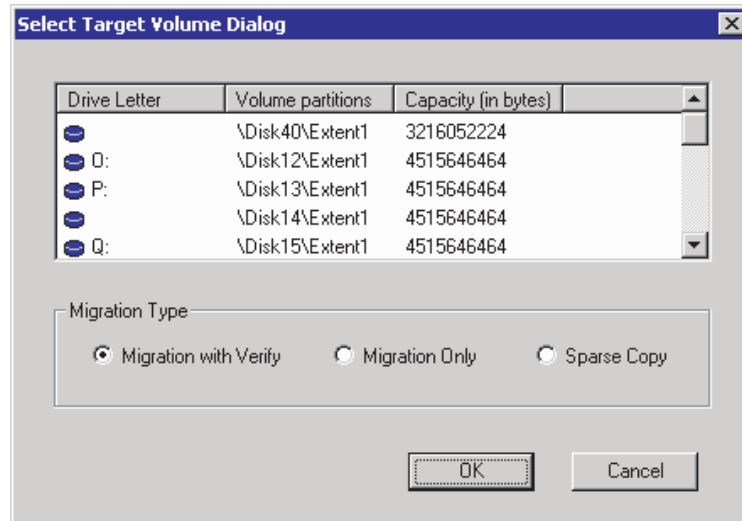
Figure 20   **Select target volume dialog box**

This dialog box displays the **Volume partitions** column to assist you with the identification of volumes that have no drive letter. To ensure selection of the proper target, compare a volume's partition layout against similar data provided in the Disk Management Snap-in.

All eligible targets on the system appear in the dialog box. An eligible target meets the following conditions:

- Its file system is NTFS.
- Its capacity equals or exceeds the source.
- Its composition excludes any system partition.

Note: If a target volume is being directly accessed by another application on your system, Open Migrator/LM may not be able to unmount the volume and the migration may fail. It is recommended that you unmount all target volumes prior to migration.

Note: When migrating MSCS volumes, ensure that you select a target disk that is visible to all nodes in the cluster and not currently a resource of the cluster.

Note: Before migrating 2008 or 2008 R2 MSCS volumes, it's highly recommended to run storage validation tests to make sure the target disks are "Certified for Windows Server 2008" or "Certified for Windows Server 2008 R2".

To select a target, click its row in the dialog box, select the appropriate **Migration Type** checkbox and click **OK**. If **Migration with Verify** is selected in this dialog box, the software performs it immediately after migration completes. If you want to delay verification, select **Migration Only** and begin verification at any time after migration completes from choosing **Verify** from the context menu.

If **Sparse Copy** is selected, only the NTFS formatted blocks containing data (used blocks) are copied to the target. Migrations using the **Sparse Copy** option cannot be verified.

Note: Upon completion of Sparse Copy cluster migrations, Open Migrator/LM does not automatically update the Open Migrator/LM log files after drive swap and expansion. Refer to the debug log file for confirmation that the drive letter has successfully been assigned to the target and the volume has expanded.

If the target volume is not empty, Open Migrator/LM warns you with a dialog box. A confirmation dialog box follows target election. Upon confirmation, the migration begins and the software notifies you of migration status by updating the completion percentage in the **Migration State** column. In addition, a progress bar appears in the middle portion of the console's bottom status bar any time you highlight the source volume in the right pane while the volume is migrating.

Once a migration begins, it continues independent of the state of the GUI. It is not necessary to activate the GUI for the application to copy data. You may close the GUI, and the software performs data migration in the background.

⚠ **CAUTION**

Open Migrator/LM does not support the migration of volumes with Shadow Copies that have been created with the Microsoft Volume Shadow Copy Service (VSS) Software Provider. Before starting the migration, you must disable Microsoft Volume Shadow Copy or any other Shadow Copy software for all the source volumes.

Note: Once a 2008 or 2008 R2 MSCS migration is launched, the target disk will join the cluster to be a cluster disk. It's in the same group with the source disk.

If the target disk is initialized in MBR format, its resource name should be OM Target of XXXX (Sig = 0xYYYY). If the target disk is initialized in GPT format, its resource name should be OM Target of XXXX (GUID = {ZZZZ}). XXXX is the name of the source disk resource, YYYY is the disk signature, and ZZZZ is the disk GUID.

During and after migration, Open Migrator/LM captures I/O to the source and synchronizes the target volume with the source volume. The software continues to capture I/O to the source and copy it to the target until the migration is successfully completed. Once it's completed manually or the final reboot occurs, whether deliberately or otherwise, the synchronization process ceases.

During migration, you can suspend and resume or cancel the migration. Refer to for more information.

