IBM TotalStorage Multiple Device Manager

Installation and Configuration Guide

Version 1.1

SC26-7588-00

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Note
Before using this information and the product it supports, read the information in "Notices" on page 185.

First Edition (March 2004)

This edition applies to the IBM TotalStorage(TM) Multiple Device Manager.

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About this book

This section briefly describes the content and the intended audience of this book. It also provides information about how and where you can submit your comments about the book.

Who should use this guide?

This publication is intended for administrators or users who are installing and using IBM® TotalStorage® Multiple Device Manager.

About this guide

This publication introduces the IBM® Multiple Device Manager (MDM), its components and features, and provides MDM installation procedures. The information is organized as follows:

- Part 1, "Introduction," on page 1 provides an overview of Multiple Device Manager and describes its components and features.
- Part 2, "Installing IBM Multiple Device Manager for Windows 2000 operating systems," on page 33 provides installation requirements and procedures to install Multiple Device Manager on the Microsoft® Windows® 2000 operating system.
- Part 3, "Installing IBM Multiple Device Manager for the Linux operating system," on page 83 provides installation requirements and procedures to install Multiple Device Manager on the Linux operating system.
- Part 6, "Configuring Multiple Device Manager," on page 163 provides Multiple Device Manager configuration procedures.

Accessing the Multiple Device Manager Information Center

This topic explains how to access the Multiple Device Manager (MDM) Information Center.

Prerequisites:

MDM must be installed and configured.

Steps:

Perform the following steps to access the MDM Information Center:

1. In the IBM Director Task pane, click **Multiple Device Manager**. The MDM tasks are displayed.
2. Invoke any MDM task. An MDM user interface panel opens.
3. Click **Help** on the interface panel. The Information Center opens.

Part 1. Introduction

This part includes the following topics:

- An overview of the Multiple Device Manager (MDM) including descriptions of its components and features.
- A description of the software products that must be installed before you use MDM including:
  - Device Manager Extension
  - DB2 Universal Database (UDB)
  - IBM Director
- Information about the following products that MDM discovers and manages:
  - IBM TotalStorage Enterprise Storage Server (ESS)

    Note: You must install the CIM Agent before MDM can support the ESS.
  - IBM TotalStorage SAN Volume Controller

    Note: You must install the SAN Volume Controller Console before MDM can support the SAN Volume Controller.
  - IBM TotalStorage FAStT Storage Server

    Note: You must install the FAStT Storage Server before MDM can support the FAStT.

Chapter 1. Multiple Device Manager

Multiple Device Manager (MDM) discovers storage devices that are compliant with the Storage Management Initiative Specification (SMI-S). MDM provides you with the following major functions:

Groups
This function displays groups discovered by MDM.

Group Contents
This function displays the contents of a group.

Tasks This function lists the tasks you can perform.

Related topics:

- "Device Manager" on page 4
- "Device Manager extension" on page 5

Multiple Device Manager associations

You can view information about the following two MDM-related associations from the IBM Director Group Contents pane:

Storage Association
When you select this association, a tree control window displays the hierarchical relationship between the storage devices. Each managed object is displayed, followed by icons for each individual object.

SAN Visibility Association
When you select this association, a tree control window displays the entities that are visible on the SAN relative to other devices. You can view each managed object in the group as well as each individual object.

Related topics:

- Chapter 1, "Multiple Device Manager"
- "Device Manager" on page 4
- "Multiple Device Manager co-server" on page 6
- "Performance Manager" on page 22
- "Replication Manager" on page 28

MDM groups

Multiple Device Manager (MDM) uses the IBM Director to discover storage devices. The storage devices are organized into groups of the same type of devices.

The contents for each of the following groups are displayed in the IBM Director Group Contents pane:

Storage Devices
All entities that are discovered by any mechanism, such as the Service Location Protocol (SLP) or SAN manager. Duplicate devices that are discovered by multiple methods are shown only once.

Enterprise Storage Servers (ESS)
ESS devices that are discovered using SLP.

FAStT FAStT devices that are discovered using SLP.

Other storage
Any devices that are discovered using SLP but that do not belong to another category.

SAN Volume Controllers
SAN Volume Controllers that are discovered using SLP.

SAN Volume Controller for Cisco MDS 9000
SAN Volume Controllers for Cisco MDS 9000 that are discovered using SLP.

SAN Fabric
Entities that the IBM Tivoli® Storage Area Network Manager discovered that are not discovered by SLP. This group is empty if the Tivoli Storage Area Network Manager is not configured.

Related topics:

- "IBM Director" on page 9
- "IBM TotalStorage Enterprise Storage Server (ESS)" on page 21
- "SAN Volume Controller" on page 10
- "SAN Volume Controller for Cisco MDS 9000" on page 20
- "Tivoli Storage Area Network Manager" on page 31

MDM device discovery

Multiple Device Manager (MDM) discovers both storage devices and storage area network (SAN) devices such as switches, ports, and hosts. Supported storage devices are discovered using the Service Location Protocol (SLP).

MDM builds on the IBM Director discovery infrastructure and adds support for discovery of storage devices to the discovery services. You can invoke MDM device discovery from either the IBM Director toolbar or the IBM Director menu bar.

Device Manager

Device Manager has a dual role as a component of Multiple Device Manager (MDM) *and* as part of the infrastructure of IBM Director. Device Manager provides you with access to single-device, multiple-device, and cross-device configuration functionality.

You can use Device Manager to perform the following tasks:

- View essential information about storage devices.
- Examine the relationships between storage devices.
- Change storage device configurations.

Device Manager provides the following key functions:

- Discovery of Storage Management Initiative Specification (SMI-S) based storage subsystems
- Inventory collection
- Health monitoring

- Association capability
- Event management

SMI-S based storage subsystem discovery:

Device Manager uses the Service Location Protocol (SLP) to discover supported, SMI-S based storage subsystems on the SAN. Device Manager creates *managed objects* (MO) to represent these discovered devices. The managed objects are displayed as individual icons in the Group Contents pane of the IBM Director Console. The Groups pane displays one group that contains all discovered storage devices.

Inventory collection:

Additional information about the discovered storage device managed objects is stored in the IBM Director inventory database. This inventory information is maintained for each storage device managed object.

Health monitoring:

Health monitoring is provided to the storage system managed objects by recording hardware status changes for the discovered storage devices in the appropriate managed objects.

Association capability:

Device Manager provides association capability between the managed objects representing the storage devices that enables you to view the interconnection relationships.

Event management:

A configuration database saves all relevant configuration information for the supported storage devices, such as RAID arrays, configured logical unit numbers (LUNs), LUN masking, and mapping data.

Related topics:

- Chapter 1, "Multiple Device Manager," on page 3

Device Manager extension

This topic lists the functions that Device Manager provides in its role as an extension to the IBM Director.

Device Manager extension provides the following functions:

- Discovery of the following storage subsystems that are based on the Storage Management Initiative Specification (SMI-S):
  - IBM TotalStorage Enterprise Storage Server® (ESS) subsystems
  - IBM TotalStorage FAStT Storage Server
  - IBM TotalStorage SAN Volume Controllers
  - IBM TotalStorage SAN File System
- Discovery of SAN managers and the following related components:
  - Host bus adapters (HBAs)

– Switches

Related topics:

- "IBM Director" on page 9
- Chapter 1, "Multiple Device Manager," on page 3
- "Device Manager" on page 4

Multiple Device Manager co-server

The function of the Multiple Device Manager (MDM) co-server is to discover components and relationships in Storage Management Initiative Specification (SMI-S) storage subsystems.

The MDM co-server discovers the following components and relationships:

- Logical unit numbers (LUNs)
- Meta-data servers
- Clients
- Associations between device components

An MDM DB2® database is located with the co-server. Device Manager creates inventory objects in the DB2 database. The DB2 database includes tables for each device type. Association information is also maintained in an association table.

Related topics:

- Chapter 1, "Multiple Device Manager," on page 3
- "IBM DB2 Universal Database (UDB)" on page 9
- "Multiple Device Manager associations" on page 3
- "Device Manager" on page 4

CIM agent

With a Common Information Model (CIM) agent, programmers can use common building blocks rather than proprietary software or device-specific programming interfaces to manage CIM-compliant devices. Standardization of the way applications handle storage provides easier storage management.

Components:

A CIM agent typically involves the following components:

agent code An open-systems standard that interprets CIM requests and responses as they transfer between the client application and the device.

CIM object manager (CIMOM)
The common conceptual framework for data management that receives, validates, and authenticates the CIM requests from the client application. It then directs the requests to the appropriate component or device provider.

client application
A storage management program that initiates CIM requests to the CIM agent for the device.

device The storage server that processes and hosts the client application requests.

device provider
A device-specific handler that serves as a plug-in for the CIM. That is, the CIMOM uses the handler to interface with the device.

Service Location Protocol (SLP)
A directory service that the client application calls to locate the CIMOM.

CIM agent at work:

Figure 1 shows the way a typical CIM agent works. The client application locates the CIMOM by calling an SLP directory service. When the CIMOM is first invoked, it registers itself to the SLP and supplies its location, IP address, port number, and the type of service it provides. With this information, the client application starts to directly communicate with the CIMOM.

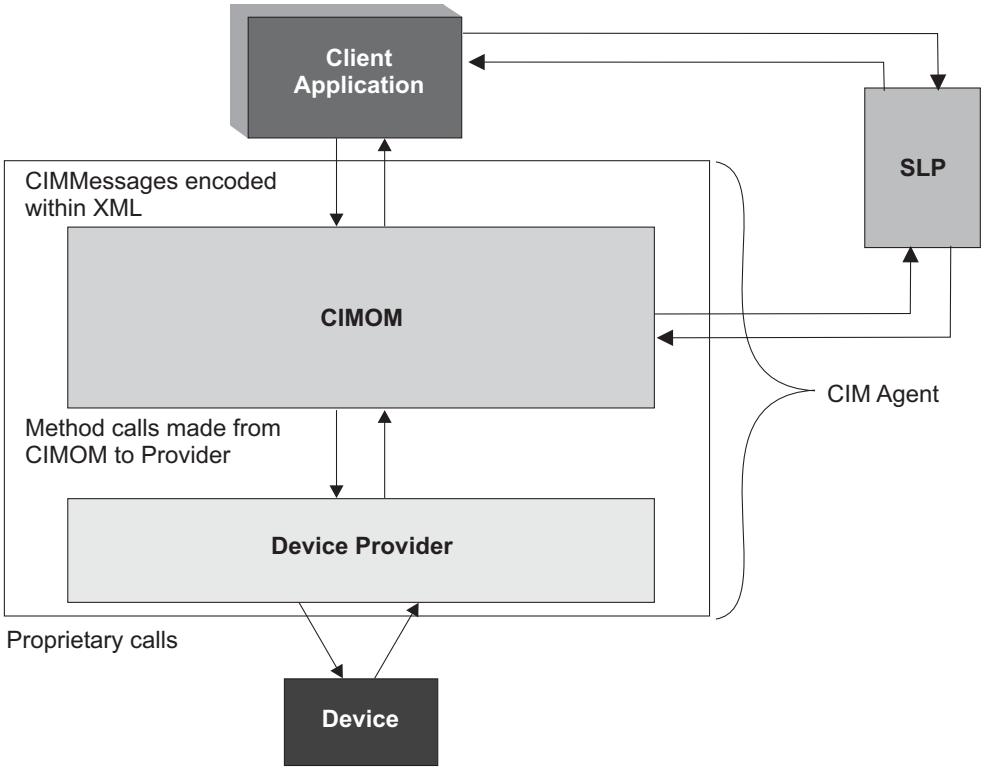

Figure 1. A typical CIM Agent at work

The client application then sends CIM requests to the CIMOM. As requests arrive, the CIMOM validates and authenticates each request. It then directs the requests to the appropriate functional component of the CIMOM or to a device provider. The provider makes calls to a device-unique programming interface on behalf of the CIMOM to satisfy client application requests.

IBM TotalStorage Productivity Center

The IBM TotalStorage Productivity Center provides an integration point for storage management and replication.

Storage administrators can use the Productivity Center interface to launch IBM TotalStorage Open Software Family products, which can help to support managing the storage volume life cycle, device configuration, performance, replication, storage network fabric, zoning, topology, alerts, data backup, data availability, and data recovery, as well as enterprise policies for managing host, application, database, and file system data. The Productivity Center interface is designed to simplify storage administration by providing a task-based organization to the broad range of capability available with the TotalStorage Open Software Family products.

You can use the links in the Productivity Center interface to perform the following actions:

Manage your storage volume lifecycle
Using Multiple Device Manager, you can configure storage and manage performance and replication.

Manage data availability
Using Tivoli Storage Manager, you can back up, archive, and recover data.

Manage your storage network fabric
Using Tivoli Storage Area Network Manager, you can manage and configure the SAN fabric, zones, topology, and alerts.

Manage host and application data
Using Tivoli Storage Resource Manager, you can manage hosts, applications, file systems, and databases with enterprise policies.

The TotalStorage Productivity Center home site is at:

http://www.storage.ibm.com/software/center/index.html

The TotalStorage Open Software Family page is at:

http://www.storage.ibm.com/software/

Related topics:

•

MDM tasks

This topic describes the device management tasks you can perform with MDM when it has been installed and configured, and the supported storage devices have been discovered.

The following sections list the tasks you can perform using Device Manager, Replication Manager, and Performance Manager.

Device Manager:

You can perform the following tasks using the Device Manager:

- Discover supported storage devices on the SAN
- View essential information about storage devices
- Examine the relationships between storage devices
- Change storage device configurations
- View inventory information about a storage device
- View hardware records about status changes for storage devices

- View configuration information about storage devices in the configuration database

Replication Manager:

You can perform the following tasks using the Replication Manager:

- Create and maintain logical unit number (LUN) groups
- Set up a group for replication
- Create, save, and name a replication task
- Schedule a replication session using the user interface
- Start a replication session

You can also perform these tasks using the Replication Manager command-line interface.

Performance Manager:

You can perform the following tasks using the Performance Manager:

- Collect data from storage devices
- Set performance thresholds for each device type
- Detect when the performance thresholds are exceeded
- Extract performance data from the Performance Manager database
- Purge performance data from the Performance Manager database
- Better allocate data to meet performance requirements by using the Performance Manager database

Related topics:

- Chapter 1, "Multiple Device Manager," on page 3
- "Performance Manager" on page 22
- "Replication Manager" on page 28

IBM DB2 Universal Database (UDB)

DB2 is an IBM program product that helps you leverage your information by delivering the performance, scalability, reliability, and availability you need for the most demanding e-commerce, CRM, BI, and ERP applications. Multiple Device Manager (MDM) uses DB2 for persistent storage needs. A copy of DB2 is shipped with MDM, and must be installed and configured for use with MDM.

DB2 UDB Workgroup Edition is a multiple-user version of the DB2 product. It provides the ability for remote clients to access data and perform administration on a DB2 workgroup server and provides Web access through Net.Data®.

IBM Director

IBM Director is a comprehensive systems-management solution. Based on industry standards, it can be used with all Intel-based systems. In addition, IBM Director has features designed expressly to work with the hardware present in IBM eServer™ xSeries® servers, IBM eServer BladeCenter™ chassis, IBM eServer blade servers, IBM NetVista™ desktop computers, IBM IntelliStation® workstations, IBM ThinkPad® mobile computers, IBM TotalStorage Network Attached Storage (NAS) products, and IBM SurePOS™ point-of-sale systems.

A powerful suite of tools and utilities, IBM Director automates many of the processes required to manage systems proactively, including capacity planning, asset tracking, preventive maintenance, diagnostic monitoring, troubleshooting, and more. It offers a graphical user interface that provides system administrators easy access to both local and remote systems.

IBM Director can be used in environments with multiple operating systems (heterogeneous environments) and integrated with robust workgroup and enterprise management software from IBM (such as Tivoli), Computer Associates, Hewlett-Packard, Microsoft, NetIQ, and BMC Software.

IBM WebSphere Application Server

The IBM WebSphere® Application Server is a high-performance, scalable transaction engine for dynamic e-business applications.

The open services infrastructure enables companies to deploy a core operating environment that works as a reliable foundation capable of handling a high volume of secure transactions and Web services. WebSphere continues the evolution to a single Web services-enabled, Java™ 2 Enterprise Edition (J2EE) application server and development environment that addresses the essential elements needed for an on-demand operating environment.

About installation:

The WebSphere Application Server is installed with the IBM Multiple Device Manager (MDM).

Notes:

1. Terminal services are not supported on a WebSphere Application Server that includes an embedded messaging feature.
2. The IBM WebSphere Studio Application Developer Integration Edition and IBM WebSphere Application Server both include an option to install embedded messaging. Because the embedded messaging option in these two products is incompatible, do not install embedded messaging for both products on the same machine.

About global security:

Enabling global security in the IBM WebSphere Application Server activates a wide variety of WebSphere security settings. You can specify values for these settings, but they will not take effect until global security is activated. The settings include the authentication of users, the choice of user registry, and Java 2 security. Application security, including authentication and role-based authorization, is not enforced unless global security is active.

SAN Volume Controller

The SAN Volume Controller is a SAN appliance that attaches open-systems storage devices to supported open-systems hosts. The IBM TotalStorage SAN Volume Controller provides symmetric virtualization by creating a pool of managed disks from the attached storage subsystems, which are then mapped to a set of virtual disks for use by attached host computer systems. System administrators can view and access a common pool of storage on the SAN, which enables them to use

storage resources more efficiently and provides a common base for advanced functions.