Verify volume…

You can choose this option any time after a Migration Only action completes, until the migration is cancelled or the system reboots. Verification compares the source and target at the physical level to ensure they are identical. The software informs you if they are not. In that case, if the migration is still desirable, you must migrate the volumes again.

A volume that completes its migration and is in the synchronization state is eligible for verification. The ability to verify a volume after migration completes provides you greater flexibility in error checking. You may opt to select verification if you expect to perform large amounts of I/O to a source during and after migration. Under this circumstance, verification provides a more accurate error check than if you chose it for completion immediately after migration.

If you click a volume in the process of verification, the middle portion of the bottom status bar becomes a progress bar indicating percentage completion of verification, refer to Figure 21. The **Migration State** column for the volume in the right pane also provides completion percentage status.

Figure 21   **Verifying the synchronization of source and target volumes**
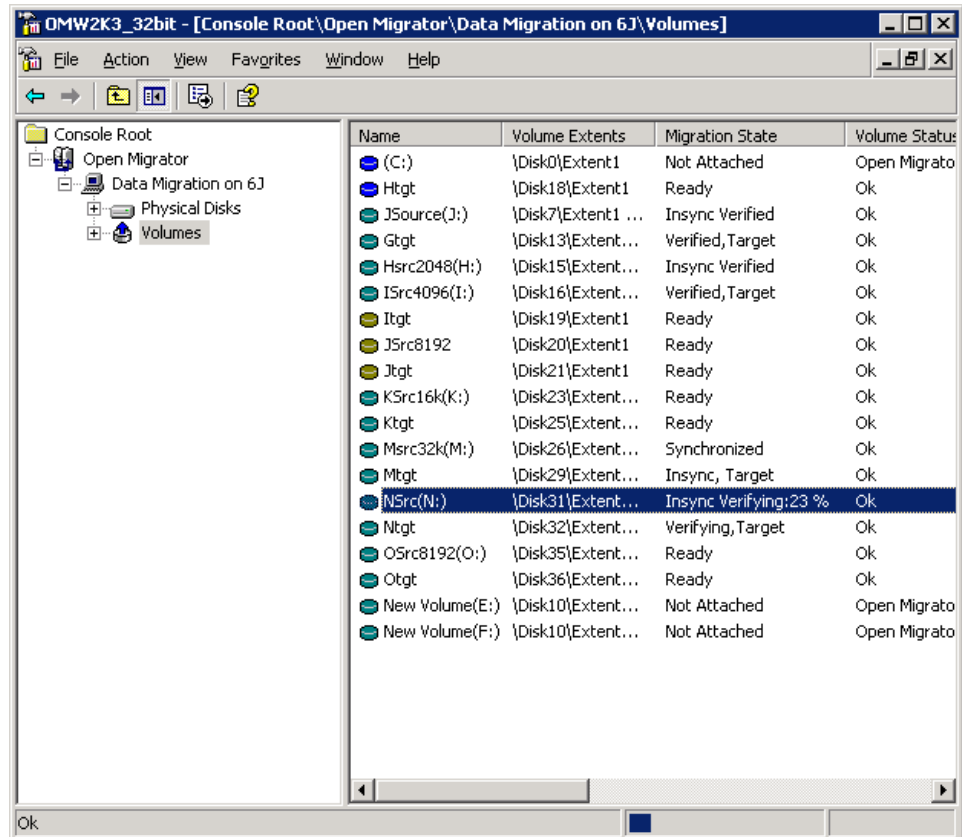
Suspend migration

While a volume is in the process of migrating or verifying, you can select the **Suspend migration** option to temporarily suspend the action. The Open Migrator/LM driver will continue to mirror the data between the source and target volumes while in the suspended state, although the migration or verify process has been stopped. It

may be desirable to use the suspend option to temporarily limit CPU usage or I/O band width during a migration. While in the suspended state, you may select **Resume migration** to continue the migration or **Cancel migration** to cancel the migration. For additional information on canceling a migration, refer to **"Cancel migration"**.

Resume migration

If you select the **Resume migration…** option while a volume is in the suspended state, the migration or verify process that was suspended is resumed from the place where it left off.

Cancel migration

If you select the **Cancel migration** option while a volume is in the process of migrating, verifying, or synchronizing, the **Cancel migration** option will terminate all of these actions. When you select **Cancel migration**, the source's drive letter is not promoted to the target and no expansion of the target's file system occurs, regardless of whether the volume is migrating, verifying, or synchronizing.

Furthermore, canceling a migration does not remove data from the target volume. If you have data on the source that you consider sensitive and you cancel a migration, you should erase the partially migrated data on the target volume.

Note: The target disk of a canceled 2008/2008R2 MSCS migration is automatically removed from the cluster. It is taken offline and must be brought online from the Windows Disk Management GUI before it can be accessed again.

Complete migration

The migration can be manually completed by selecting **Complete migration**. This menu is enabled only if the source volume and target volume are fully synchronized or verified.

When the migration completes, the software moves the source's drive letter, and or mount point(s), to the target, and if necessary expands the file system to match the size of the target.

For a cluster disk migration, the software also copies all the cluster information (resource name, dependency, cluster disk properties, etc.)

of the source disk to the target disk. The source disk is removed from the cluster after the migrations is manually completed. In a 2008/2008 R2 MSCS environment, it is taken offline and must be brought online from Disk Management GUI before it can be accessed again.

Note: Once it's started to complete a 2003 MSCS migration, the target disk will join the cluster to be a cluster disk, which is in the same group with source disk. The resource name should be OM Target of *XXXX* (Sig = 0x*YYYY*). *XXXX* is the name of the source disk resource, *YYYY* is the signature property value of the target disk resource.

Open Migrator/LM locks the source volume to get the exclusive control of the source volume before it starts completing the migration. If it fails to lock it, message boxes pop up to tell you which processes are accessing the source volume.

Note: Microsoft system tools Handle and Process Explorer can be used to find the processes accessing the source.

Note: If the source disk is configured for the clustered File Server service or there are any shared folder in the source disk, Windows System process may hold open handles of the source volume and the migration cannot be completed. Please stop LanManServer service by "Net Stop LanManServer" and try to complete the migration again.

⚠ **CAUTION**

For non-cluster migration, close all the services/applications which are accessing the source volume before selecting Complete migration.

Note: Migrations in a standalone environment (non-MSCS) can also be completed by a final reboot. The final reboot is highly recommended to complete standalone migration because no user operation is required.

⚠ **CAUTION**

For a cluster migration, all the cluster services/applications in the group are taken offline by Open Migrator/LM.

Note: It's highly recommended to offline all the cluster resource (except the migrating cluster disks and the quorum resource) in the migrating group.

Completing a cluster migration is a complicated operation. All nodes in the cluster must be UP during completing cluster migrations.

⚠ **CAUTION**

Do not modify any cluster configuration or change any cluster resource state if there are any cluster migrations being completed.

Do not reboot or shut down any cluster nodes if there are any cluster migrations being completed.

After an MSCS migration completes, the target cluster disk displays under Cluster; the source cluster disk is removed from Cluster. The target cluster disk inherits all the cluster setting of the source cluster disk, including the resource name. For example, the target cluster disk is renamed "Cluster Disk 7" if the source cluster disk was named "Cluster Disk 7."

Detach from volume

Selection of this option removes the filter driver from a volume to which it has been attached.

⚠ **CAUTION**

You *must* remove the filter from volumes as soon as possible after using Open Migrator/LM. However, you should never detach the filter from a volume that is migrating, synchronizing, or verifying. Do not detach the filter until the reboot for drive swap and volume expansion has occurred.

Migration best practices

This section provides some best practices to follow when performing migration activities with Open Migrator/LM V3.12.

Note: If you are running migrations with previous Open Migrator/LM releases (V3.9, V3.10 or V3.11), please update to V3.12 or refer to the *Open Migrator/LM Product Guide Version 3.9.*

Getting started

To get started using Open Migrator/LM, do the following:

1. Familiarize yourself with all the product documentation. The GUI is a Microsoft Management Console (MMC) Snap-in. If you are unfamiliar with MMC, consult your Windows documentation.

2. If you are performing remote migrations, use dcomcnfg.exe to set access and launch permissions for the Open Migrator/LM server.

   Note: Only do this on the machine(s) on which you installed both the client and server packages; you must do this for *every* machine on which you installed both packages.

   Note: For more information, refer to "Remote migrations" on page 63 and "Configuring the service for remote access" on page 71.

3. If you are performing MSCS migrations, the following restrictions/limitations apply:

   • Open Migrator/LM should only be installed on a single node of the cluster node set.

   • All clustered volumes must be assigned a drive letter or mount point.

   • Multiple mount points are not supported.

   • Volumes in a cluster can only be migrated to volumes that are visible to all nodes in the cluster and not currently a resource of a cluster.

   • Ensure that the target disk selected is a shared disk (visible to all nodes in the cluster).

- Only disks with a single partition and volume can be migrated.

- Open Migrator/LM does not support the migration of Veritas dynamic disks in a MSCS environment.

- Open Migrator/LM does not support the migration of Cluster Shaved Volumes in a Windows Server 2008 R2 MSCS environment.

Note: For MSCS instructions, refer to "Microsoft Cluster Server migrations" on page 64.