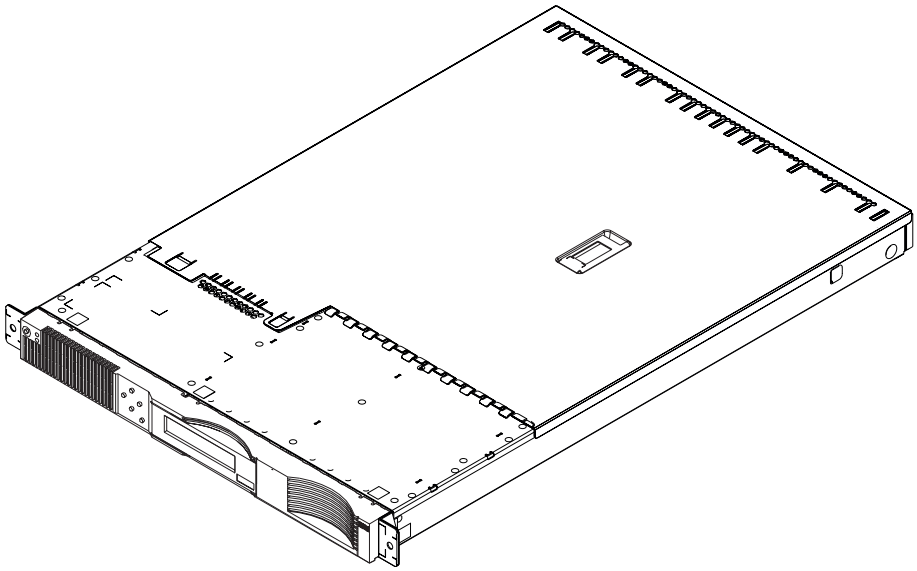

Figure 2. A SAN Volume Controller node

The SAN Volume Controller is analogous to a logical volume manager (LVM) on a SAN. It performs the following functions for the SAN storage that it is controlling:

1. Creates a single pool of storage
2. Manages logical volumes
3. Provides advanced functions for the SAN, such as:
   a. Large scalable cache
   b. Copy services
      - FlashCopy® (point-in-time copy)
      - Remote Copy (synchronous copy)
   c. Space management
      - Mapping that is based on desired performance characteristics
      - Quality of service metering

A *node* is a single storage engine. The storage engines are always installed in pairs with one or two pairs of nodes constituting a *cluster*. Each node in a pair is configured to back up the other. Each pair of nodes is known as an *I/O group*. All I/O operations handled by the nodes in an I/O group are cached on both nodes for resilience. Each virtual volume is defined to an I/O group. To eliminate any single point of failure, each of the two nodes in the I/O group are protected by different uninterruptible power supplies.

The SAN Volume Controller I/O groups see the storage presented to the SAN by the back-end controllers as a number of disks, known as *managed disks*. The application services do not see these managed disks. Instead, they see a number of logical disks, known as *virtual disks*, that are presented to the SAN by the SAN Volume Controller. Each node must only be in one I/O group and provide access to the virtual disks in the I/O group.

The SAN Volume Controller helps to provide continuous operations and can also optimize the data path to ensure performance levels are maintained.

The fabric contains two distinct zones: a host zone and a disk zone. In the host zone, the host systems can identify and address the nodes. You can have more than one host zone. Generally, you will create one host zone per operating system type. In the disk zone, the nodes can identify the disk drives. Host systems cannot operate on the disk drives directly; all data transfer occurs through the nodes. As shown in Figure 3, several host systems can be connected to a SAN fabric. A cluster of SAN Volume Controllers is connected to the same fabric and presents virtual disks to the host systems. You configure these virtual disks using the disks located on the RAID controllers.

Note: You can have more than one host zone. Generally, you create one host zone per operating system type, because some operating systems will not tolerate other operating systems in the same zone.

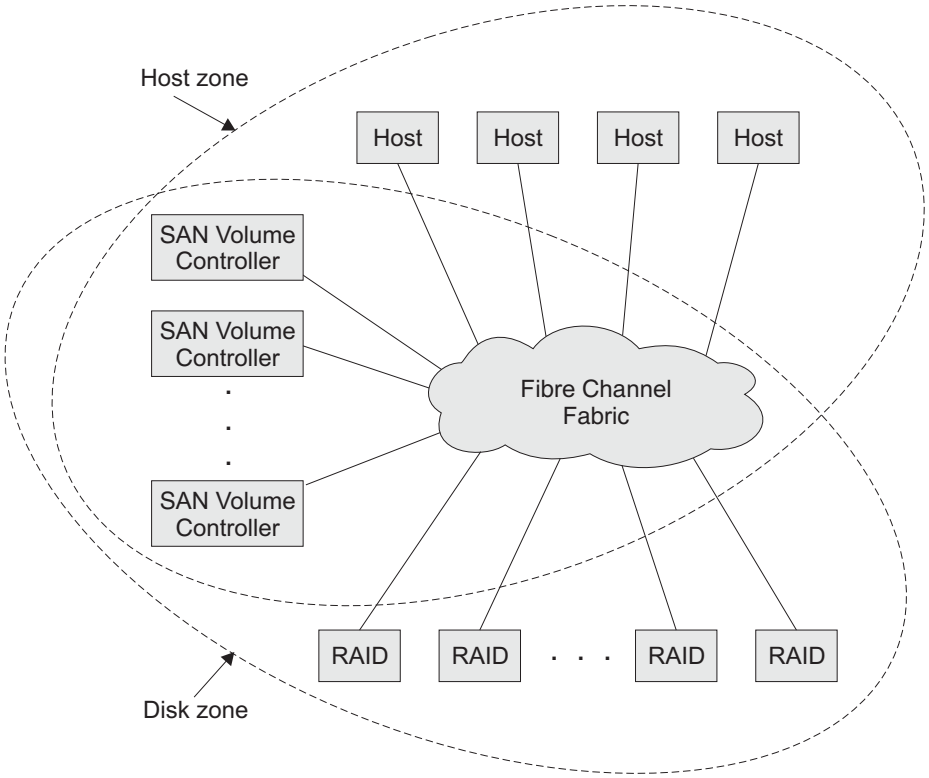

Figure 3. Example of a SAN Volume Controller in a fabric

When hardware service or maintenance is required, you can remove one node in each I/O group from a cluster. After you remove the node, you can replace the field replaceable units (FRUs) in the node. All disk drive communication and communication between nodes is performed through the SAN. All SAN Volume Controller configuration and service commands are sent to the cluster through an Ethernet network.

Each node contains its own vital product data (VPD). Each cluster contains vital product data that is common to all the nodes on the cluster. Any system connected to the Ethernet network can access this VPD.

Enclosure configuration information is stored on every node that is in the cluster to allow concurrent replacement of FRUs. An example of this information might be information that is displayed on the menu screen of the SAN Volume Controller.

When a new FRU is installed, and when the node is added back into the cluster, configuration information that is required by that node is ready from other nodes in the cluster.

SAN Volume Controller operating environment:

- Minimum of one pair of SAN Volume Controller nodes
- Two uninterruptible power supplies
- One master console is required per SAN installation for configuration

Features of a SAN Volume Controller node:

- 19-inch rack mounted enclosure
- 4 fibre channel ports
- 2 fibre channel adapters
- 4 GB cache memory

Supported hosts:

- The SAN Volume Controller supports connectivity with Intel-based servers with the following supported operating systems:
  - IBM x-Series
  - AIX® 4.3.3 Required Maintenance Level 11
  - AIX 5.1 Required Maintenance Level 4
  - AIX 5.2 Required Maintenance Level 1
  - Windows 2000 Advanced Server Service Pack 3
  - Windows 2000 Server Service Pack 3
  - Windows NT® 4 Server Service Pack 6a
  - Red Hat Enterprise Linux AS 2.1 with 2.4.9-e.16 enterprise kernel
  - SUN Solaris 8 release 7 or later
  - HP-UX 11i version 1.6

Multipathing software:

- IBM Subsystem Device Driver (SDD)
- Redundant Dual Active Controller (RDAC)

Note: The multipath drivers, SDD and RDAC, can coexist on a host for certain operating systems.

Check the following Web site for the latest support and coexistence information:

http://www.ibm.com/storage/support/2145

User interfaces:

The SAN Volume Controller provides the following user interfaces:

- IBM TotalStorage SAN Volume Controller Console, a Web-accessible graphical user interface (GUI) that supports flexible and rapid access to storage management information
- A command-line interface (CLI) using Secure Shell (SSH)

Application programming interfaces:

The SAN Volume Controller provides the following application programming interface:

- IBM TotalStorage Common Information Model (CIM) Agent for the SAN Volume Controller, which supports the Storage Management Initiative Specification of the Storage Network Industry Association.

Related topics:

- "Virtual disks (VDisks)" on page 18

Managed disks (MDisks)

A managed disk (MDisk) is a logical disk (typically a RAID array or partition thereof) that a storage subsystem has exported to the SAN fabric to which the nodes in the cluster are attached. A managed disk might, therefore, consist of multiple physical disks that are presented as a single logical disk to the SAN. A managed disk always provides usable blocks of physical storage to the cluster even if it does not have a one-to-one correspondence with a physical disk.

Each managed disk is divided into a number of *extents*, which are numbered, from 0, sequentially from the start to the end of the managed disk. The extent size is a property of managed disk groups. When an MDisk is added to an MDisk group, the size of the extents that the MDisk will be broken into depends on the attribute of the MDisk group to which it has been added.

Access modes:

The access mode determines how the cluster uses the MDisk. The possible modes are:

Unmanaged
The MDisk is not used by the cluster.

Managed
The MDisk is assigned to an MDisk group and is providing extents that virtual disks (VDisks) can use.

Image The MDisk is assigned directly to a VDisk with a one-to-one mapping of extents between the MDisk and the VDisk.

Attention: If you add a managed disk that contains existing data to a managed disk group, you will lose the data that it contains. The *image mode* is the only mode that will preserve this data.

The figure shows physical disks and managed disks.

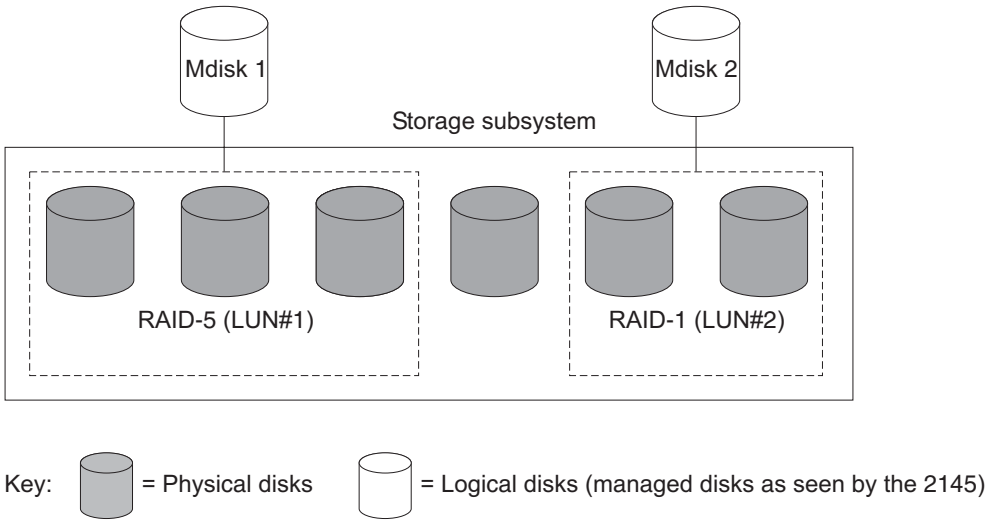

Figure 4. Controllers and MDisks

The status of a managed disk consists of four settings. The following table describes the different states of a managed disk:

Table 1. Managed disk status

Status	Description
Online	The MDisk can be accessed by all online nodes. That is, all the nodes that are currently working members of the cluster can access this MDisk. The MDisk is online when the following conditions are met: • All timeout error recovery procedures complete and report the disk as online. • LUN inventory of the target ports correctly reported the MDisk. • Discovery of this LUN created successfully. • All of the managed disk target ports report this LUN as available with no fault conditions.
Degraded	The MDisk cannot be accessed by all the online nodes. That is, one or more (but not all) of the nodes that are currently working members of the cluster cannot access this MDisk. The MDisk may be partially excluded; that is, some of the paths to the MDisk (but not all) have been excluded.
Excluded	The MDisk has been excluded from use by the cluster after repeated access errors. Run the Directed Maintenance Procedures to determine the problem. You can reset an MDisk and include it in the cluster again by running the **svctask includemdisk** command.
Offline	The MDisk cannot be accessed by any of the online nodes. That is, all of the nodes that are currently working members of the cluster cannot access this MDisk. This state can be caused by a failure in the SAN, the storage subsystem, or one or more physical disks connected to the storage subsystem. The MDisk will only be reported as offline if all paths to the disk fail.

Extents:

Each MDisk is divided into chunks of equal size called *extents*. Extents manage the mapping of data between MDisks and virtual disks (VDisks).

Attention: If your fabric is undergoing transient link breaks or you have been replacing cables or connections in your fabric, you might see one or more MDisks change to the degraded status. If an I/O operation was attempted during the link breaks and the same I/O failed several times, the MDisk will be partially excluded and will change to a status of degraded. You should include the MDisk to resolve the problem. You can include the MDisk by either selecting the Include MDisk task from the Work with Managed Disks - Managed Disk panel in the SAN Volume Controller Console, or issue the following command:

```
svctask includemdisk <mdiskname/id>
```

Managed disk path Each managed disk will have an online path count, which is the number of nodes that have access to that managed disk; this represents a summary of the I/O path status between the cluster nodes and the particular storage device. The maximum path count is the maximum number of paths that have been detected by the cluster at any point in the past. Thus if the current path count is not equal to the maximum path count then the particular managed disk may be degraded. That is, one or more nodes may not see the managed disk on the fabric.

Managed disk (MDisk) groups

An *MDisk group* is a collection of MDisks that jointly contain all the data for a specified set of virtual disks (VDisks). All MDisks in a group are split into extents of the same size. VDisks are created from the extents that are available in the group. You can add MDisks to an MDisk group at any time. This way you increase the number of extents that are available for new VDisks or to expand existing VDisks.

Note: RAID array partitions on HP StorageWorks subsystems controllers are only supported in single-port attach mode. MDisk groups that consist of single-port attached subsystems and other storage subsystems are not supported.

You can add MDisks to an MDisk group at any time either to increase the number of extents that are available for new VDisks or to expand existing VDisks. You can add only MDisks that are in unmanaged mode. When MDisks are added to a group, their mode changes from unmanaged to managed.

You can delete MDisks from a group under the following conditions:

- VDisks are not using any of the extents that are on the MDisk.
- Enough free extents are available elsewhere in the group to move any extents that are in use from this MDisk.

Attention: If you delete an MDisk group, you destroy all the VDisks that are made from the extents that are in the group. If the group is deleted, you cannot recover the mapping that existed between extents that are in the group and the extents that VDisks use. The MDisks that were in the group are returned to unmanaged mode and can be added to other groups. Because the deletion of a group can cause a loss of data, you must force the deletion if VDisks are associated with it.

The status of an MDisk group consists of three settings. The following table describes the different states of an MDisk group:

Table 2. Managed disk group status

Status	Description
Online	The MDisk group is online and available. All the MDisks in the group are available.
Degraded	The MDisk group is available; however, one or more nodes cannot access all the MDisks in the group.
Offline	The MDisk group is offline and unavailable. No nodes in the cluster can access the MDisks. The most likely cause is that one or more MDisks are offline or excluded.

Attention: If a single MDisk in an MDisk group is offline, that is, it cannot be seen by all of the online nodes in the cluster, the MDisk group that this MDisk is a member of goes offline. This causes *all* the VDisks that are being presented by this MDisk group to go offline. Care should be taken when creating MDisk groups to ensure an optimal configuration.

Consider the following guidelines when you create MDisk groups:

1. If you are creating image-mode VDisks, do not put all of these VDisks into one MDisk group because a single MDisk failure results in all of these VDisks going offline. Allocate your image-mode VDisks between your MDisk groups.
2. Ensure that all MDisks allocated to a single MDisk group are of the same RAID type. This ensures that a single failure of a physical disk in the storage subsystem does not take the entire group offline. For example, if you had three RAID-5 arrays in one group and added a non-RAID disk to this group, if the non-RAID disk fails, then you lose access to all the data striped across the group. Similarly, for performance reasons you should not mix RAID types. The performance of all MDisks will be reduced to the lowest performer in the group.
3. If you intend to keep the virtual disk allocation within the storage exported by storage subsystem, you should ensure that the MDisk group that corresponds with a single subsystem is presented by that subsystem. This also enables non-disruptive migration of data from one subsystem to another subsystem and simplifies the decommissioning process should you wish to decommission a controller at a later time.

Extent:

To track the space that is available, the SAN Volume Controller divides each MDisk in an MDisk group into chunks of equal size. These chunks are called *extents*, and are indexed internally. Extent sizes can be 16, 32, 64, 128, 256, or 512 MB.

You must specify the extent size when you create a new MDisk group. You cannot change the extent size later; it must remain constant throughout the lifetime of the MDisk group. MDisk groups can have different extent sizes, however different extent sizes can place restrictions on the use of data migration. The choice of extent size affects the total amount of storage that can be managed by a SAN Volume Controller cluster. Table 3 on page 18 shows the maximum amount of storage that can be managed by a cluster for each extent size. Because the SAN Volume

Controller allocates a whole number of extents to each virtual disk that is created, using a larger extent size can increase the amount of wasted storage at the end of each virtual disk. Larger extent sizes also reduce the ability of the SAN Volume Controller to distribute sequential I/O workloads across many managed disks. Therefore, larger extent sizes might reduce the performance benefits of virtualization.

Table 3. Capacities of the cluster given extent size

Extent size	Maximum storage capacity of cluster
16 MB	64 TB
32 MB	128 TB
64 MB	256 TB
128 MB	512 TB
256 MB	1 PB
512 MB	2 PB

The following figure shows an MDisk group containing four MDisks.