4. Do one of the following to open the Open Migrator/LM GUI:

- Double-click OMW2K3_32bit.msc in the folder you specified during installation.

- Select **Start**, **Programs**, **EMC Open Migrator/LM**.

- Open MMC by typing **mmc** at **Start**, **Run**. When MMC opens, select **Add/Remove Snap-in** from the **Console** drop-down box. In the **Add/Remove Snap-in** dialog box, click **Add**. A dialog box displays listing all the MMC Snap-ins registered with the OS. Scroll down to the **EMC Open Migrator/LM** icon, select and press **OK** or double-click the icon on the Windows desktop.

5. Attach servers to the Open Migrator/LM console. Right-click the icon in the console file, select **Attach to Server**. In the next dialog box that displays, type the name or the IP address of the server that you want to attach to the console. Repeat this process for each server you want attached to the console file.

Tip: You do not have to type anything to attach the local server, just leave the edit box blank and select **OK**.

6. Attach the filter driver to the volumes that you plan to migrate. Right-click the volume to which you want to attach the filter and select **Attach to volume**. Each time you attempt to attach the filter, a dialog box displays indicating whether a reboot is necessary to complete the action. You must attach the filter to both the source and target volume for each migration pair. Do not attach the filter to volumes that you do not plan to migrate.

Note: For more information, refer to "Attach to volume" on page 49.

⚠️ **CAUTION**

You must remove the filter from volumes as soon as possible after using Open Migrator/LM. However, you should never detach the filter from a volume that is migrating, synchronizing, or verifying. Do not detach the filter until the migration is complete.

Tip: Now may be a good time for you to customize the properties that display with the volumes in the left pane. To do this, right-click the **Volume** icon in the left pane and select **View**, **Add/Remove Columns**. A dialog box displays in which you can display and hide properties based on your preference.

Note: Refer to Table 3 on page 45 for a description of each volume property.

7. Reboot, *only if necessary.* You can first **Rescan disks and volumes** using the right-click menu option to update the volume status. You must reboot if after the rescan, the filter driver is not attached to some of the required volumes.

   You must also reboot if in the process of attaching the filter driver Open Migrator/LM displays a dialog box indicating that a reboot is necessary. If not, you are ready to launch migrations.

8. Once the filter driver is attached to a volume, migrate the volume by right-clicking the volume and selecting **Migrate volume**. The Select Target dialog box appears.

   Note: Refer to "Migrate volume…" on page 51 for additional information on migrating volumes.

9. Once the migration finishes, you must complete the migration.

   For non-cluster migrations, it's highly recommended to complete all the migrations by the final reboot. It's much simpler because no user operations are required. If you don't want reboot, you must close all the services/applications accessing the source volumes, and select **Complete Migration** for each of them.

   For cluster migrations, it must be done by selecting **Complete Migration**.

Note: Refer to "Complete migration" on page 55 for additional information on completing migration.

Refer to the following best practice sections for additional instructions on performing your specific type of migration:

Migration with Windows Volume Manager

To use Open Migrator/LM with the Windows Volume Manager, do the following:

◆ Right-click on the **Computer** icon and select **Rescan disks and volumes** to update Open Migrator/LM with the current state of Windows' disk and volumes. Rescan anytime you make changes to disks, volumes, or partitions in the Disk Management Snap-in, including, but not limited to:

  • Adding or deleting a volume.

  • Adding or deleting a drive letter or mount point.

  • Updating a disk from basic to dynamic.

  • Importing or exporting a disk.

  • Changing a volumes' fault-tolerance.

  • Extend or shrink the volume.

  Never modify, in any way, a volume or a disk in the Disk Management Snap-in to which the Open Migrator/LM filter driver is attached. First, go into the Open Migrator/LM Snap-in, detach the filter from the volume, perform a reboot if indicated, and then make the needed changes in the Disk Management Snap-in.

  Note: If the server on which you are performing the migrations uses a volume manager other than the one bundled with Windows 2003/2008, these rules still apply.

Mount point migrations

If the source volume is mounted by a mount point used by a service, that service must depend on the Open Migrator/LM Service. Otherwise, the mount points will not be transferred from the source to the target. To make the service(s) that will access the source volume a dependency of the Open Migrator/LM Service, do the following:

1. Find the data for the application's NT Service in the registry in `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services`.

Tip: If none of the names of the keys at `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services` clearly indicate the registry data for the application's NT Service, you can find it by searching the registry with the name that the Service Control Manager displays for the service. In accordance with Windows specifications for registering a service with the system, a value called **Display Name** holds the name that the Service Control Manager presents to the user. For example, the NT Service that manages folder sharing for the operating system is listed as **Server** in the Services Control Manager. If you search for that key in the left tree view of regedit.exe or regedt32.exe under `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services`, it does not exist. The key for the hive that contains the data for the NT Service listed as **Server** in the Services Control Manager is named **lanmanserver** in the left tree view of regedit.exe or regedt32.exe.