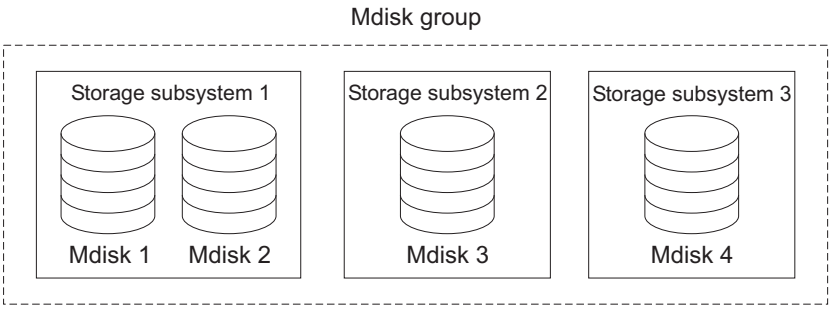

Figure 5. MDisk group

Related topics:

- "Managed disks (MDisks)" on page 14
- "Virtual disks (VDisks)"

Virtual disks (VDisks)

A *VDisk* is a logical disk that the cluster presents to the storage area network (SAN). Application servers on the SAN access VDisks, not managed disks (MDisks). VDisks are created from a set of extents in an MDisk group. There are three types of VDisks: striped, sequential, and image.

Types:

You can create the following types of VDisks:

Striped

The striping is at extent level. One extent is allocated, in turn, from each managed disk that is in the group. For example, a managed disk group that has 10 MDisks takes one extent from each managed disk. The 11th extent is taken from the first managed disk, and so on. This procedure, known as a round-robin, is similar to RAID-0 striping.

Attention: Care should be taken when specifying a stripe set if your MDisk group contains MDisks of unequal size. By default, striped VDisks are striped across all MDisks in the group. If some of the MDisks are smaller than others, the extents on the smaller MDisks will be used up before the larger MDisks run out of extents. Manually specifying the stripe set in this case, might result in the VDisk not being created.

If you are unsure about whether there is sufficient free space to create a striped VDisk select one of the following options:

- Check the free space on each MDisk in the group, using the **svcinfo lsfreeextents** command
- Let the system automatically create the VDisk, by not supplying a specific stripe set.

You can also supply a list of MDisks to use as the stripe set. This list can contain two or more MDisks from the managed disk group. The round-robin procedure is used across the specified stripe set.

The following figure shows an example of a managed disk group containing three MDisks. This figure also shows a striped virtual disk created from the extents available in the group.

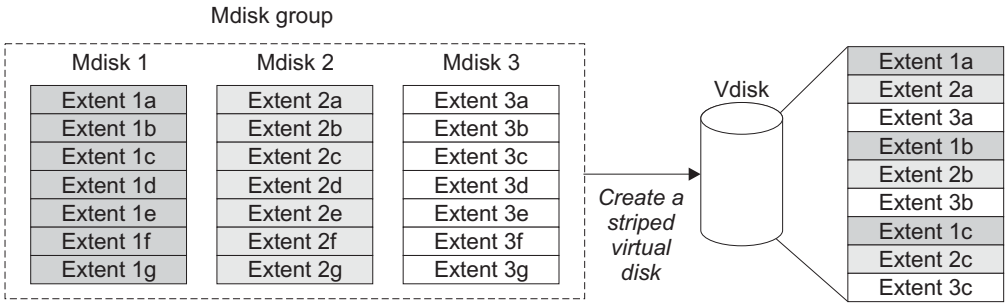

Figure 6. Managed disk groups and VDisks

Sequential
When selected, extents are allocated sequentially on one managed disk to create the virtual disk if enough consecutive free extents are available on the chosen managed disk.

Image Image-mode VDisks are special VDisks that have a direct relationship with one managed disk. If you have a managed disk that contains data that you want to merge into the cluster, you can create an image-mode virtual disk. When you create an image-mode virtual disk, a direct mapping is made between extents that are on the managed disk and extents that are on the virtual disk. The managed disk is not virtualized. In other words, the logical block address (LBA) x on the managed disk is the same as LBA x on the virtual disk.

When you create an image-mode VDisk, you must assign it to a managed disk group. An image-mode VDisk must be at least one extent in size. In other words, the minimum size of an image-mode VDisk is the extent size of the MDisk group to which it is assigned.

The extents are managed in the same way as other VDisks. When the extents have been created, you can move the data onto other MDisks that are in the group without losing access to the data. After you move one or

more extents, the virtual disk becomes a real virtualized disk, and the mode of the managed disk changes from image to managed.

Attention: If you add an MDisk to an MDisk group as a managed disk, any data on the MDisk will be lost. Ensure that you create image-mode VDisks from the MDisks that contain data before you start adding any MDisks to groups.

MDisks that contain existing data have an initial mode of unmanaged, and the cluster cannot determine whether they contain partitions or data.

The status of a virtual disk consists of three settings. The following table describes the different states of a virtual disk:

Table 4. Virtual disk status

Status	Description
Online	The virtual disk is online and available if both nodes in the I/O group can access the virtual disk. A single node will only be able to access a VDisk if it can access all the MDisks in the MDisk group associated with the VDisk.
Offline	The VDisk is offline and unavailable if both nodes in the I/O group are missing or none of the nodes in the I/O group that are present can access the VDisk.
Degraded	The status of the virtual disk is degraded if one node in the I/O group is online and the other node is either missing or cannot access the virtual disk.

You can also use more sophisticated extent allocation policies to create VDisks. When you create a striped virtual disk, you can specify the same managed disk more than once in the list of MDisks that are used as the stripe set. This is useful if you have a managed disk group in which not all the MDisks are of the same capacity. For example, if you have a managed disk group that has two 18 GB MDisks and two 36 GB MDisks, you can create a striped virtual disk by specifying each of the 36 GB MDisks twice in the stripe set so that two thirds of the storage is allocated from the 36 GB disks.

If you delete a virtual disk, you destroy access to the data that is on the virtual disk. The extents that were used in the virtual disk are returned to the pool of free extents that is in the managed disk group. The deletion might fail if the virtual disk is still mapped to hosts. The deletion might also fail if the virtual disk is still part of a FlashCopy or a Remote Copy mapping. If the deletion fails, you can specify the force-delete flag to delete both the virtual disk and the associated mappings to hosts. Forcing the deletion will also delete the copy services relationship and mappings.

SAN Volume Controller for Cisco MDS 9000

The SAN Volume Controller Storage Software for Cisco MDS 9000 provides virtualization software on a Cisco MDS 9000 Family switch.

This software provides symmetric virtualization by creating a pool of managed disks from the attached storage subsystems, which are then mapped to a set of virtual disks for use by various attached host computer systems. System administrators can view and access a common pool of storage on the SAN, which

enables them to use storage resources more efficiently, and provides a common base for advanced functions. The SAN Volume Controller Storage Software for Cisco MDS 9000 is analogous to a logical volume manager (LVM) on a SAN.

Related topics:

- "SAN Volume Controller" on page 10
- "Multiple Device Manager associations" on page 3

IBM TotalStorage FAStT Storage Server

The FAStT Storage Server is a RAID controller device that contains fibre-channel interfaces that connect the operating systems and the disk drive enclosures. The FAStT Storage Server provides high system availability through use of hot-swappable and redundant components.

IBM TotalStorage Enterprise Storage Server (ESS)

The ESS provides integrated caching and support for redundant arrays of independent disks (RAID) for the disk drive modules (DDMs). The DDMs are attached through a serial storage architecture (SSA) interface.

The ESS provides the following features:

- RAID-5 arrays or non-RAID disk groups
- Fast disk drives
- Fast reduced instruction-set computer (RISC) processors
- A fault-tolerant system
- Sharing of storage between open-systems hosts
- Instant copy solutions with FlashCopy
- Disaster recovery solutions with Peer-to-Peer Remote Copy (PPRC)

When displaying a volume ID for ESS volumes, MDM displays a four-digit hexadecimal number in the format *LLVV*, where *LL* represents the LSS ID and *VV* represents the volume number. Any volume ID displayed in this format uniquely identifies a volume within a particular ESS.

Because of the ESS architecture, count-key data (CKD) volumes will therefore have volume ids in MDM that begin with a leading 0, whereas fixed block (FB) volumes will have ids beginning with 1. Another way of saying this is that CKD volumes belong to LSSs whose LSS ids begin with 0, whereas FB volumes belong to LSSs whose ids begin with 1.

You must correlate ESS volume ids as displayed in MDM to those displayed in the ESS Specialist and ESS CLI. Specialist generally displays the volume id as a three digit number that is identical to the last three digits of the MDM volume id. Specialist also generally appends additional information such the ESS serial number. MDM displays the serial number as part of the Device ID column.

To convert between MDM and Specialist formats, it is necessary to match the three-digit ESS volume id to the rightmost three digits of the MDM volume id. The leftmost MDM digit, which is always 0 or 1, should be used to differentiate between CKD and FB volumes.

Note: In some cases the ESS Specialist displays the volume id in decimal rather than hexadecimal format. Correlating this with MDM will involve

conversion between decimal and hexadecimal, as MDM uses hexadecimal format consistently for ESS volume ids.

inally, the ESS CLI displays volume ids in a long format that contains the same four-digit hexadecimal identifier used by MDM. Correlating this to MDM format is straightforward.

The following are examples of the same volume ID in each of the formats described above:

MDM

```
Volume ID  Device ID
---------  ---------
160A       2105.22331
```

ESS Specialist

```
Volume
------
60A-22331
```

ESS CLI

```
ESS.22331.160A.60a22331
```

Performance Manager

You can use the Performance Manager component of Multiple Device Manager (MDM) to manage and monitor the performance of the storage devices that MDM supports.

Performance Manager provides the following functions:

Collecting data from devices
Performance Manager collects data from these devices:

- IBM TotalStorage Enterprise Storage Server (ESS)
- IBM TotalStorage SAN Volume Controller

Configuring performance thresholds
You can use the Performance Manager to set performance thresholds for each device type. Setting thresholds for certain criteria allows Performance Manager to notify you when a certain threshold has been crossed, thus enabling you to take action before a critical event occurs.

Viewing performance data from the Performance Manager database
You can view performance data from the Performance Manager database using the gauge application programming interfaces (APIs). These gauges present performance data in graphical and tabular forms.

Obtaining the current size and location of the performance data
You can obtain the current size and location of the performance data of the Performance Manager database.

Deleting performance data
You can delete performance data from the Performance Manager database.

Improving performance
You can use allocation optimization algorithms to help you design your data layout so that it meets your performance requirements for the new space.

Related topics:

- Chapter 1, “Multiple Device Manager,” on page 3
- “Device Manager” on page 4
- “Multiple Device Manager co-server” on page 6
- “Multiple Device Manager associations” on page 3
- “Replication Manager” on page 28

ESS Specialist

The IBM TotalStorage Enterprise Storage Server Specialist (ESS Specialist) is a Web-based interface to the ESS. Performance Manager uses ESS Specialist to verify user access to an ESS before the user can create a data collection task for that ESS. Identification of users is a security requirement of the ESS.

You can also use the ESS Specialist to establish a path between a logical subsystem (LSS) in a source ESS and an LSS in a target ESS for use in creating copy pairs.

Storage group

A storage group is a collection of storage units that jointly contain all the data for a specified set of storage units, such as volumes. The storage units in a group must be from storage devices of the same type.

Groups can be created to identify sets of volumes that need to be managed as a consistent unit. A general purpose group can be used as a container for volumes that share some association, for example a group of volumes that are all associated with a specific application. A group can contain any set of compatible managed elements, for example managed disks (MDisks).

After a storage group is created, you can perform the following tasks:

- Add volumes or other managed elements
- Delete volumes or other managed elements
- Change the description of the group

A storage group can be managed by a Replication Manager session, so that copy tasks can be performed between storage groups.

Related topics:

- “Replication session” on page 29

Storage pools for the SAN Volume Controller

Volumes can be collected into user-defined groups and pools. A *pool* is a set of volumes that you have set aside for a particular purpose, such as for targets of copy operations. A collection of SAN Volume Controllers can share the storage resources in a storage pool within a storage area network (SAN).

Each managed disk (MDisk) on a SAN Volume Controller that is a member of the same group is split into fixed-size units of data called *extents*. The storage available on these MDisks is added to a pool of extents available to members of the group. Free extents from the pool are used to create virtual disks (VDisks).

After you have created a storage pool, you can perform the following tasks:

- Add VDisks

- Delete VDisks
- Change the description of the pool

A storage pool can be managed by a Replication Manager session for data copy tasks.

Related topics:

- "Replication session" on page 29

Storage pools

A storage pool is an aggregation of storage resources on a storage area network (SAN) that you have set aside for a particular purpose. For example, you could use a storage pool for targets of copy operations that a collection of storage devices on the SAN can use.

The pool can be split into virtual disks (VDisks) that are visible to the storage devices that use them. The storage devices can be from different vendors but must be a type that Multiple Device Manager supports.

MDM paths

Replication Manager uses a communication link to copy volumes between a source device and a target device.

In the IBM TotalStorage Enterprise Storage Server (ESS), this communication link is called a *path*. For the ESS, you use the ESS Specialist to create and remove paths.

Related topics:

- "ESS Specialist" on page 23
- "Partnerships"

Partnerships

Partnerships are established between SAN Volume Controller clusters for remote copy functions.

Creation of partnerships is not an MDM-supported task. Use the SAN Volume Controller Console to create or remove a partnership between clusters.

You can use the MDM Paths panel to view the partnerships that have been established between SAN Volume Controller clusters. The Paths panel provides the following information:

- Device ID
- Source cluster
- Target cluster
- Connection type (ESCON® or fibre channel)
- Status (established or suspended)

You can also view information about partnership status and partnership bandwidth by double clicking on a SAN Volume Controller icon in the Group Contents pane of the IBM Director.

Performance threshold task

You can use Performance Manager to set performance thresholds for each storage device type. Setting thresholds for certain criteria allows Performance Manager to notify you when a certain threshold has been crossed, which enables you to take action before a critical event occurs.

Multiple Device Manager (MDM) provides an interface you can use to create a performance data-collection task. You can set the following thresholds when you are creating a performance data-collection task.

Note: Not all of the listed thresholds are displayed for a selected device. The thresholds are device dependent.

Threshold Name
Description

Disk Utilization
Percent of time busy

Percent of sequential I/Os
Percent of sequential I/Os

Nonvolatile Storage
Percent of time full

Average cache holding time
Measured in seconds

I/O rate
Total number of I/O requests

VDisk I/O rate
Total number of virtual disk I/Os for each I/O group

VDisk bytes/second
Virtual disk bytes per second for each I/O group

MDisk I/O rate
Total number of managed disk I/Os for each managed disk group

MDisk bytes/second
For each managed disk group

Data transaction (count/second)
Total server-level data transaction rate

Data transaction for updates (count/second)
Total server-level data transaction rate for updates to system objects

Related topics:

- "Performance Manager" on page 22

Performance data-collection task

You can use Multiple Device Manager (MDM) performance data-collection tasks as an aid for evaluating performance across a data-storage environment. A defined task collects performance data from MDM supported storage devices. You define performance data-collection tasks using the MDM Performance Manager interface panels.

Defined and saved performance data-collection tasks are displayed in the IBM Director Task pane. Authorized MDM users can view, modify, and delete a performance data-collection task.

Once a performance data-collection task is saved, you can create a job within the IBM Director scheduler. Performance collection tasks must be defined and contained in a scheduled job before you can use gauge, threshold, and Performance Manager advisor functions. You can define the date, the time, and any job repetition parameters using the scheduler functions. You can also view, change, and delete jobs containing performance data-collection tasks using the scheduler.

Data collection for the SAN Volume Controller:

Performance Manager uses an integrated configuration assistant tool (ICAT) interface for an IBM TotalSTorage SAN Volume Controller to start and stop performance statistics collection on a SAN Volume Controller device. If the device is available and the connection is successfully established, a secure shell (SSH) is used to retrieve files that contain performance data. These files are copied into a directory on Performance Manager. Data is read from these files and saved into Performance Manager database tables.

Data collection for the Enterprise Storage Server:

To collect performance data for the IBM TotalStorage Enterprise Storage Server (ESS), Performance Manager invokes the ESS Specialist server, setting a particular performance data-collection frequency and duration of collection. ESS Specialist collects the performance statistics from an ESS, establishes a connection, and sends the collected performance data to Performance Manager. Performance Manager then processes the performance data and saves it in Performance Manager database tables.

Related topics:

- "Performance Manager" on page 22
- "Multiple Device Manager gauges"

Multiple Device Manager gauges

Multiple Device Manager (MDM) gauges are user-defined, graphical and tabular presentations of performance data and performance exceptions.

Gauges are saved in the Performance Manager database and retrieved upon request. When you request data pertaining to a defined gauge from Performance Manager, Performance Manager builds a query to the database, retrieves and formats the data, and returns it to you.

You can create (define) gauges, list gauges, modify and delete gauges, and display information about a specific gauge.

Gauge types:

Performance Manager supports the following gauge types:

Performance
The performance-type gauges present sample-level performance data. The frequency at which performance data is sampled on a device depends on

the sampling frequency that you specify when you define the performance collection task. The maximum and minimum values of the sampling frequency depend on the device type. The static display presents historical data over time. The refreshable display presents near real-time data from a device that is currently collecting performance data.

Exception

The exception-type gauges present a count of warning and critical thresholds exceeded for each of the thresholds that are enabled. An exception occurs when a measurement from a collection of values sent by a storage device, exceeds a preset value. For each day in a time span that you select, Performance Manager reports the total number of warning- and critical-exceptions for the selected device. The types of exceptions that are reported depend on the device type. With an expanded view, you can see information about each exception occurrence such as the time, subcomponent identification, and the actual value of the metric when the exception occurred.

Related topics:

• "Performance Manager" on page 22

Volume performance advisor

The volume performance advisor function shows you how to set performance requirements for data retrieval and maintenance and how to allocate data storage to meet these requirements. The advisor uses allocation optimization algorithms to guide you toward a data layout for new storage that will meet your performance requirements.