2. The Open Migrator/LM Service must be added to the **DependOnService** value for each service using the mount point. If the **DependOnService** list exists, type **EmcOMSrv** at the end of the data field for this value. If this value does not exist, add a `Reg_Multi_SZ` value named **DependOnService** and type **EmcOMSrv** in the data field.

3. Validate that the service is a dependency of the NT Service. Open the Service Control Manager Snap-in. Double-click **EMC Open Migrator/LM Server**. Click the **Dependencies** tab. In the field under **These services depend on the EMC Open Migrator/LM Server:**, the name of the application's NT Service should be listed.

4. As soon as the migration involving the mount point(s) has completed, including the post-migration reboot, remove the **DependOnService** value that was added in the previous step. Failure to do so may result in the service not starting automatically.

Note: Above operations are required only if the migrations are completed by the final reboot.

Note: Refer to Microsoft technical document 280297 for valid mount point configurations in MSCS environment.

Remote migrations

To perform remote migrations with Open Migrator/LM, do the following:

1. Verify that the client and server machines are in the same domain or in trusted domains.

2. Grant both the **System** and **Network** security principals launch and access permissions in dcomcnfg.exe. Refer to for specific instructions pertaining to Windows 2003.

3. In dcomcnfg.exe, remove any security principals other than **Network**, **System**, and the specific users you want. The system sometimes automatically grants access and launch permission to the principal that installs the Open Migrator/LM **Server Package** option and the **Interactive** user. The **Interactive** user should never have access or launch permission. The security privileges of the user who installed Open Migrator/LM should be removed unless you want that account to have access to the Open Migrator/LM server.

Active partition migrations

Open Migrator/LM does not allow migration of active partitions. Any partitions that are marked as active will appear as systems disks in the GUI. To migrate a volume with an active partition, use Microsoft Diskpart to mark the partition as inactive and restart your system.

Thin device migrations

Open Migrator/LM supports migrations to thin devices. When specifying the migration type for thin device migrations, Sparse Copy is highly recommended.

Note: If Migrate with Verify or Migration Only is selected, Open Migrator/LM will perform a byte-by-byte copy of the source volume to the target volume. The required space for the target device will be increased.

⚠ **CAUTION**

When performing migrations to thin devices, you must make sure that the storage pool for the thin devices has enough free space.

Microsoft Cluster Server migrations

As a prerequisite, EMC recommends that the user possess a thorough understanding of Microsoft Cluster Server (MSCS) environments and their specific configuration before attempting to migrate MSCS data.

Note: For specific Microsoft Cluster Server product information and relevant articles on clustering, troubleshooting, installation, and cluster disks, refer to the Microsoft website at http://www.microsoft.com.

Microsoft MSCS resources

EMC recommends the following Microsoft Knowledge Base Articles (referenced by number), obtainable from www.microsoft.com:

259267 — *Microsoft Cluster Service Installation Resources*

175278 — *How to Add Additional Non-Hot Swap SCSI Hard Disks to a Cluster Node on a Shared SCSI Bus*

305793 — *How to Replace a Disk That is on a Windows 2003 Server Cluster*

172951 — *How to Recover From a Corrupted Quorum Log*

266274 — *How to Troubleshoot Cluster Service Startup Issues*

280297 — *How to configure volume mount points on a Microsoft Cluster Server.*

919117— A hotfix is available that adds support for GUID partition table (GPT) volumes that are larger than 2 terabytes on a Windows Server 2003-based server cluster.

Quorum disk migrations

The quorum volume in a quorum disk contains configuration data for the entire cluster. Usually, the volume does not contain other user data. It is highly recommended to replace quorum disk by reconfiguring the quorum resource using the Failover Cluster Management. Refer to the Microsoft Failover Cluster Management help for how to reconfigure the quorum resource.

If the quorum volume does have user data besides the cluster configuration files and does need to be migrated, replace the quorum by another cluster disk using the Microsoft Failover Cluster Management GUI. Then migrate the source volume (now it is not the quorum) using the Open Migrator/LM.

How to perform an MSCS migration

To perform data migrations in MSCS for non-quorum disks, follow these steps:

Note: If you are running 2003 MSCS migrations with previous Open Migrator/LM releases (V3.9, V3.10 or V3.11), please update to V3.12 or refer to the Open Migrator/LM Product Guide Version 3.9.