You can use the Volume performance advisor wizard to estimate the workload of the application for which storage is to be allocated. If you do not know the workload characteristics of the application, you can select a default workload profile from a set of predetermined characteristics for common application types. You select the workload profile from the Workload profile page in the Volume performance advisor wizard.

The volume performance advisor function uses the historical performance information that you provide to make recommendations about volume creation and maintenance. You must define performance collection tasks and run the tasks in scheduled jobs before the volume performance advisor can make recommendations.

Related topics:

• "Performance Manager" on page 22

Zones

A storage area network (SAN) can be arranged with various areas called *zones*. The SAN administrator can divide the SAN into two distinct zones, a host zone and a disk zone. These zones enable the SAN Volume Controllers to access the RAID controllers and the host systems to access the SAN Volume Controllers. All SAN Volume Controller connections must be in both zones.

Host zone:

The *host zone* is that portion of the SAN that consists of the hosts and a SAN Volume Controller. Hosts can detect and directly address the SAN Volume Controller. However, hosts cannot detect and directly address the disk controller systems that are connected to the SAN Volume Controller.

Disk zone:

The *disk zone* is that portion of the SAN that consists of the SAN Volume Controller, the disk controller systems, and the devices attached to the disk controller systems. The SAN Volume Controller can detect and directly address the logical units (LUs) presented by the disk controllers. The SAN Volume Controller also controls all the physical storage in the disk zone.

Replication Manager

Replication Manager provides two types of copy services: continuous, synchronous, remote copy and point-in-time copy. These data-copy services maintain consistent copies of data on source volumes that are managed by Multiple Device Manager.

A Replication Manager copy session ensures that data on multiple, related, heterogeneous volumes is kept consistent by managing the volume pairs in the session as a consistent unit.

Replication Manager provides an interface for creating, maintaining, and using volume groups and for scheduling copy tasks. Replication Manager populates the lists of volumes using the Multiple Device Manager interface. You can use Replication Manager to perform the following tasks:

- Create replication groups.

  A replication group is a collection of volumes grouped together so that they can be managed concurrently.
- Set up a group for replication.
- Create, save, and name a replication task.
- Schedule a replication session using the following interface panels:
  - Create session wizard
  - Select source group.
  - Select copy type.
  - Select target pool.
  - Save session.
- Start a replication session.

You can also perform these tasks using the Replication Manager command-line interface.

Related topics:

- Chapter 1, “Multiple Device Manager,” on page 3
- “Device Manager” on page 4
- “Multiple Device Manager co-server” on page 6
- “Multiple Device Manager associations” on page 3
- “Performance Manager” on page 22

Replication session

Replication Manager supports the *session* concept in which multiple pairs of volumes are handled as a consistent unit. You can create and manage copy relationships between source and target volume pairs or source volume groups, and among target pools through a Replication Manager copy session.

The Replication Manager Sessions panel shows sessions and their associated status. The status indicates if the volume is a source, target, or both; and it shows the copy mode of the volume. You can also use this panel to assess if current replication activities are proceeding normally or abnormally.

When you are creating a Replication session, you can select source and target volume pairs or volume groups, then establish a continuous, synchronous, remote copy (remote copy) or point-in-time copy (PIT copy) relationship between them. The Sessions panel includes the following options:

Create Invokes the Create Session wizard, which you can use to create copy relationships for a new session. You select copy types (remote copy or PIT copy), source volume groups, and target pools during the creation of the new session.

Delete Deletes an existing session.

Start Starts an existing session.

Increment
Makes another PIT copy of the data for an existing session; the previous copy is lost.

Suspend (consistent)
Freezes an existing session, which results in a consistent target copy if there are no errors.

Suspend (immediate)
Stops an existing session with no guarantee of consistency.

Terminate
Stops an existing session and withdraws the relationships.

Status Provides an at-a-glance status view of an existing session.

Properties
Displays the Session Properties panel for an existing session.

Related topics:

- "Replication Manager" on page 28

MDM storage units

MDM uses Device Manager to manage data storage units. Storage units are data storage containers, such as volumes and logical unit numbers (LUNs). Storage devices assign the LUNs to the storage units. The LUN provides a unique address or identifier for the logical volume.

Device Manager provides interconnections between managed objects and storage units. For example, Device Manager provides the association between a virtual LUN and a managed LUN in a SAN Volume Controller. By examining the storage

units being used by each device and matching worldwide node names, Device Manager creates associations between the managed objects that represent the storage device and the storage unit.

Note:

When reporting storage capacity, MDM follows the IEEE standard definitions in which:

- kilobyte (KB) = 1000 bytes
- megabyte (MB) = 1000 kilobytes
- gigabyte (GB) = 1000 megabytes

The FAStT Storage Manager and SAN Volume Controller Administrative Console both report capacities using these equivalencies:

- kilobyte (KB) = 1024 bytes
- megabyte (MB) = 1024 kilobytes
- gigabyte (GB) = 1024 megabytes

Thus, if the SAN Volume Controller Administrative Console reports the capacity of a virtual disk as ″1 GB″, MDM will report it as ″1.0737 GB″. In both cases the capacity of the virtual disk is 1,073,741,824 bytes: it is the size of the unit ″gigabyte″ that is being treated differently.

Related topics:

- “Device Manager” on page 4

Volumes

Volumes are units of data assigned to storage devices such as the IBM TotalStorage Enterprise Storage and the IBM FAStT Storage Server. Multiple Device Manager (MDM) provides volume management functions, such as creating and deleting volumes and assigning volumes to a host.

Logical volumes are identified in the MDM interface by a volume ID, which is also known as a logical unit number (LUN).

Note:

The identification number is consistent with whatever convention is used in the native application. For example, an IBM TotalStorage Enterprise Storage Server volume ID is identified by four hex characters (0 - 9 or uppercase A - F). For an IBM FAStT Storage Server, the volume ID is identified as `LUN number`.

You can find more information about the IBM TotalStorage Enterprise Storage Server in *Supported Devices* in this infocenter.

Related topics:

- “Device Manager” on page 4
- “Logical unit numbers (LUNs)” on page 31
- “IBM TotalStorage Enterprise Storage Server (ESS)” on page 21

Logical unit numbers (LUNs)

Storage devices assign the LUN to a storage unit, such as a logical volume. The LUN provides a unique address or identifier for the logical volume.

Device Manager provides interconnections between managed objects and LUNs. For example, Device Manager provides the association between a virtual LUN and a managed LUN in a SAN Volume Controller. By examining the LUNs being used by each device and matching worldwide nodes, the Device Manager creates associations between the managed objects that represent the storage device and the LUNs. This association enables you to view the interconnection relationships.

Note: LUNs are identified in the Multiple Device Manager (MDM) interface by the label `volume ID`. The identification number is consistent with whatever convention is used in the native application. For example, an IBM TotalStorage Enterprise Storage Server volume ID is identified by four hex characters (0 - 9 or uppercase A - F). For an IBM TotalStorage FAStT Storage Server, the volume ID is shown as `LUN` *`number`*.

Related topics:

- "Device Manager" on page 4
- "MDM storage units" on page 29

Tivoli Storage Area Network Manager

The Tivoli Storage Area Network Manager helps you manage your resources by providing network resource discovery and management capabilities. Multiple Device Manager SAN Volume Controller supports SAN fabric entities that the Tivoli Storage Area Network Manager discovers.

Tivoli Storage Area Network Manager has a manager and one or more managed hosts:

- The manager does the following:
  - Gathers data from agents on managed hosts, such as descriptions of storage area networks (SANs), logical unit numbers (LUNs), and file systems and host information.
  - Provides graphical displays of SAN topology.
  - Generates Simple Network Management Protocol (SNMP) events when a change is detected in the SAN fabric.
  - Forwards events to the Tivoli Enterprise Console or an SNMP console.
- An agent resides on each managed host. The agents on the managed hosts do the following:
  - Gather information about the SAN by querying switches and devices for attribute and topology information.
  - Gather host-level information, such as file systems and mapping to logical units (LUNs).
  - Gather event information and other information detected by host bus adapters (HBAs).

Related topics:

- "MDM groups" on page 3
- "SAN Volume Controller" on page 10

Part 2. Installing IBM Multiple Device Manager for Windows 2000 operating systems

This part describes installation requirements and procedures to install the IBM Multiple Device Manager (MDM) for Microsoft Windows 2000.

Chapter 2. Planning for installation for Windows

Perform these tasks to plan for the installation of the Multiple Device Manager (MDM).

Steps:

Perform the following steps during the planning phase for MDM installation:

1. Verify that your Microsoft Windows 2000 operating system is updated with Service Pack 4 or later.
2. Verify that your hardware meets the following requirements:
   - 1 GHz or faster Intel™ Pentium® III
   - 1 GB RAM minimum; 2 GB RAM recommended
   - Ethernet or token-ring card for network connectivity

     Note: External Internet connectivity is not required to install MDM.
   - CD-ROM drive
   - (Optional) If you are installing Tivoli Storage Area Network Manager, you need to connect to the SAN fabric using a fibre-channel, host bus adapter
3. Verify that your server has 4 GB of free disk space for prerequisite software and future storage data.
4. Schedule the installation of the following software *before* you install MDM:
   - CIM Agent
   - Service Location Protocol (SLP)
5. There can be potential TCP/IP port conflicts between existing software on your system (for example, Tivoli NetView) and the ports which you will assign to WebSphere Application Server. Refer to "TCP/IP port considerations" listed in the related topics section for more information about TCP/IP port usage by WebSphere Application Server and NetView.

   The "typical" path in the MDM installation program will assume default WebSphere Application Server port usage unless it detects an active port conflict with the default WebSphere Application Server ports. If the install program detects a port conflict, it will present you with the WebSphere Application Server port panel so that you can change the default port settings.

In addition to the above preparation you need the following prerequisite software. These products are included on your MDM CDs.

- IBM Director Version 4.12
- IBM WebSphere Version 5.1 (installed from the MDM Base CD)

  Notes:

  1. This installation of WebSphere Application Server must be reserved for use with Multiple Device Manager, so Multiple Device Manager and the related installation and removal programs can start and stop WebSphere Application Server as necessary.
  2. The Multiple Device Manager installation program will automatically install WebSphere Application Server 5.1 and its required components on your system. If you install WebSphere Application Server 5.1 outside of the MDM

installation wizard, you will need to install the components separately. The required WebSphere Application Server 5.1 components are:
  - Admin Scripting
  - IBM HTTP Server
  - WebSphere Message Queuing
  - WebSphere Message Queuing CSD 05
- IBM DB2 Version 8.1 with FixPak 2.

Attention: Performance Manager and Replication Manager are ordered separately and both may not be contained in your Media kit. However, at least one of them must be installed with Multiple Device Manager Base Code.

Related topics:
- "System prerequisites for Windows"
- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing IBM Director for Windows" on page 44
- "Installing Multiple Device Manager for Windows" on page 46
- "User names and passwords" on page 39
- "Creating SSL key files and certificates for Windows" on page 57
- "Installing Performance Manager for Windows" on page 59
- "Installing Replication Manager for Windows" on page 69
- "TCP/IP port considerations" on page 41
- "Avoiding port conflicts" on page 168

System prerequisites for Windows

The prerequisites for installing Multiple Device Manager (MDM) are listed in the following sections. Verify that all requirements are met before you install MDM.

MDM installation prerequisites:

Table 5 lists the MDM installation prerequisites.

Table 5. MDM installation prerequisites

Operating system	• Microsoft Windows 2000 Server with Service Pack 4
Hardware	• 1 GHz or faster Intel Pentium III • 1 GB RAM minimum; 2 GB RAM recommended • Ethernet or token-ring card • CD-ROM drive • Network connectivity **Note:** External Internet connectivity is not required to install MDM. • (Optional) If you are installing Tivoli Storage Manager, connectivity to the SAN fabric using a fibre-channel, host bus adapter
Disk space	4 GB free disk space for prerequisite software and future storage data

Attention: If you use IBM TotalStorage® Enterprise Storage Server (ESS) Expert, note that MDM and Expert cannot coexist on the same server. You need to install MDM on a separate server from Expert.

LIC and CIM Agent prerequisites:

Table 6 lists the MDM Managed I/O Subsystem Licensed Internal Code (LIC) and CIM Agent prerequisites

Table 6. MDM Managed I/O Subsystem LIC and CIM Agent prerequisites

MDM Managed I/O Subsystem	Minimum Licensed Internal Code (LIC)	CIM Agent code levels
Enterprise Storage Server	LIC 2.63	CIM Agent for ESS 1.2.0.28 ESS CLI 2.3.0.19
SAN Volume Controller	LIC 1.2.0.0	SAN Volume Controller Console 1.2.0.2
FAStT	600, 700, and 900 (8.3 microcode)	LSI Provider 1.0.2
Brocade switches	Microcode 2.1 or higher	

Related topics:

- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing IBM Director for Windows" on page 44
- "Installing Multiple Device Manager for Windows" on page 46
- "Installing Performance Manager for Windows" on page 59
- "Installing Replication Manager for Windows" on page 69
- "Related Web sites" on page 186

Installation overview for Windows

This topic gives an overview of the installation tasks for IBM TotalStorage Multiple Device Manager (MDM) and the order in which they are to be performed. It also includes descriptions of the components that must be installed.

Installation tasks overview:

This section lists the tasks you perform when installing Multiple Device Manager. You must complete these tasks in the order that they are presented:

1. Verify hardware and software prerequisites for the target Multiple Device Manager system.
2. (Required) Install DB2 Universal Database™ Workgroup Edition V8.1 with FixPak 2.
3. (Required) Install IBM Director 4.12.

   Note: You will need the DB2 user name and password for the IBM Director installation.
4. (Required) Install Multiple Device Manager (MDM) software and the WebSphere Application Server 5.1, including the WebSphere Message Queuing CSD 05, using the Multiple Device Manager Installation wizard. (If the WebSphere Application Server 5.1 and its required components are already installed on your machine, the MDM Installation Wizard will detect them and will only install the Multiple Device Manager software.)

Note: You will need the DB2 user name and password for the MDM software installation.

5. (Optional) Install Performance Manager using IBM Performance Manager wizard.

   Note: You will need the DB2 user name and password for the Performance Manager installation.

6. (Optional) Install Replication Manager using IBM Replication Manager wizard.

Note:

See the *User names and passwords* topic listed below for more detail about the particular user name and password combinations required during the installation process.

Components to be installed:

This section lists additional detail about the components that must be installed before you can use Multiple Device Manager.

DB2 Universal Database
Multiple Device Manager uses DB2 for persistent storage needs. A copy of DB2 is shipped with MDM, and must be installed and configured for use with MDM.

IBM Director
As part of the Multiple Device Manager infrastructure IBM Director provides device discovery, device management, and other services to Multiple Device Manager users. These services are provided through a graphical user interface that gives system administrators easy access to both local and remote systems. Additional single-device, multiple-device, and cross-device configuration functions are provided by Device Manager, which has a dual role as a component of Multiple Device Manager and as part of the infrastructure of IBM Director.

Multiple Device Manager
Multiple Device Manager software is the basic component of the Multiple Device Manager product and is added to IBM Director. It provides access to single-device, multiple-device, and cross-device configuration functionality

WebSphere Application Server
The WebSphere Application Server is a high-performance, scalable transaction engine for dynamic e-business applications. WebSphere provides a single Web services-enabled application server and development environment.

Notes:

1. This installation of WebSphere Application Server must be reserved for use with Multiple Device Manager, so Multiple Device Manager and the related installation and removal programs can start and stop WebSphere Application Server as necessary.
2. The MDM uninstallation program uninstalls MDM but it does not uninstall WebSphere Application Server. Separate instructions are provided for removing Multiple Device Manager and for removing WebSphere Application Server.

Performance Manager

The Performance Manager component of Multiple Device Manager manages and monitors the performance of the storage devices that Multiple Device Manager supports. Users can track the performance of a storage device from the data that Performance Manager collects. The data can be viewed in user defined graphs. The performance advisor function shows the user how to set performance requirements for data retrieval and maintenance and how to allocate data storage to meet these requirements.

Replication Manager

Replication Manager provides a user interface for creating, maintaining, and using volume groups and for scheduling copy tasks. The User Interface populates lists of volumes using the Device Manager interface. Replication Manager provides two types of copy services, Continuous Copy and Point-in-Time Copy. These data-copy services maintain consistent copies of data on source volumes that are managed by Multiple Device Manager. A Replication Manager copy session ensures that data on multiple related heterogeneous volumes is kept consistent by managing the volume pairs in the session as a consistent unit.

Related topics:

- "User names and passwords"
- "System prerequisites for Windows" on page 36
- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing IBM Director for Windows" on page 44
- "Installing Multiple Device Manager for Windows" on page 46

User names and passwords

You must set user names (sometimes referred to as *user IDs*) and passwords for Multiple Device Manager (MDM) and its components during installation and configuration. This topic describes various user names, when and how they are set, and when they are used.

Multiple Device Manager:

The MDM and Performance Manager installation programs request that you enter this user name and password. The user name must be registered with the operating system. On Windows, the user name must be part of the DirAdmin and DirSystem groups, which are the IBM Director Group group names. On Linux, the user name must be part of the diradmin and dirsystem groups, which are the Linux IBM Director Group names. You can change the MDM user name after installation using the Configure MDM task in the IBM Director Console. The MDM user name must be treated as a universal user name to accomplish connectivity with MDM managed devices. You must put this same user name and password on your CIM Agents in your enterprise.

CIM Agent for IBM TotalStorage Enterprise Storage Server (ESS):

The CIM Agent for ESS provides MDM with access to the ESSs. You must customize the CIM Agents in your enterprise to accept the MDM user name and password. See the **setuser** command for CIM Agent for ESS.