1. Install Open Migrator/LM on a node of the cluster where the migrations are to be executed. For installation instructions, refer to the *"Installation"* chapter in this manual.

2. Move all cluster volumes to be migrated to the Open Migrator/LM node.

3. Rescan disks and volumes.

   The GUI does not automatically rescan disks and volumes after rebooting and moving cluster volumes back to the Open Migrator/LM host. You must do a manual rescan of the disks and volumes for the MSCS volumes to be visible in the GUI. Use the **Rescan disks and volumes** right-click menu option on the computer node to update disks and volumes. For more information, refer to "Migration with Windows Volume Manager" on page 61.

4. Attach the Open Migrator/LM filter driver to the required source and target volumes.

5. Rescan disks and volumes.

Note: Before migrating volumes in an MSCS environment, ensure that none of the target volumes are currently in use by other applications or other hosts.

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6. Migrate the required volumes from the host running Open Migrator/LM. For migration instructions, refer to "Migrate volume…" on page 51.
   Figure 22 on page 67 shows an example of the target cluster resource in Microsoft Failover Cluster Manager.

Note: There should be one more cluster disk (target disk) in the same group with the source disk after a 2008 or 2008 R2 cluster migration is launched.
If the target disk is initialized in MBR format, its resource name should be `OM Target of XXXX (Sig = 0xYYYY)`. If the target disk is initialized in GPT format, its resource name should be `OM Target of XXXX (GUID = {ZZZZ})`. *XXXX* is the name of the source disk resource, *YYYY* is the disk signature, and *ZZZZ* is the disk GUID.
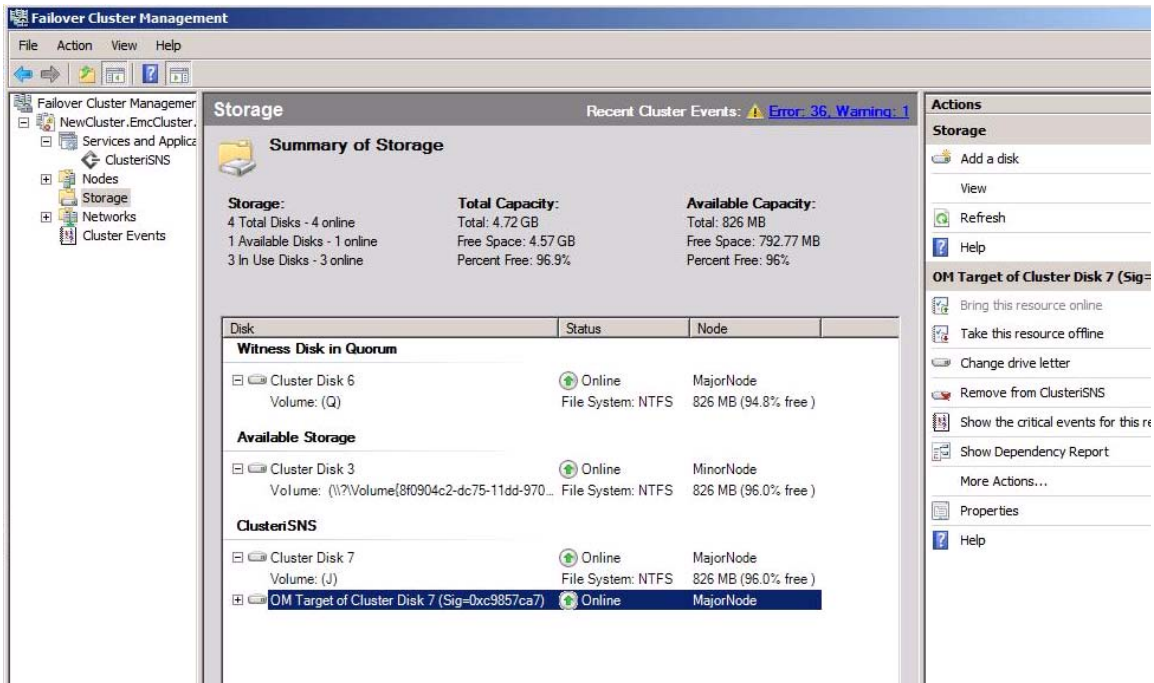

Figure 22   Target cluster resource

7. After data movement for all volumes completes on the Open Migrator/LM host, close all local services/applications accessing the source volume and complete the cluster migration by selecting **Complete migration** from the Open Migrator/LM GUI. For migration instructions, refer to "Complete migration" on page 55.
Figure 23 on page 68 shows the Open Migrator/LM GUI Complete migration option.

Note: Local services/applications means they are not configured as cluster resources. For example, a Windows Explorer session that is reading from or writing to the source volume.