CIM Agent for IBM TotalStorage SAN Volume Controller:

The CIM Agent for SAN Volume Controller is part of the SAN Volume Controller Console and provides MDM with access to SAN Volume Controller clusters. You must customize the CIM Agents in your enterprise to accept the MDM user name and password. See the SAN Volume Controller Console user assistance to change passwords and create new user names for the SAN Volume Controller Console.

User that is installing MDM:

The logged-on user that is performing the installation is the user account that is active during the installation of MDM and Performance Manager. This individual must have certain user rights that might not always be assigned to the administrators group. During MDM installation, MDM detects the missing user rights, and adds them to the account when the user accepts this option.

IBM DB2 Universal Database:

When you install DB2 Universal Database, you provide a user name string and password. If the user name does not exist on the operating system, DB2 installation creates it for you. The DB2 services run under the log-on properties of the user name. If you change the password, you must correct the services log-on properties for DB2. You need the DB2 user name and password when you are installing the following products:

- The IBM Director installation requests a valid DB2 user name and password.
- The MDM installation program requests a valid DB2 user name and password.
- The Performance Manager installation program requests a valid DB2 user name and password.

IBM Director:

The IBM Director installation program requires that you enter the IBM Director user name and password. The IBM Director services run under the log-on properties of the user name that you provide. If you change the password, you must correct the services log-on properties for the IBM Director. The IBM Director user name and password are also used to log on to the IBM Director Console. For Windows, any valid user names that are defined within the DirAdmin or DirSuper groups on the system where the IBM Director server is installed have access to the IBM Director and MDM Console functionality. For Linux, any valid user names that are defined within the diradmin or dirsuper groups on the system where the IBM Director server is installed have access to the IBM Director and MDM Console functionality.

IBM WebSphere Application Server:

For Windows, the WebSphere Application Server services run under the log-on properties of the user name that you provide. The MDM installation requests that you enter this user name. A new user name is created on the operating system if it does not exist. To avoid WebSphere Application Server user name restrictions, enter a user name with eight or less characters and avoid non-alphabetic characters and blanks. If you change the password, you must correct the services log-on properties for the WebSphere Application Server.

For Linux, the WebSphere Application Server services run under root.

If WebSphere Application Server was installed as part of your MDM installation, the WebSphere Application Server superuser user ID and password are the same as

the MDM superuser ID and password. To stop WebSphere Application Server, you must include the superuser ID and password in the stopServer command. To log onto the WebSphere Application Server Administration Console, you must use the MDM superuser user ID and password.

Performance Manager:

When you create a performance data-collection task for a storage device, some devices require a user name and password. User names and passwords are required for a SAN Volume Controller in the following situations:

- When you create a performance data-collection task for a SAN Volume Controller, enter the SAN Volume Controller user name and password that you use when you are running the SAN Volume Controller CLI. This is the same user name that you enter in the browser network-security window when you access the SAN Volume Controller cluster. (The network security for the SAN Volume Controller Console prompts you for the administrator user name.) Do *not* enter the MDM super user name.

TCP/IP port considerations

This topic contains information about configuring TCP/IP ports on your system for WebSphere Application Server, including considerations regarding potential port conflicts with other software on your system.

Default MDM WebSphere Application Server ports:

The MDM installation program will pre-configure the TCP/IP ports used by WebSphere Application Server 5.1 as shown in Table 7.

Table 7. Multiple Device Manager default WebSphere Application Server ports

WebSphere Application Server Port	Port value
Bootstrap port	2809
IBM HTTP Server port	80
IBM HTTP Admin port	8008
HTTP Transport port	9080
HTTPS Transport port	9443
Admin Console port	9090
Admin Console Secure Server port	9043
JMS Server Direct Address port	5559
JMS Server Security port	5557
JMS Server Queued Address port	5558
SOAP Connector Address port	8980
DRS Client Address port	7873

If you chose the “advanced” installation path, you will be presented with the default WebSphere Application Server TCP/IP ports panel. The “typical” installation path will assume default WebSphere Application Server port usage unless it detects an active port conflict with the default assignments. If a conflict is detected, then the WebSphere Application Server TCP/IP ports panel will be displayed so that you can change the default values.

The installation program will check for port conflict at the time of installation. However, if ports come active after the MDM installation, a port conflict might occur.

Ensure that the port numbers you use are not used by other applications. To determine which port numbers are currently in use on a particular machine, type either of the following commands from a command prompt: **netstat -a**, or **netstat -an**. The port numbers in use on that system will be listed in the "Local Address" column of the output in the format `host:port`, for example:

```
Active Connections

Proto  Local Address          Foreign Address        State

TCP    hostai:1025            hostai:0               LISTENING

TCP    hostai:1038            hostai:0               LISTENING
```

Note: The **netstat** command reflects ports currently in use. However, port usage can subsequently change as the software runs, is started, or new software is installed.

Consult your system administrator for more information about TCP/IP port usage on your system. You can also find additional port assignment information at http://www.iana.org/assignments/port-numbers.

Related topics:

- "Avoiding port conflicts" on page 168
- Chapter 2, "Planning for installation for Windows," on page 35
- Chapter 5, "Planning for installation for Linux," on page 85

Installing DB2® Universal Database Workgroup Edition for Windows

You can use these procedures to install the DB2 Universal Database (UDB) Workgroup Edition V8.1 including the DB2 V8.1.2 update (FixPak 2). If you already have DB2 Universal Database Workgroup Edition V8.1 installed on your system, you must install the DB2 V8.1.2 update (FixPak 2). The DB2 updates are available for download from IBM. See the Post-processing requirements section of this topic for more information about locating and installing DB2 updates.

Prerequisites:

Before starting the installation of DB2 UDB Workgroup Edition, you should have already verified your hardware and software requirements.

Steps:

Perform the following steps to install the DB2 UDB Workgroup Edition:

1. Insert the DB2 UDB Workgroup Edition product CD into the CD-ROM drive. AutoRun starts the LaunchPad.

   The DB2 installation program should start within 15-30 seconds if you have AutoRun mode set on your system. If the Installation program does not start, perform either of the following:

a. Use a command prompt to change to the root of the CD-ROM and type: **setup.exe**.
b. Use Windows Explorer, open the root of the CD-ROM and double-click on the setup.exe file.

   Note: If you are viewing the folder with Windows Explorer with the option selected to hide file extensions for known file types, find the setup file with the file type of Application.

2. In the Welcome to DB2 window, click the **Install Products** button on the left side menu bar.
3. In the Select the Product you would like to install window, select **DB2 UDB Workgroup Server Edition**. Click **Next**.
4. When the DB2 Setup wizard window opens, click **Next**.
5. In the License Agreement window, read the license agreement and click **I accept the terms in the license agreement** if you agree to the terms. Click **Next**.
6. In the Select the installation type window, select **Typical**. Click **Next**.
7. Click **OK** in the Warning window.
8. In the Select installation folder window, select a folder or use the default. Click **Next**.
9. Complete the following steps in the Set user information for the DB2 Administration Server window:
   a. Type the domain of this user. If it is a local user, leave this field blank.
   b. Type a user name and password of the DB2 user account that you want to create.

      DB2 will create a user with the following administrative rights:
      - Act as part of an operating system
      - Create a token object
      - Increase quotas
      - Replace a process-level token
      - Log on as a service

   c. Select the check box to "use the same user name and password for the remaining DB2 services."
   d. Click **Next**.
10. When the Set up the administration contact list window opens, accept the default settings and click **Next**.
11. If the Warning window opens, click **OK**.
12. In the Configure DB2 instances window, accept the default settings and click **Next**.
13. When the Prepare the DB2 tools catalog window opens, accept the default settings and click **Next**.
14. In the Specify a contact for health monitor notification window, click **Defer the task until after installation is complete**, and click **Next**.
15. Click **Install** in the Start copying files window.
16. Click **Finish** in the Setup is complete window.
17. In the First Steps window, click **Exit First Steps** button on the left-side menu bar.

Post-processing requirements:

The DB2 CD supplied with Multiple Device Manager installs DB2 V8.1 with the DB2 V8.1.2 update (FixPak 2) already integrated in the code. If you have installed DB2 V8.1 from another source, you may need to install the DB2 V8.1.2 update (FixPak 2). You can ensure that you have installed the correct level of the DB2 code by using the following steps:

1. Open the DB2 command line tool by clicking **Start**–>**Programs**–>**IBM DB2**–>**Administrative Tools**–>**Command Line Tools**–>**Command Line Processor**->**Command Window**, and type the following command:

   ```
   db2 level
   ```

   The following is an example of the output of the **db2level** command:

   ```
   C:\Program Files\IBM\SQLLIB\BIN>db2level DB21085I
   Instance "DB2" uses "32" bits and DB2 code release
   "SQL08012" with level identifier "02030106".
   Informational tokens are "DB2 v8.1.2.169", "s030508",
   "WR21318", and FixPak "2". Product is installed at
   "C:\PROGRA~1\IBM\SQLLIB".
   ```

   Find the FixPak level in the output from the **db2level** command. In this example output, the FixPak level is 2.

   If the FixPak level is 2 when you run the **db2level** command, your installation of DB2 is complete.
2. If the FixPak level is less than 2, you need to download DB2 V8.1.2 update (FixPak 2) from the IBM DB2 UDB and DB2 Connect™ Online Support Web site at: http://www.ibm.com/software/data/db2/udb/winos2unix/support

   Each update contains a set of release notes and a README file. The README file provides instructions for installing the update. Perform the instructions in the README file to install the update.

Related topics:

- "System prerequisites for Windows" on page 36
- "Installing IBM Director for Windows"
- "Installing Multiple Device Manager for Windows" on page 46

Installing IBM Director for Windows

You can use these procedures to install the IBM Director.

Prerequisites:

Before starting the installation of the IBM Director, you should have already installed the IBM DB2 Universal Database Workgroup Edition. DB2 should also be enabled before you log on to the IBM Director Console.

Ensure DB2 is started from the Services window.

1. Click **Start –> Settings –> Control Panel**.
   a. From the Control Panel window, double-click the **Administrative Tools** icon.
   b. From the Administrative Tools window, double-click the **Services** icon.

      Check to ensure that the **Status** column for **DB2-DB2** is **Started**. If not, perform the following steps:
   c. From the Services window, find and single-click the **DB2-DB2** icon, and then either:

- Select the **Start** option from the **Action** menu; or
- Right-click and select **Start** from the menu.

d. Close the Services window.

e. Close the Administrative window.

Steps:

Perform the following steps to install the IBM Director:

1. Insert the IBM Director product CD-ROM into the CD-ROM drive. AutoRun should start the LaunchPad. Click **Install IBM Director**.

   The IBM Director installation program should start within 15 - 30 seconds if you have AutoRun mode set on your system. If the Installation program does not start, perform either of the following steps:

   a. From a Command Prompt window, change to the root of the CD-ROM and type: `setup.exe`

   b. From Windows Explorer, open the root of the CD-ROM and double-click on the setup.exe file.

      Note: If you are viewing the folder with Windows Explorer with the option selected to hide file extensions for known file types, find the setup file with the file type of `Application`.

   c. Click **Install IBM Director**.

2. The IBM Director Installation window opens. Select **IBM Director Server Installation**.

   Note: **Important**: Only select **IBM Director Server Installation**. *Do not* select **IBM Director Agent Installation** or **IBM Director Console Installation**.

3. The IBM Director InstallShield wizard opens. Click **Next**.
4. Read the license agreement. Click **I accept the terms in the license agreement** in the License Agreement window if you agree with the license agreement. Click **Next**.
5. Click **Next** in the advertisement for Enhance IBM Director with the new Server Plus Pack window.
6. Accept the default settings and click **Next** in the Feature and installation directory selection window.
7. In the IBM Director service account information window, type the domain for the IBM Director system administrator. Alternatively, if there is no domain, then type the local host name. Type a user name and password for IBM Director. The IBM Director will run under this user name and you will log on to the IBM Director console using this user name. Click **Next**.
8. Accept the default settings in the Encryption settings window. Click **Next**.
9. In the Software Distribution settings window, select folders or accept the default values and click **Next**.
10. Click **Install** in the Ready to Install the Program window.
11. The Installing IBM Director server window reports the status of the installation.
12. Accept the default settings in the Network driver configuration window, and click **OK**. The secondary window closes and the installation wizard performs more actions, which are tracked in the status window.
13. Select **IBM DB2 Universal Database** in the Select the database to be configured window. Click **Next**.

14. A secondary window opens called IBM Director DB2 Universal Database configuration. (This window might open behind the status window, and you must click it to bring it to the foreground.)

    Perform the following steps to configure your IBM Director to use the DB2 database.

    a. In the **Database name** field, either type a new database name for the IBM Director database table or type an existing database name.

    b. In the **User ID** and **Password** fields, type the DB2 user ID and password that you created during the DB2 installation. Click **Next**.

15. Accept the default DB2 node name (LOCAL - DB2) in the IBM Director DB2 Universal Database configuration secondary window. Click **OK**.

16. The Database configuration in progress window is displayed at the bottom of the IBM Director DB2 Universal Database configuration window. Wait for the configuration to complete and the secondary window to close.

17. Click **Finish** when the InstallShield Wizard Completed window opens.

18. You must reboot your system at some time after installing IBM Director before using its services. Click **Yes** in the IBM Director Server Installer Information window to have your system rebooted immediately.

Result:

The IBM Director is installed.

Related topics:

- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing Multiple Device Manager for Windows"

Installing Multiple Device Manager for Windows

You can use these procedures to install Multiple Device Manager on a Windows operating system and also to install the IBM WebSphere Application Server (WAS), if it is not already installed.

Prerequisites:

Before you install the Device Manager extensions, you should have already installed the DB2 Universal Database Workgroup Edition and the IBM Director.

Notes:

1. Terminal services are not supported on a WebSphere Application Server that includes an embedded messaging feature.
2. The IBM WebSphere Studio Application Developer Integration Edition and IBM WebSphere Application Server both include an option to install embedded messaging. Because the embedded messaging option in these two products is incompatible, do not install embedded messaging for both products on the same machine.

Steps:

Perform the following steps to install Multiple Device Manager and the WebSphere Application Server (if it is not already installed):

1. Log on to your system as a local administrator.

Multiple Device Manager must be installed by a user who is logged on as a local administrator (for example, as the administrator user) on the system where the Multiple Device Manager will be installed. If you intend to install Multiple Device Manager as server, the user needs the following required system privileges, called *user rights*, to successfully complete the installation:

- Act as part of the operating system
- Create a token object
- Increase quotas
- Replace a process level token
- Debug programs

Note: The installation program checks the user privileges and asks the user to set these privileges in step 17 on page 51.

These user rights are governed by the Local security policy and are not initially set as the defaults for administrators. They might not be in effect when you log on as the local administrator. If the Multiple Device Manager installation program does not detect the required user rights for the logged on user name, the program can optionally set them. The program can set the local security policy settings to assign these user rights. Alternatively, you can manually set them prior to performing the installation. To manually set these privileges, click the following path and select the appropriate user rights:

a. Click **Start**–>**Settings**–>**Control Panel**
b. Double-click **Administrative Tools**.
c. Double-click **Local Security Policy**, and the Local Security Settings window opens.
d. Expand **Local Policies**.
e. Double-click **User Rights Assignments** to see the policies in effect on your system. For each policy added to the user, perform the following steps:
   1) Highlight the policy to be checked.
   2) Double-click the policy and look for the user's name in the Assigned To column of the Local Security Policy Setting window to verify the policy setting. Ensure that the **Local Policy Setting** and the **Effective Policy Setting** options are checked.
   3) If the user does not appear in the list for the policy, you must add the policy to the user. Perform the following steps to add the user to the list:
      a) Click **Add** on the Local Security Policy Setting window.
      b) In the Select Users or Groups window, highlight the user of group under the Name column.
      c) Click **Add** to put the name in the lower window.
      d) Click **OK** to add the policy to the user or group.

After these user rights are set (either by the installation program or manually), log off the system, and then log on again in order for the user rights to take effect. You can then restart the installation program to continue with the Multiple Device Manager installation.

2. You must first stop the IBM WebSphere Application Server, if it exists on the system: **Start**–>**Programs**–>**IBM WebSphere**–>**Application Server v5.1**–>**Stop the Server**, if the WebSphere Application Server has the global security disabled. Otherwise stop WebSphere Application Server by running from a separate Command Prompt window the following command:

```
<WAS_dest-path>\bin\stopServer.bat server1 -username <username>
 -password <password>
```

where:

<*WAS_dest-path*> is the destination path, where IBM WebSphere Application Server v5.1 was installed

<*username*> is the name of a Console user having an Operator or Administrator role, when Global Security is enabled

<*password*> is the password of the entered user

Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:

- You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
- <*WAS_dest-path*> is <*dest-path*>\WebSphere\AppServer

  where <*dest-path*> is the installation location for the Multiple Device Manager.

3. Next, you must stop the IBM Director services by selecting each on the Service panel in Administrative tools, then selecting **stop** in the **Action** menu:
   a. Click **Start –>Settings** and click the **Control Panel** icon.
   b. From the Control Panel window, double-click the **Administrative Tools** icon.
   c. From the Administrative Tools window, double-click the **Services** icon.
   d. From the Services window, single-click the **IBM Director Support Program** icon.
   e. Select the **Stop** option from the **Action** menu.

      Note: Stopping the Director Support Program usually stops both of the Director services.

   f. From the Services window, find and single-click the **IBM Director Server** icon.
   g. Select the **Stop** option from the *Action* menu.
   h. Close the Service List window.
   i. Close the Administrative Tools window.

   When you complete these steps, the IBM Director icon that is located in the start tray (lower right corner of the screen) changes to a red diamond indicating that the server has stopped.
4. If the IBM TotalStorage Multiple Device Manager CD is not already mounted, insert it into the CD-ROM drive.

   The Multiple Device Manager installation program should start within 15 - 30 seconds if you have AutoRun mode set on your system.
5. If the LaunchPad window does not open, use a Command Prompt or Windows Explorer to change to the W2K directory on the CD and type:

   ```
   LaunchPad
   ```
6. The following options are displayed when the LaunchPad window opens :

   Multiple Device Manager overview
   Provides information about Multiple Device Manager.

   Readme file
   Provides any last minute product information that did not make it into this installation guide.

Installation guide
Provides instructions on how to install Multiple Device Manager (a softcopy of this document)

License agreement
Provides information about the license for Multiple Device Manager.

Multiple Device Manager Web site
Provides information from the product Web site.

Installation wizard
Starts the Multiple Device Manager installation program.

Post installation tasks
Provides information about configuring Multiple Device Manager.

Exit Exits the Multiple Device Manager LaunchPad program.

7. Click the **Readme** file from the LaunchPad window or from the **README.txt** file located in the doc or W2K directory on the IBM TotalStorage Multiple Device Manager CD to check for information that might supersede the information in this guide.
8. Click **Installation wizard** from the LaunchPad window to start the installation of Multiple Device Manager.

   Note: The LaunchPad window remains open behind the installation wizard so that you can access product information during the installation process. Click **Exit** if you want to close the LaunchPad.
9. There might be a slight delay while the software loads on your system. After the software loads a DOS prompt window opens to display the following message:

```
+------------------------------------------------------------------------+
|Initializing InstallShield Wizard...                                    |
|Preparing Java (tm) Virtual Machine ........................... .      |
|.....................................................                   |
+------------------------------------------------------------------------+
```

10. The Welcome window suggests what documentation you should review prior to installation . Click **Next** to continue, or click **Cancel** to exit the installation.
11. When the License Agreement window opens , read the license agreement information.

    Select **I accept the terms of the license agreement** if you agree with it, then click **Next** to accept the license agreement.

    Otherwise, keep the selection **I do not accept the terms of the license agreement** (it is the default setting) and click **Cancel** to exit the installation.
12. In the Destination Directory window , select one of the following options:
    a. Click **Next** to accept the default directory.
    b. Click **Browse** to select a different directory for the installation and then click **Next** to continue the installation process.
    c. Click **Cancel** to exit the installation process.

    Note: The Multiple Device Manager Director extensions files will not be installed under the specified destination directory. They will be automatically installed under the IBM Director installation location.
13. Select an installation type in the Select Product Type window :
    - **Multiple Device Manager Server**

This option will install both server and console extensions, on a system where you have installed IBM Director Server 4.12 or greater, containing all the product features:

Multiple Device Manager Application
The program installs the Multiple Device Manager WebSphere Application Server applications. The Multiple Device Manager installation program checks if there is an IBM WebSphere Application Server 5.1 installed on your system and if it is not installed then the program will install it.

Note: If the program installs the Multiple Device Manager WebSphere Application Server applications, the Multiple Device Manager superuser ID and password will also be the WebSphere Application Server superuser ID and password.

Director Server Extensions
The program installs Multiple Device Manager server extensions for IBM Director Server 4.12 or greater.

Director Console Extensions
The program installs Multiple Device Manager console extensions for IBM Director Console 4.12 or greater and also the Console Help System implemented using Eclipse.

- **Multiple Device Manager Console**

  This option allows you to install Multiple Device Manager console extensions and also Console Help System implemented using Eclipse, on a system where you have installed only IBM Director Console 4.12 or greater.

After selecting an installation type, click **Next** to continue with the installation. If you want to exit the installation program, click **Cancel**.

14. The installation program verifies that the following prerequisite products and product versions are installed on your system:
    a. For IBM TotalStorage Multiple Device Manager Server:
       - IBM DB2 8.1 with FixPak 2 (or greater)
       - IBM Director Server 4.12 (or greater)
    b. For IBM TotalStorage Multiple Device Manager Console:
       - IBM Director Console 4.12 (or greater)

    If all of these prerequisites are verified, the installation program skips to step 17 on page 51 and continues.

    Otherwise, the result is displayed in the Checking Prerequisite Products window (step 16).
15. If the IBM WebSphere Application Server 5.1 was installed on your system prior to the installation of the Multiple Device Manager, the installation program will verify that all the required subcomponents of the WebSphere Application Server are installed. The subcomponents include:
    - Admin Scripting
    - IBM HTTP Server
    - WebSphere Message Queuing
    - WebSphere Message Queuing CSD 05
16. The Checking Prerequisite Products window opens and displays the problems found during the checking of the prerequisite products. If the prerequisite products are not installed or the wrong version is installed, the installation program cannot continue and you must correct the problem.

Click **Cancel** to exit the Multiple Device Manager installation program.

17. If the installation program detects that the user who is logged onto Windows does not have all of the required privileges (user rights) needed to perform the installation, a message window opens asking the user to set these privileges.

    If you want to manually set these privileges, click **No** to quit the installation program. See Step 1 on page 46 for instructions on how to manually set these privileges. Then, log off and log on again to make these privileges take effect.

    Click **Yes** to permit the installation program to update the user rights. When this action is completed, a new pop-up window opens that tells you to log off and log on again to make the privileges take effect. When you log on again, you must restart the installation from the beginning (refer back to Step 1 on page 46).

18. You can now choose whether you would like to perform a typical or advanced installation. In a typical installation, the install wizard will make port and database assignments. The advanced installation will allow you to assign these settings yourself.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

19. You must enter the name and password for the MDM super user in the Multiple Device Manager, User Name Input (1 of 3) window. This user name must be defined to the operating system. You can change it after you logon to the IBM Director.

    If the user name does not exist, you will be asked whether you would like to create a new user account. If so, the installer will create a new user account and add it to the DirAdmin group (the IBM Director administrative group).

    After completing all the fields, click **Next** to continue with the installation. You can click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

20. You also need to enter the user name and password for the IBM DB2 Universal Database Server in the User Input (2 of 3) window.

    Note: This user name and password will be the exact same one that you assigned to the DB2 server.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

21. If the installation program does not detect WebSphere Application Server, then it must install it. To complete the installation of IBM WebSphere Application Server:

    a. You will be asked for the user name and password for WebSphere Application Server services in the User Input (3 of 3) window . Enter the name and password of the user under which the IBM WebSphere Application Server v5.1 service will run.

       The user must have the following rights:

       - Act as part of operating system.
       - Log on as service.

       If the user does not have the proper authority, the installation program will assign user rights that allow it to work properly.

       The user name should be less than twelve characters to satisfy a WebSphere MQ limitation.

If the user account does not exist, click **Yes** in the `Would you like to create a new user account xxx` window to create the new account.

Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

b. Enter the node name for IBM WebSphere Application Server 5.1 installation in the Node and Host window .

The node name must be unique within a cell. The node name is a logical name, so although the default is the system host name, it does not actually have to be the host name.

The host name is the DNS name or the IP address of your system.

Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

22.

Note: The following screen will appear only if you either chose the advanced install option, or if the installation wizard detects that one of the default ports is already in use (in which case an error message will display).

The IBM WAS Ports window displays the ports that the IBM WebSphere Application Server 5.1 uses. You can accept these displayed default ports or you can modify them to avoid conflict with the ports already in use on your system.

To see the ports in use on your system, run:

```
netstat -a
```

command and see the **<***system_drive***>\WINNT\system32\drivers\etc\services** file.

Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

23. If you selected **IBM TotalStorage Multiple Device Manager Server**, then you must enter the fully qualified name of the two server key files that were either generated previously or that must be generated during or after the MDM installation in the SSL Configuration window . The information you enter will be used later.

Select one of the following options in the SSL Configuration window:

Generate a self-signed certificate
Select his option if you want the installer to automatically generate these certificate files

Defer the generation of the certificate as a manual post-installation task
Select this option if you want to manually generate these certificate files after the installation, using WebSphere Application Server ikeyman utility. In this case the next step (Generate Self-Signed Certificate) will be skipped.

After completing all of the fields, click **Next** to continue with the installation. Click **Back** to review what you have previously selected or click **Cancel** to exit the installation program.

24. If you chose to have the installation program generate the certificate for you, the Generate Self-Signed Certificate window opens .

25. After completing all the fields, click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

26. If you chose the advanced install path, you will next be asked to select one of the following options in the Select Database window for the database you want dedicated to the Multiple Device Manager:

    Create a new Device Manager local database
    If you select this option, this procedure continues with step 27.

    Use existing Device Manager database
    If you select this option, this procedure skips to step 28.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

27. If you chose either the typical install path, or to create a new local database in the advanced path, you will be presented with the Create Local Database window . Enter parameters for the new database in the following fields:

    - Database name

      Note: The database name must be unique to Device Manager. You cannot share the Device Manager database with any other applications.

    - Database drive

    If you want the program to create the database tables, select the "Create the database tables" check box.

    After completing all of the fields, click **Next** to continue with the installation. You can click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

28. If you chose to use an existing database in the advanced install path, you will see the Select Existing Database window . Select a database from the list of the existing databases.

    If you want to create other tables in the selected database, select the "Drop the tables, if existing, and create new tables" check box.

    After completing all of the fields, click **Next** to continue with the installation. You can click **Back** to review what you previous selected or click **Cancel** to exit the installation program.

29. The Preview window displays a summary of all of the choices that were made during the customization phase of the installation.

    Click **Install** to begin the installation. You can click **Cancel** to exit the installation wizard or go back to the previous window by clicking **Back**.

30. The installation program begins to install the components you previously selected as follows:

    - If you previously selected the creation of a new database, the Create Database Progress window opens, displaying a progress bar indicating the status of creating database. You can click **Cancel** to exit the installation wizard.

      Note: If you click **Cancel**, a popup window opens asking you to confirm the cancellation of the installation wizard: "Cancel the current operation? **Yes No**". Be aware that if you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

    - If you previously selected creation of a new database and this creation failed (for example, you want to create a database whose name is the same as that of an existing database), the Error on Create Database window

displays an error message which indicates the location of the log file detailing the error. View the log file for more detail about the error. The most frequent source of failure is naming a preexistent database. If this is the case, click **Back** to the panel to select another database name to create or to select an existing database. Click **Cancel** to exit the installation wizard.

- If you previously selected the creation of a new database (or you selected an existing database and also selected the "Drop the tables, if existing, and create new tables" check box), the `Create Database Objects Progress` window displays a progress bar indicating the status of creating the database objects. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel** a popup window asks you to confirm the cancellation of the installation wizard: "Cancel the current operation? **Yes No**". Be aware that if you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
- If the Multiple Device Manager installation program must install IBM WebSphere Application Server, the IBM WAS Installation Progress window indicates the progress of the IBM WebSphere Application Server installation.

  Installation usually takes 20-25 minutes depending on the configuration of your machine. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel** a popup window asks you to confirm the cancellation of the installation wizard: "Cancel the current operation? **Yes No**". Be aware that if you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
- If the Multiple Device Manager installation program must install the IBM WebSphere MQ patch, the WebSphere MQ Patch Installation Progress window indicates the progress of the IBM WebSphere MQ patch installation.

  Installation usually takes five minutes depending on the configuration of your machine. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel** a popup window asks you to confirm the cancellation of the installation wizard: "Cancel the current operation? **Yes No**". Be aware that if you confirm the cancellation by clicking **Yes**, the installation will be cancelled after the IBM WebSphere MQ patch is applied. Information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
- If the Multiple Device Manager installation program must generate the keystore/trustore files, the Generate certificate files window indicates the progress of the keystore/trustore file generation.

  Generation of the certificate files usually takes one minute depending on the configuration of your machine. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel** a popup window asks you to confirm the cancellation of the installation wizard: "Cancel the current operation? **Yes No**". Be aware that if you confirm the cancellation by clicking **Yes**, the installation will be cancelled after the keystore/trustore files

are generated. Information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

- The Installation Progress window indicates the progress of the Multiple Device Manager installation.

  Installation usually takes under 5 minutes depending on the configuration of your machine. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel** a popup window asks you to confirm the cancellation of the installation wizard: "Cancel the current operation? **Yes No**". Be aware that if you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

31. The Finish window opens . Before proceeding, you might want to review the log file for any possible error messages. The log file is located in *xxx*\logs\dmlog.txt, where *xxx* is the destination directory where the Multiple Device Manager was installed. The dmlog.txt file contains a trace of the installation actions.

    Click **Finish** to exit the installation wizard.

    Note: Ordinarily, you do not need to restart your system during or after the installation of the Multiple Device Manager. However, the installation wizard might determine that a restart is necessary. Restart your system if required.

32. At this point, you may want to view the post installation tasks by clicking the **Post installation tasks** item from the LaunchPad window.
33. Otherwise, you can exit the LaunchPad program by clicking **Exit** on the LaunchPad window.
34. The Multiple Device Manager installs a small program named "IBM TotalStorage Productivity Center", that can be run from Start menu.

    The Productivity Center user interface allows storage administrators to launch IBM TotalStorage Open Software Family products (see "IBM TotalStorage Productivity Center" on page 7).
35. At this point, you can install Performance Manager. Refer to *Installing Performance Manager* for information about that installation. **If you want to work with Multiple Device Manager immediately, you must manually start the services:**
    a. Select **Start**–>**Settings**, and click on the **Control Panel** icon.
    b. From the Control Panel, double-click on the **Administrative Tools** icon.
    c. From the Administrative Tools, double-click on the **Services** icon.
    d. From the Services window, find and single-click the **IBM Director Server Program** icon.
    e. Select the **Start** option from the **Action** menu.
    f. From the Services window, find and single-click the **IBM Director Support Program** icon.
    g. Select the **Start** option from the **Action** menu.

    When the Director server has started, the Director icon that is located in the start tray (lower right corner of the Windows screen) becomes a green circle.
36. Start the IBM WebSphere Application Server:
    a. Select **Start**–>**Programs**–>**IBM WebSphere**–>**Application Server v5.1**–>**Start the Server**.

A Command Prompt window will appear to describe the starting of WebSphere Application Server. The window will close when the WebSphere Application Server start is complete. You can open the WebSphere Application Server Administrator's Console to confirm the starting of WebSphere Application Server.

b. Select **Start–>Programs–>IBM WebSphere–>Application Server v5.1–>Administrative Console**.

   A browser window should appear and a log on screen for the WebSphere Administrator's Console should appear.

   If you receive a message that "The page cannot be displayed", the WebSphere Application Server has not completely started or has stopped.

37. Start the IBM Director Console and log in to verify if the Multiple Device Manager installation was successful.
    a. Select **Start–>Programs–>IBM Director–>IBM Director Console**.
    b. Log on to the IBM Director Server. When you log on to the IBM Director Server through the IBM Director Console, the user ID and password are validated against the operating system's security subsystem where the IBM Director Server component is installed, not on the workstation where the Director Console is running. The user ID and password must be valid on the operating system where the IBM Director Server is running, and the user must be authorized as a IBM Director administrator.

       IBM Director Server
       Identifies which IBM Director Server you want to log on to.

       User ID
       Identifies the user ID of the person opening the console.

       Password
       Specifies the password for the user ID entered.

    c. When you have logged onto the IBM Director console, check the Tasks panel for the task "Multiple Device Manager." Drop open the Multiple Device Manager to reveal the subtasks, such as "Configure MDM."

Result:

If you can successfully log on and see the Multiple Device Manager tasks, MDM is properly installed.

You can continue with the post installation tasks for the Multiple Device Manager using the procedures in the section titled: *Configuring*.

You can view the post installation tasks by clicking the **Post installation tasks** item from the LaunchPad window.

You can now install the Performance Manager and Replication Manager since you have installed its prerequisite, the Multiple Device Manager.

Attention: Performance Manager and Replication Manager are ordered separately and both may not be contained in your Media kit. However, at least one of them must be installed with Multiple Device Manager Base Code.

Related topics:

- "Installation overview for Windows" on page 37
- "System prerequisites for Windows" on page 36

- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing IBM Director for Windows" on page 44
- "Installing Performance Manager for Windows" on page 59
- "Installing Replication Manager for Windows" on page 69
- Chapter 8, "Removing Multiple Device Manager for Windows," on page 131
- Chapter 9, "Removing the IBM WebSphere Application Server for Windows," on page 135
- Chapter 16, "Setting the IBM Multiple Device Manager universal user ID and password," on page 165
- Chapter 17, "Performing Multiple Device Manager configuration tasks," on page 167

Creating SSL key files and certificates for Windows

The IBM WebSphere Application Server provides the ikeyman utility that manages Secure Sockets Layer (SSL) key files and certificates. For secure communication, you must create server key files with personal certificates. This procedure is only necessary if you chose to defer generating the SSL files and certificates during the MDM installation.

Steps:

The Multiple Device Manager installation program gives you the option to defer creating the SSL certificate files until after the installation completes. If you selected that option during the installation, you will need to follow this procedure to create the files manually.

Perform the following steps to create the key files using the ikeyman utility:

1. **Launch the utility:**
   a. Type the following command:
      `<WAS-destination-directory>\WebSphere\AppServer\bin\ikeyman.bat`
      where *<WAS-destination-directory>* is the directory where the WebSphere Application Server is installed on your system.
2. **Create the server SSL key file and certificate:**
   a. Open the ikeyman utility and create a new JKS key file.
   b. Name the file the same as you entered it in the ″SSL Configuration″ window during the Multiple Device Manager installation (for example, MDMServerKeyFile.jks, the default value of **Key File Name** item in the SSL Configuration window).
   c. Keep a record of all the passwords for these keys.
   d. Click **Signer Certificates**, and delete all of the JKS key files listed.
   e. Click **Personal Certificates**, and then create a new self-signed certificate.
   f. Enter the appropriate information for the new certificate. It is best to include as much information as you can.
3. **Create the server SSL trust file and certificate:**
   a. Open the ikeyman utility and create a new JKS key file.
   b. Name the file the same as you entered it in the SSL Configuration window during the Multiple Device Manager installation (for example, MDMServerTrustFile.jks, the default value of **Trust file name** item in the SSL Configuration window).

c. Keep a record of all the passwords for these keys.
d. Click **Signer Certificates** and delete all of the JKS key files listed.