Completing a cluster migration is a complicated operation. It is strongly recommended that you turn on all nodes in the cluster before completing this cluster migration. All services and applications resources in the same group with the source disk are

taken offline by Open Migrator during completion of a cluster migration. They are in the online state again after migration successfully completes, even if they were in the offline state before.
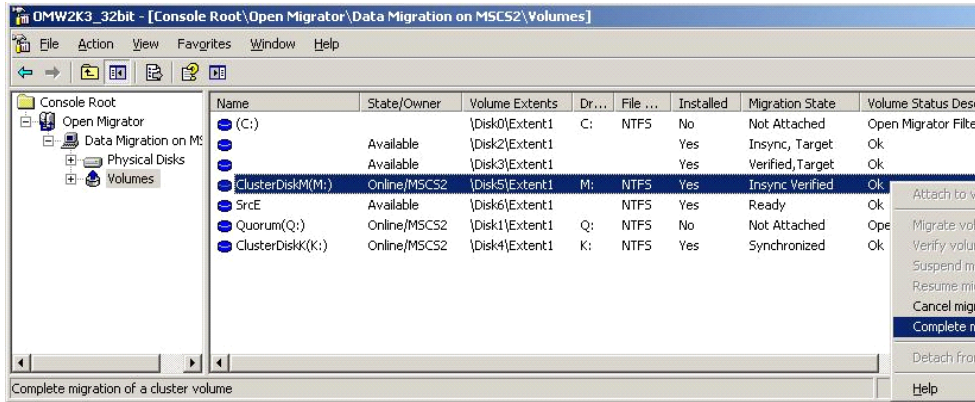

Figure 23   Complete migration option

> **Note:** Do not modify any cluster configuration of the migrating resources when it is in the process of being completed. The cluster service must be running when a MSCS migration is in the process of being completed.

8. Rescan disks and volumes.

9. Using the Open Migrator GUI and Microsoft Failover Cluster Management tools, verify that the volume data has migrated successfully. Verify all volume information using Windows Disk Manager and check cluster information using the Microsoft Failover Cluster Management tool or by using the cluster commands (run cmd and input cluster commands).

> **Note:** Information shown in the Microsoft Failover Cluster Management GUI may not be current. It may be necessary to refresh the data or restart the Microsoft Failover Cluster Management GUI.

After the migration completes, the target cluster disk displays under Cluster; the source cluster disk is deleted from Cluster. The target cluster disk inherits the resource name of the source cluster disk. For

example, the target cluster disk is renamed "Cluster Disk 7" if the source cluster disk was named "Cluster Disk 7."

The most important cluster information is resource dependency. All resources depending on the source disk should be dependent on the target disk after the migration completes.

Note: The deleted cluster disk becomes available offline and has to be brought online using the Windows Disk Management GUI before it can be accessed again.

MSCS and disaster recovery

The following four scenarios outline the suggested procedures to recover from a failed MSCS migration with Open Migrator/LM.

Scenario 1

Migration was initiated on Node A in a multi-node cluster. Node A was rebooted while migrations were in progress.

Solution:

When Node A was restarted, all migrations were cancelled. You must fail all required resources back to Node A and ensure that all required target volumes are available to all nodes before attempting the migration again.

Note: It is recommended that you manually format all target volumes.

If it's 2008/2008 R2 MSCS, all the target disks must be removed from the cluster and be brought online from the Windows Disk Management GUI before they can be accessed again.

Scenario 2

Migration was initiated on Node A in a multi-node cluster. Other nodes in the cluster were restarted while migrations were in progress on Node A.

Solution:

No action is required, as the required source and target volumes will remain available to Node A. When migrations are completed, follow the shutdown and restart instructions outlined in , steps 7 through 9.

Scenario 3

Migration was initiated on Node A in a multi-node cluster. Source volumes failed over to another cluster node during the migration and have become unavailable to Open Migrator/LM on Node A.

Solution:

When the source volumes failed over from Node A to another node in the cluster, migrations immediately failed.

1. You must move the require source volumes back to Node A and manually format all of target volumes on Node A.

   If it's 2008/2008 R2 MSCS, all the target disks must be removed from the cluster and be brought online from the Windows Disk Management GUI before they can be migrating targets again.

2. From the GUI, choose **Rescan disks and volumes** using the right-click menu option.

3. Restart all required migrations as described in "How to perform an MSCS migration" on page 65, steps 6 through 9.

Scenario 4

Migration was initiated on Node A in a multi-node cluster. When migrations completed, Node A was restarted while other nodes in the cluster were running.

Solution:

All migrations will fail in this scenario.

1. You must move the require source volumes back to Node A and manually format all of target volumes on Node A.

   If it's 2008/2008 R2 MSCS, all the target disks must be removed from the cluster and be brought online from the Windows Disk Management GUI before they can be migrating targets again.

2. From the GUI, choose Rescan disks and volumes using the right-click menu option.

3. Restart all required migrations as described in "How to perform an MSCS migration" on page 65, steps 6 through 9.

Note: It is recommended that you manually format all target volumes.

Configuring the service for remote access

The Open Migrator/LM Service is a DCOM object. All Windows OS editions provide a utility, dcomcnfg.exe, to configure DCOM objects for remote access.

The installation should register the EMC Open Migrator/LM Server properly with DCOM on the user's system. However, you must set permissions for the client. Once permissions are set, the Open Migrator/LM server must be stopped and restarted to accept the changes. This can be done by rebooting the server or by using the following two server commands: net stop "EMC Open Migrator/LM Server", followed by, net start "EMC Open Migrator/LM Server".

To configure your service for remote access, refer to the following topics, according to your Windows operating system.

Note: Setting permissions for the Windows 2003 client is not required. Although, users must be added to the Distributed COM users group on the local host to be able to utilize Open Migrator/LM. Refer to .

Note: If you have any questions on configuring the Windows Firewall or Distributed DCOM users, refer to Microsoft technical documents.

Configuring the Windows Firewall for remote access

If Windows Firewall is enabled, the Open Migrator/LM Service must be allowed to pass through it. To allow the Open Migrator/LM Service for remote access, do the following according to your Windows operating system.

In Windows Server 2003, double click Windows Firewall in the Control Panel, select the Exceptions tab, and click the Add program button to pop up the Add a program dialog box. Click Browse to add EmcOmSrv.exe into the list.

In Windows Server 2008, double click Windows Firewall in the Control Panel and select Allow a program or feature through Windows Firewall to display the dialog box. Select the Exceptions tab, and click the Add program button to display the Add a program dialog box. Click Browse to add EmcOmSrv.exe into the list.

In Windows Server 2008 R2, double click Windows Firewall in the Control Panel and select the Allow a program or feature through Windows Firewall to display the dialog box. Click Allow another program button to display the Add a program dialog box. Click Browse to add EmcOmSrv.exe into the list.

Add remote users for a Windows 2003 client

As a minimum requirement for Windows 2003 remote users, the user must be added to the Distributed COM users group on the local host to be able to utilize Open Migrator/LM. To add a user to the Distributed COM users group, do the following:

1. On the local host, click **Start**, right-click **My Computer**, and then click **Manage**.

2. Expand **Local Users and Groups**, click **Groups**, right-click **Distributed COM Users** in the right pane, and then select **Add to Group**.

3. The **Distributed COM Users Properties** box appears. Select the user listed under **Members** and click **Add**.

4. Click **OK**.

Setting permissions for a Windows 2003 client

Setting permissions for a Windows 2003 client is not required for a remote user to be able to utilize Open Migrator/LM. Refer to "Add remote users for a Windows 2003 client" for minimum configuration instructions.

The following instructions are optional can be used to set permissions for a Windows 2003 client:

1. From the Windows **Start** menu, select **Run**.

2. When the **Run** dialog box appears, type **dcomcnfg** in the **Open** box, and then click **OK**.

   The **Windows 2003 Component Services** dialog box appears.

3. Go to **Component Services**, **Computers**, **My Computer, DCOM Config**.

4. Select **Open Migrator/LM Server** from the **DCOM Config** window, right-click and select **Properties**.

   The **Server Properties** sheet appears.

5. On the **Security** tab, select **Customize** under **Access Permissions**, and then click **Edit**.

   The **Access Permission** dialog box appears.

6. Click **Add**.

   The **Select User, Computers, or Groups** dialog box appears. The **From This Location:** field displays the domain to which the server is connected.

7. To change the domain for the user or groups that will connect to Open Migrator/LM remotely, click **Locations…**.

   The **Locations** dialog box appears.

8. Browse the location and select the domain you require for Open Migrator/LM, and then click **OK**.

9. From the **Select User, Computers, or Group**s dialog box, click **Advanced**.

10. Click **Find Now** to populate the **Search Results** field with the names of all users and groups in the domain.

11. Scroll to the desired user, select the user, and then click **OK**. If you want to add multiple users at once, select the first user, and depressing the Ctrl key, select all other users to add. Click **OK** when done.

12. Click **OK** in the **Access Permissio**n dialog box to give the user(s) access permission.

The security principal you added now has access rights to the Open Migrator/LM server. To specify users for launch and configuration permission or to change user access rights, perform the same actions described in steps 4 through 10. Finally, make sure that the System and Network accounts have both access and launch rights.

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