Related topics:

- "Installing Multiple Device Manager for Windows" on page 46

Chapter 3. Installing IBM Performance Manager

This chapter describes installation requirements and procedures to install the IBM Performance Manager.

Installing Performance Manager for Windows

You can use these procedures to install Performance Manager.

Prerequisites:

1. Log on to your system as a local administrator.
2. Ensure that the user name has the required user rights.

   Performance Manager must be installed by a user name that is logged on as a local administrator (for example, as the administrator user) on the system where the Performance Manager will be installed. The user name must have the following system privileges, called *user rights*, to successfully complete the installation:

   - Act as part of the operating system
   - Create a token object
   - Increase quotas
   - Replace a process-level token
   - Debug programs

   Note: The installation program checks the user privileges and asks the user to set these privileges in Step 13 on page 64.

   These user rights are governed by the local security policy and are not initially set as the defaults for administrators. They might not be in effect when you log on as the local administrator. If the Performance Manager installation program does not detect the required user rights for the logged-on user name, the program can optionally set them. The program can set the local security policy settings to assign these user rights.

   Alternatively, you can manually set the user rights prior to performing the installation. Perform the following steps to manually set these privileges:

   a. Click **Start –> Settings –> Control Panel**.
   b. Double-click **Administrative Tools**.
   c. Double-click **Local Security Policy**. The `Local Security Settings` window opens.
   d. Expand **Local Policies**.
   e. Click **User Rights Assignments** to see the policies in effect on your system. For each policy that you want to add, perform the following steps:
      1) Highlight the policy to be checked.
      2) Double-click the policy and look for the user name in the Assigned To column of the `Local Security Policy Setting` window to verify the policy setting. Ensure that both the **Local Policy Setting** and the **Effective Policy Setting** check boxes are selected.
      3) If the user name does not appear in the list for the policy, you must add the policy for the user. Perform the following steps to add the user name to the list:

a) Click **Add** on the `Local Security Policy Setting` window. The `Select Users or Groups` window opens.
b) Highlight the user or group in the Name column.
c) Click **Add** to put the name in the lower window.
d) Click **OK** to add the policy to the user or group.

3. After these user rights are set (either by the installation program or manually), log off the system, and then log on again so that the user rights can take effect.
4. The SSH client is used to connect to the SSH server software in the SAN Volume Controller cluster. This software is preinstalled on the SAN Volume Controller management node.

   Windows platform: for the Windows platform, this SSH client support must be provided by PuTTY. If PuTTY is not already installed on your system, you can find the installation software on your Performance Manager CD. The installation program is in the <CD root>SSHClient\PuTTY directory. The wizard to install PuTTY is started using the putty-0.53b-installer.exe file. Accept all default settings as you run the PuTTY installation wizard.

   Refer to the section explaining how to customize Performance Manager to run San Volume Controller cluster data collection tasks for information about PuTTY keys.
5. Stop the IBM WebSphere Application Server, if it exists on the system: **Start–>Programs–>IBM WebSphere–>Application Server v5.1–>Stop the Server**, if the WebSphere Application Server has the global security disabled. Otherwise stop WebSphere Application Server by running from a separate Command Prompt window the following command:

   ```
   <WAS_dest-path>\bin\stopServer.bat server1 -username <username>
   -password <password>
   ```

   where:

   <*WAS_dest-path*> is the destination path, where IBM WebSphere Application Server v5.1 was installed

   <*username*> is the name of a Console user having an Operator or Administrator role, when Global Security is enabled

   <*password*> is the password of the entered user

   Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:
   - You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
   - <*WAS_dest-path*> is <*dest-path*>\WebSphere\AppServer

     where <*dest-path*> is the installation location for the Multiple Device Manager.
6. Next, you must stop the **IBM Director** services by selecting each on the Service panel in Administrative tools, then selecting **stop** in the Action menu:
   a. Click **Start –>Settings** and click the **Control Panel** icon.
   b. In the Control Panel window, double-click the **Administrative Tools** icon.
   c. In the Administrative Tools window, double-click the **Services** icon.
   d. In the Services window, find and single-click the **IBM Director Server** icon.
   e. Select the **Stop** option from the **Action** menu.

f. In the Services window, single-click the **IBM Director Support Program** icon.

g. Select the **Stop** option from the **Action** menu.

h. In the Services window, single-click the **IBM HTTP Administration 1.3.28** service.

i. Select the **Stop** option from the **Action** menu.

j. In the Services window, single-click the **IBM HTTP Server 1.3.28**.

k. Select the **Stop** option from the **Action** menu.

l. Close the Services window.

m. Close the Administrative Tools window.

When you complete these steps, the IBM Director icon that is located in the start tray (lower right corner of the screen) changes to a red diamond indicating that the server has stopped.

Steps:

1. Insert the Performance Manager CD into the disk drive.

   If you have AutoRun mode set on your system, the Performance Manager installation program should start within 15 - 30 seconds.

   If the LaunchPad window does not open or you do not have AutoRun set on your system, use a Command Prompt to change to the W2K directory on the CD and type:

   ```
   LaunchPad
   ```

2. The following options are displayed when the LaunchPad window opens:

   Performance Manager overview
   Provides information about Performance Manager.

   Readme file
   Provides any last minute product information that did not make it into this installation guide.

   Installation guide
   Provides instructions on how to install Performance Manager (a softcopy of this document).

   License agreement
   Provides information about the license for Performance Manager.

   IBM Performance Manager Web site
   Provides information from the product Web site.

   Installation wizard
   Starts the Performance Manager installation program.

   Post installation tasks
   Provides information about configuring users and device communications.

   Exit Exits the Performance Manager LaunchPad program.

3. Click **Readme** from the LaunchPad window or from the **README.txt** file located in the doc or W2K directory on the Performance Manager CD. Check for information that might supersede the information in this guide.

4. Click **Installation wizard** from the LaunchPad window to start installing Performance Manager.

Note: The LaunchPad window remains open behind the installation wizard so that you can access product information during the installation process. Click **Exit** if you want to close the LaunchPad.

5. There might be a slight delay while the software loads on your system. After the software loads, a DOS prompt window displays the following message:

```
+---------------------------------------------------------------------+
|Initializing InstallShield Wizard...                                 |
|Searching for Java (tm) Virtual Machine ..........................  .|
|.....................................................               |
+---------------------------------------------------------------------+
```

6. The Welcome window opens suggesting what documentation you should review prior to installation. Click **Next** to continue, or click **Cancel** to exit the installation.
7. Read the license agreement information when the License Agreement window opens.

   Select **I accept the terms of the license agreement**, then click **Next** to accept the license agreement.

   Otherwise, accept the selection **I do not accept the terms of the license agreement** (the default) and click **Cancel** to exit the installation.
8. Select one of the following options in the Destination Directory window:
   a. Click **Next** to accept the default directory.
   b. Click **Browse** to select a different directory for the installation and then click **Next** to continue the installation process.
   c. Click **Cancel** to exit the installation process.

   Note: The Multiple Device Manager Director extensions files will not be installed under the specified destination directory. They will be automatically installed under the IBM Director installation location.

   If you want to reinstall the product, this window is skipped.
9. In the Select Product Type window, select one of the following two types of installations:
   - **Performance Manager Server**

     This option will install both Performance Manager server and client extensions, on a system where you have installed IBM Director Server 4.12 or greater and also IBM Multiple Device Manager Server, and contains all the product features:

     Performance Manager Application
     Installs the Performance Manager WebSphere Application Server applications.

     Director Server Extensions
     Installs the Performance Manager extensions for IBM Director Server 4.12 or greater.

     Director Console Extensions
     Installs the Performance Manager extensions for IBM Director Console 4.12 or greater.

     Command Line Client
     Installs the Performance Manager Command Line Client.

     If you select Performance Manager Server (all the product features listed above), the Features Selection window is skipped.

Note: If you select to install Performance Manager Server on a system where you have installed only IBM Director Console, an error message is displayed and the installation program will stop.

- **Performance Manager Client**

  This option allows you to install client product features, on a system where you have installed IBM Director Console 4.12 or greater and partially, IBM Multiple Device Manager Console. The client product features selection is described in the next window.

  Note: If you select Performance Manager Client on a system where you have installed IBM Director Server and also IBM Multiple Device Manager Server, an error message is displayed and the installation program will stop.

Select an option and then click **Next** to continue with the installation. Click **Cancel** if you want to exit the installation program.

Note: This window is skipped in the following cases:

a. If you want to reinstall Performance Manager Server on a system with Performance Manager Server installed;

b. If you want to reinstall Performance Manager Client, on a system where one or both clients (Performance Manager Director Console Extension and Performance Manager Command Line Client) are installed.

10. If you selected to install the Performance Manager Client in the previous window or if you want to reinstall Performance Manager Client on a system where one client is installed, you can select one or more from the following features:

    Director Console Extensions
    This feature must be selected if you want to install Performance Manager console extensions (or **Performance Manager Console**) on a system, where both IBM Director Console 4.12 or greater and IBM Multiple Device Manager Console are installed.

    Command Line Client
    This feature must be selected if you want to install Performance Manager Command Line Client (**Performance Manager CLI Client**).

    If you have previously installed one Performance Manager Client feature (for example, **Director Console Extension**) you will be given the opportunity to add additional features to the current install or to reinstall the selected features. These already installed features are marked as "(installed)" (in our example, **Director Console Extension (installed)**).

    Note: If you want to reinstall Performance Manager Client on a system where Performance Manager Client was previously installed with all clients, this window is skipped.

    After you selected the desired features (one or more), click **Next** to continue with the program installation or click **Cancel** to exit the installation program.

11. The installation program verifies that the following prerequisite products and product versions are installed on your system:

    a. For Performance Manager Server:
       - IBM DB2 8.1 (or greater)
       - IBM Director Server 4.12 (or greater)
       - IBM WebSphere Application Server V5.1

- IBM Multiple Device Manager Server
- Secure Shell (SSH) Client

b. For Performance Manager Client:
   - IBM Director Console 4.12 or greater (only for Performance Manager Console client).
   - IBM Multiple Device Manager Console (only for Performance Manager Console client).

12. The Checking Prerequisite Products window displays any problems that were found when the program checked for the prerequisite products. If the prerequisite products are not installed or the wrong version is installed, the installation program cannot continue and you must correct the problem.

    Click **Cancel** to exit the Performance Manager installation program.

13. If the installation program detects the user, who is logged onto Windows, does not have all of the required privileges (user rights) needed to perform the installation, a message window opens, asking the user to set these privileges.

    If you want to manually set these privileges, click **No** to quit the installation program. See Step 1 on page 46 for instructions on how to manually set these privileges. Then, log off and log on again to make these privileges take effect.

    Click **Yes** to permit the installation program to update the user rights. When this action is completed, a new pop-up window opens that tells you to log off and log on again to make the privileges take effect. When you log on again, you must restart the installation from the very beginning (from Step 2 on page 59).

14. You can now choose whether you would like to perform a typical or advanced installation.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

15. If you selected to install Performance Manager Server, the PuTTY Configuration window opens. This window contains information about generating the private key file, using the PuTTYgen utility, if you want to manage IBM San Volume Controllers at Performance Manager installation time.

    You must enter the private key file name, generated before, or select it using the **Browse** button and then click the **Next** button to continue the installation. The program will check whether the type of key is correct.

    If you do not use a SSH Client, you do not need a SSH2 RSA private key, then you can skip this step by selecting the “Skip this step” check box. If you decide to use a SSH Client later, after Performance Manager installation, you have to generate manually the private key file **icat.ppk** in the location where PuTTY utility is installed under the **pmgrkey** sub-directory. For example:

    ```
    <PuTTY_home>\pmgrkey\icat.ppk
    ```

    where, <PuTTY_home> is the location where the PuTTY utility is installed on your system.

    You can click **Cancel** to exit the installation process or click **Back** to go back to the previous window.

16.

    Note: The following screen will only appear if you chose the advanced installation path.

    If you selected Performance Manager Server, the Select Database window

requires you to select what type of database you want to be dedicated to the Performance Manager Server from the following:

- Create a new Performance Manager local database
- Use existing Performance Manager database

Click **Next** to continue with the installation. Click **Back** to review what you previously selected. Click **Cancel** to exit the installation program.

17. If you chose either the typical install path, or to create a new local database in the advanced path, enter parameters for the new database in the following fields of the Create Local Database window:

    - Database name

      Note: The database name must be unique to Performance Manager. You cannot share the Performance Manager database with any other applications.

    - Database drive

      Note: If the database name that you entered already exists with the same alias on the same specified path/drive, a warning message will display. Please choose: **Use** if you want to use the existing database. **Drop then create** if you want the installer to drop and then recreate a new database with the same name and alias on the specified path/drive, or **Cancel** if you want to change the database name or the path/drive.

    If you want to also create the database tables, select the **Create the database tables** check box.

    After completing all the fields, click **Next** to continue the installation. Click **Back** to review what you previously selected. Click **Cancel** to exit the installation program.

18. If you chose to use an existing database in the advanced install path, you will see the Select Existing Database window. Select a database from the list of the existing databases.

    If you want to create other tables in the selected database, select the "Drop the tables, if existing, and create new tables" check box.

    After completing all of the fields, click **Next** to continue with the installation. You can click **Back** to review what you previous selected or click **Cancel** to exit the installation program.

19. At this point, you have answered all the customization questions and the verification steps are successfully completed. The Preview window displays a summary of all of the choices that you made on the previous panels.

    Click **Install** to continue the installation. Click **Cancel** to exit the installation wizard. Click **Back** to review what you previously selected.

20. The installation program begins to install the selected features of the Performance Manager, as follows:

    - If you previously selected the creation of a new database, the Create Database Progress window displays a progress bar that indicates the status of the database creation. Click **Cancel** to exit the installation wizard.

      Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard: `Cancel the current operation? Yes No`. If you click **Yes** to confirm the cancellation, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

- If you previously selected the creation of a new database and this creation has failed, the Error on Create Database window indicates the cause of the errors during creation of the database.

  See the log file for details. The most frequent source of failure is naming a preexisting database. If this is the case, click **Back** to select another database name to create or to select an existing database. Click **Cancel** to exit the installation wizard.
- If you previously selected the creation of a new database and you selected the **Create the database tables** check box or, if you selected an existing database and selected the **Drop the tables, if existing, and create new tables** check box, the Create Database Objects Progress window opens.

  A progress bar indicates the status of creating the database objects. Click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel** , a window opens asking you to confirm the cancellation of the installation wizard: `Cancel the current operation? Yes No`. If you click **Yes** to confirm the cancellation, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
- The Installation Progress window indicates how much of the installation has completed.

  This phase of the installation usually takes under 5 minutes, depending on the configuration of your machine. Click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard: `Cancel the current operation? Yes No`. If you click **Yes** to confirm the cancellation, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

21. The Finish window opens. Before proceeding, you might want to review the log file for any possible error messages. The log file is located in the *xxx***logs****pmlog.txt** file, where *xxx* is the destination directory where the Performance Manager was installed. The **pmlog.txt** file contains a trace of the installation actions.

    Click **Finish** to exit the installation wizard.

    Note: Ordinarily, you do not need to restart your system during or after the installation of the Performance Manager. However, the installation wizard might determine that a restart is necessary. Restart your system if required.
22. Click **Exit** on the LaunchPad window to end the LaunchPad program if you have not already done so.

Post-processing requirements:

1. To manually start the **IBM Director Support Program** services, perform the following steps:
   a. Click **Start –> Settings**, and then double-click the **Control Panel** icon.
   b. From the Control Panel, double-click the **Administrative Tools** icon.
   c. From the Administrative Tools, double-click the **Services** icon.

      Perform the following steps to select and start each desired service (according to the selected features at installation time):

d. From the Services window, single-click the **IBM Director Support Program** icon, and then select the **Start** option from the **Action** menu.

e. From the Services window, single-click on the **IBM Director Server** icon, and then select the **Start** option from the **Action** menu.

   When you have completed these steps, the **IBM Director** icon that is located in the start tray (lower right corner of the screen) changes to a green circle indicating that the server has started.

f. Start WebSphere by selecting the **Start –> Programs –> IBM WebSphere –> Application Server V5.1 –> Start the Server**.

g. You must stop and restart the IBM Director server.

2. Start the Director Console and log in to verify successful installation.

   a. Click **Start –> Programs –> IBM Director –> IBM Director Console**.

   b. Log in to the **IBM Director server**. When you log in to the IBM Director Server through the IBM Director Console, the user ID and password are validated against the security subsystem for the operating system where the IBM Director server component is installed, not on the workstation where the IBM Director Console is running. The user ID and password must be valid on the operating system where the IBM Director server is running, and the user must be authorized as an IBM Director administrator.

      IBM Director Server
      Identifies the IBM Director server you wish to log in to.

      User ID
      Identifies the user ID of the person opening the console.

      Password
      Specifies the password for the user ID that was entered.

   c. After you are logged into IBM Director, look for **Multiple Device Manager** in the Tasks pane. Expand the **Multiple Device Manager** task and look for the **Manage Performance** task.

Result:

If you can successfully log in to the IBM Director and expanded the **Multiple Device Manager** task to see the **Manage Performance** task, the Performance Manager is properly installed.

You can continue with the post installation tasks for the Performance Manager using the procedures in the topic addressing MDM username and password restrictions and in the topics related to configuring Multiple Device Manager.

You can also click **Post installation tasks** on the LaunchPad window to view the post installation tasks.

Only after a successful installation of the Performance Manager you can also install Replication Manager.

Related topics:

- Chapter 20, “Customize Performance Manager to run San Volume Controller cluster data-collection tasks,” on page 183
- Chapter 17, “Performing Multiple Device Manager configuration tasks,” on page 167
- “Installing Multiple Device Manager for Windows” on page 46

- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing IBM Director for Windows" on page 44
- "Installing Replication Manager for Windows" on page 69

Chapter 4. Installing IBM Replication Manager

This chapter describes installation requirements and procedures to install the IBM Replication Manager.

Installing Replication Manager for Windows

You can use these procedures to install Replication Manager.

Prerequisites:

1. Log on to your system as a local administrator.

   To install the Replication Manager server and console, you must be logged on as a local administrator (for example, as the administrator user) on the system where Replication Manager will be installed.

   If you intend to install the Replication Manager server, you must have the following system privileges, called *user rights*, to successfully complete the installation:

   - Act as part of the operating system
   - Create a token object
   - Increase quotas
   - Replace a process-level token
   - Debug programs

   Note: The installation wizard checks your privileges and asks you to set these privileges in step 13 on page 74.

   These user rights are governed by the local security policy and are not initially set as the defaults for administrators. They might not be in effect when you log on as the local administrator. If the Replication Manager server installation wizard does not detect the required user rights for the logged on user name, the program can optionally set them. The program can set the local security policy settings to assign these user rights.

   Note: If you do not set the user rights manually, you will have to begin the installation again when the rights are automatically set during the installation.

   Alternatively, you can manually set them prior to performing the installation. To manually set these privileges, click the following path and select the appropriate user rights:

   a. Click **Start –> Settings**, and then double-click the **Control Panel** icon.
   b. In the Control Pane window, double-click the **Administrative Tools** icon.
   c. In the Administrative Tools window, double-click the**Local Security Policy** icon.
   d. In the Local Security Settings window, expand **Local Policies**.
   e. Click **User Rights Assignments** to see the policies that are in effect on your system. Perform the following steps to verify that the user name has the required rights:
      1) Highlight the policy to be checked.

2) Double-click the policy and look for the user name in the Assigned To column of the Local Security Policy Setting window to verify the policy setting. Ensure that the **Local Policy Setting** and the **Effective Policy Setting** check boxes are selected.
3) If the user name is not listed for the policy, perform the following steps to add the user name to the list:
   a) In the Local Security Settings window, click **Add**.
   b) In the Select Users or Groups window, highlight the user of the group in the Name column.
   c) Click **Add** to add the name to the lower window.
   d) Click **OK** to add the policy to the user or group.

   After these User Rights are set (either by the installation wizard or manually), log off the system, and then log on again to put the user rights into effect.

2. Stop the IBM WebSphere Application Server, if it exists on the system: **Start–>Programs–>IBM WebSphere–>Application Server v5.1–>Stop the Server**, if the WebSphere Application Server has the global security disabled. Otherwise stop WebSphere Application Server by running from a separate Command Prompt window the following command:

   ```
   <WAS_dest-path>\bin\stopServer.bat server1 -username <username>
   -password <password>
   ```

   where:

   <*WAS_dest-path*> is the destination path, where IBM WebSphere Application Server v5.1 was installed

   <*username*> is the name of a Console user having an Operator or Administrator role, when Global Security is enabled

   <*password*> is the password of the entered user

   Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:
   - You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
   - <*WAS_dest-path*> is <*dest-path*>\WebSphere\AppServer

     where <*dest-path*> is the installation location for the Multiple Device Manager.

3. Perform the following steps to stop each of the IBM Director services:
   a. Click **Start –> Settings**, and double-click the **Control Panel** icon.
   b. In the Control Panel window, double-click the **Administrative Tools** icon.
   c. In the Administrative Tools window, double-click the **Services** icon.
   d. In the Services window, find and single-click the **IBM Director Server** icon.
   e. Select the **Stop** option from the **Action** menu.
   f. In the Services window, single-click the **IBM Director Support Program** icon, and then either:
      - Select the **Stop** option from the **Action** menu; or
      - Right-click on the service and select **Stop** from the menu.
   g. In the Services window, single-click the **IBM HTTP Administration 1.3.28** service.

h. Select the **Stop** option from the **Action** menu.

i. In the Services window, single-click the **IBM HTTP Server 1.3.28**.

j. Select the **Stop** option from the **Action** menu.

k. Close the Services window.

l. Close the Administrative Tools window.

When you complete these steps, the IBM Director icon that is located in the start tray (lower right corner of the desktop) changes to a red diamond indicating that the server has stopped.

Steps:

1. Insert the Replication Manager CD into the CD-ROM drive.

   If you have AutoRun mode set on your system, the Replication Manager installation wizard should start within 15 - 30 seconds.

   If the LaunchPad window does not open, or you do not have AutoRun set on your system, open a Command Prompt window and change to the W2K directory on the CD. Then type:

   ```
   LaunchPad
   ```

2. When the LaunchPad window opens , the following options are displayed:

   Replication Manager overview
   Provides information about Replication Manager.

   Readme file
   Provides any last minute product information that did not make it into this installation guide.

   Installation guide
   Provides instructions on how to install Replication Manager (a softcopy of this document).

   License agreement
   Provides information about the license for Replication Manager.

   Replication Manager Web site
   Provides information from the product Web site.

   Installation wizard
   Starts the Replication Manager installation wizard.

   Post installation tasks
   Provides information about configuring users and device communications.

   Exit Exits the Performance Manager LaunchPad program.

3. In the LaunchPad window, click **Readme** or open the README.txt file located in the doc or W2K directory on the Replication Manager CD. Check for information that might supersede this information.

4. In the LaunchPad window, click **Installation wizard** to start the installation of Replication Manager.

   Note: The LaunchPad window remains open behind the installation wizard so that you can access product information during the installation process. Click **Exit** if you want to close the LaunchPad.

5. There might be a slight delay while the software loads on your system. After the software loads, a DOS prompt window opens displaying the following message:

```
+------------------------------------------------------------------------+
|Initializing InstallShield Wizard...                                    |
|Searching for Java (tm) Virtual Machine ..... .                         |
|.....                                                                   |
+------------------------------------------------------------------------+
```

6. The Welcome window opens suggesting what documentation you should review prior to installation . Click **Next** to continue, or click **Cancel** to exit the installation.
7. When the License Agreement window opens , read the license agreement information.

   Select **I accept the terms of the license agreement**, then click **Next** to accept the license agreement.

   Otherwise, accept the selection **I do not accept the terms of the license agreement** (the default), and click **Cancel** to exit the installation.
8. In the Destination Directory window , select one of the following options:
   a. Click **Next** to accept the default directory.
   b. Click **Browse** to select a different directory for the installation and then click **Next** to continue the installation process.
   c. Click **Cancel** to exit the installation process.

   Note: The Multiple Device Manager Director extensions files will not be installed under the specified destination directory. They will be automatically installed under the IBM Director installation location.
9. In the Select Product Type window , select one of the following installations:
   - **Replication Manager Server**: This option installs Replication Manager server and client extensions, on a system where both IBM Director Server 4.12 or higher and IBM TotalStorage Multiple Device Manager Server programs are installed. The following product features will be installed.

     Replication Manager Application
     Installs some WebSphere Application Services applications for Replication Manager. If this feature is selected, the Replication Manager installation wizard checks if IBM WebSphere Application Server 5.1 is installed on your system. If it is not installed, an error message is displayed.

     Director Server Extensions
     Installs Replication Manager extensions for IBM Director Server 4.12 or higher.

     Director Console Extensions
     Installs Replication Manager extensions for IBM Director Console 4.12 or higher.

     Command Line Client
     Installs the command-line client.

     If you select **Replication Manager Server** (all the product features listed above), the next window, Features Selection, is skipped.

     Note: If you select to install Replication Manager Server on a system where you have installed only IBM Director Console, an error message is displayed and the installation wizard stops.
   - **Replication Manager Client**: This option installs Replication Manager client product features on a system where both IBM Director Console 4.12 or

higher and IBM TotalStorage Multiple Device Manager Console are installed. The Replication Manager client features are described in the next window.

Note: If you select to install Replication Manager Console on a system where you have installed only IBM Director Server and IBM TotalStorage Multiple Device Manager Server, an error message is displayed and the installation wizard stops.

Select an option, and then click **Next** to continue with the installation. If you want to exit the installation wizard, click **Cancel**.

Note: This window is skipped in the following cases:

a. If you want to reinstall Replication Manager Server on a system that already has Replication Manager Server installed.

b. If you want to reinstall the Replication Manager Client on a system where one or both clients (Replication Manager Director Console Extension and Replication Manager Command Line Client) are installed.

10. If you selected **Replication Manager Client** in the previous window (or if you want to reinstall Replication Manager on a system where only one Replication Manager client was previously installed), the Features Selection window opens and requires you to select one or more of the following features:

    - **Director Console Extensions**: This feature must be selected if you want to install Replication Manager extensions (Replication Manager Console) on a system where both IBM Director Console 4.12 or higher and Multiple Device Manager Console are installed.
    - **Command Line Client**: This feature must be selected if you want to install Replication Manager Command Line Client (Replication Manager CLI Client).

    If you have previously installed some Replication Manager features (for example, IBM Director Console Extensions), you will be given the opportunity to add additional features to the current installation or to reinstall the selected features. These already installed features are marked as `(installed)`.

    Note: If you want to reinstall Replication Manager Client on a system where Replication Manager Client was previously installed with all clients (Console and CLI), this window is skipped.

    After you selected the desired features (one or more), click **Next** to continue with the program installation or click **Cancel** to exit the installation wizard.

11. The installation wizard verifies that the following prerequisite products and product versions are installed on your system:

    a. For Replication Manager Server:
        - Verifies that IBM DB2 8.1 (or higher) is installed.
        - Verifies that IBM Director Server 4.12 (or higher) is installed.
        - Verifies that IBM WebSphere Application Server 5 is installed.
        - Verifies that IBM TotalStorage Multiple Device Manager Server is installed.

    b. For Replication Manager Console:
        - Verifies that IBM Director Console 4.12 (or higher) is installed.
        - Verifies that IBM Multiple Device Manager Console is installed.

If all these verifications are successful, the installation wizard continues, skipping the next step.

Otherwise, the results of the verifications are displayed in the Checking Prerequisite Products window (see the next step).

12. The Checking Prerequisite Products window lists the problems that were found while checking for the prerequisite products. If the prerequisite products are not installed or the wrong version is installed, the installation wizard cannot continue and you must correct the problem.

    Click **Cancel** to exit the Replication Manager installation wizard.

13. If the installation wizard detects that the user name that is logged onto Windows does not have all of the required privileges (user rights) needed to perform the installation, a message window asks you to set these privileges.
    - If you want to manually set these privileges, click **No** to quit the installation wizard. See Step 1 on page 69 for instructions on how to manually set these privileges. Then, log off and log on again to put these privileges into effect.
    - If you want the installation wizard to update the user rights, click **Yes**. When this action is completed, a new window opens that tells you to log off and log on again to put the privileges into effect. When you log on again, you must restart the installation from the very beginning (from step 1 on page 46).

14. You can now choose whether you would like to perform a typical or advanced installation.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

15.

    Note: The following screen will only appear if you chose the advanced installation path.

    In the `Select Database for "Hardware" Subcomponent` window, select the type of hardware database that you want to be dedicated to the Replication Manager from the following list:
    - Create a new Hardware local database.
    - Use existing Hardware database.

    Select the appropriate action:
    - Click **Next** to continue with the installation.
    - Click **Back** to review what you previously selected.
    - Click **Cancel** to exit the installation wizard.

16. If you chose either the typical install path, or to create a new local database in the advanced path, enter parameters for the new database in the following fields of the `Create Local Database for "Hardware" Subcomponent` window:
    - Database name

      Note: The database name must be unique to the Hardware subcomponent. You cannot share the Hardware subcomponent database with any other applications or with other Replication Manager subcomponents.
    - Database drive

    If you want to also create the database tables, select the **Create the database tables** check box.

    After you complete all the fields, select the appropriate action:
    - Click **Next** to continue with the installation.

- Click **Back** to review what you previously selected.
- Click **Cancel** to exit the installation wizard.

17. If you chose to use an existing database in the advanced install path, you will see the `Select Existing Database for "Hardware" Subcomponent` window. Select a database from the list of the existing databases.

    If you want to create other tables in the selected database, select the "Drop the tables, if existing, and create new tables" check box.

    After completing all of the fields, click **Next** to continue with the installation. You can click **Back** to review what you previous selected or click **Cancel** to exit the installation program.

18.

    Note: The following screen will only appear if you chose the advanced installation path.

    The `Select Database for "ElementCatalog" Subcomponent` window opens. You must select what type of element catalog database you want to be dedicated to the Replication Manager from the following list:

    - Create a new ElementCatalog local database.
    - Use existing ElementCatalog database.

    Select the appropriate action:

    - Click **Next** to continue with the installation.
    - Click **Back** to review what you previously selected.
    - Click **Cancel** to exit the installation wizard.

19. If you chose either the typical install path, or to create a new local database in the advanced path, enter parameters for the new database in the following fields of the `Create Local Database for "ElementCatalog" Subcomponent` window:

    - Database name

      Note: The database name must be unique to the ElementCatalog subcomponent. You cannot share the ElementCatalog subcomponent database with any other applications or with other Replication Manager subcomponents.

    - Database drive

    If you want to also create the database tables, select the **Create the database tables** check box.

    After you complete all the fields, select the appropriate action:

    - Click **Next** to continue with the installation.
    - Click **Back** to review what you previously selected.
    - Click **Cancel** to exit the installation wizard.

20. If you chose to use an existing database in the advanced install path, you will see the `Select Existing Database for "ElementCatalog" Subcomponent` window. Select a database from the list of the existing databases.

    If you want to create other tables in the selected database, select the "Drop the tables, if existing, and create new tables" check box.

    After completing all of the fields, click **Next** to continue with the installation. You can click **Back** to review what you previous selected or click **Cancel** to exit the installation program.

21.

Note: The following screen will only appear if you chose the advanced installation path.

The `Select Database for "ReplicationManager" Subcomponent` window requires you to select what type of Replication Manager database you want to be dedicated to the Replication Manager from the following list:

- Create a new ReplicationManager local database.
- Use existing ReplicationManager database.

Select the appropriate action:

- Click **Next** to continue with the installation.
- Click **Back** to review what you previously selected.
- Click **Cancel** to exit the installation wizard.

22. If you chose either the typical install path, or to create a new local database in the advanced path, enter parameters for the new database in the following fields of the `Create Local Database for "ReplicationManager" Subcomponent` window:

    - Database name

      Note: The database name must be unique to the ReplicationManager subcomponent. You cannot share the ReplicationManager subcomponent database with any other applications or with other Replication Manager subcomponents.

    - Database drive

    If you want to also create the database tables, select the **Create the database tables** check box.

    After you complete all the fields, select the appropriate action:

    - Click **Next** to continue with the installation.
    - Click **Back** to review what you previously selected.
    - Click **Cancel** to exit the installation wizard.

23. If you chose to use an existing database in the advanced install path, you will see the `Select Existing Database for "ReplicationManager" Subcomponent` window. Select a database from the list of the existing databases.

    If you want to create other tables in the selected database, select the "Drop the tables, if existing, and create new tables" check box.

    After completing all of the fields, click **Next** to continue with the installation. You can click **Back** to review what you previous selected or click **Cancel** to exit the installation program.

24.

    Note: The following screen will only appear if you chose the advanced installation path.

    The `Select Database for "svcHardware" Subcomponent` window requires you to select what type of SVC hardware database you want to be dedicated to the Replication Manager from the following list:

    - Create a new svcHardware local database.
    - Use existing svcHardware database.

    Select the appropriate action:

    - Click **Next** to continue with the installation.
    - Click **Back** to review what you previously selected.
    - Click **Cancel** to exit the installation wizard.

25. If you chose either the typical install path, or to create a new local database in the advanced path, enter parameters for the new database in the following fields of the `Create Local Database for "svcHardware" Subcomponent` window:
    - Database name

      Note: The database name must be unique to the svcHardware subcomponent. You cannot share the svcHardware subcomponent database with any other applications or with other Replication Manager subcomponents.
    - Database drive

    If you want to also create the database tables, select the **Create the database tables** check box.

    After you complete all the fields, select the appropriate action:
    - Click **Next** to continue with the installation.
    - Click **Back** to review what you previously selected.
    - Click **Cancel** to exit the installation wizard.
26. If you chose to use an existing database in the advanced install path, you will see the `Select Existing Database for "svcHardware" Subcomponent` window. Select a database from the list of the existing databases.

    If you want to create other tables in the selected database, select the "Drop the tables, if existing, and create new tables" check box.

    After completing all of the fields, click **Next** to continue with the installation. You can click **Back** to review what you previous selected or click **Cancel** to exit the installation program.
27. If you selected **Replication Manager CLI Client**, you are required to enter the co-server host name, port value, MDM superuser name, and password for the super user currently identified to MDM, to enable Replication Manager Command Line Interface access in the `CoServer Parameters` window.

    After you complete all the fields, select the appropriate action:
    - Click **Next** to continue with the installation.
    - Click **Back** to review what you previously selected.
    - Click **Cancel** to exit the installation wizard.
28. At this point, you have answered all the customization questions and the verification steps are successfully completed. The Preview window displays a summary of all of the choices that you made on the previous panels.
    - Click **Install** to begin the installation.
    - Click **Back** to review what you previously selected.
    - Click **Cancel** to exit the installation wizard.
29. The installation wizard begins to install the selected features of Replication Manager, as follows:
    a. If you previously indicated that you wanted a new database to be created for the hardware subcomponent:
        - The Create Database for 'Hardware' Subcomponent Progress window opens. A progress bar indicates the status of the database creation task. Wait for the process to complete or click **Cancel** to exit the installation wizard.

          Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example:

```
Cancel the current operation?
Yes No
```

Be aware that if you click **Yes** to confirm the cancellation, the information you entered or selected in the previous windows is not saved. You must start the installation again from the first step.

- If the creation of a new database has failed, the `Error on Create Database for 'Hardware' Subcomponent` window displays an error message indicating the cause of the errors that occurred while the database was being created.

  See the log file for details. The most frequent source of failure is naming a preexisting database. If this is the case, select the appropriate action:

  – Click **Back** to select another database name to create or select an existing database.
  – Click **Cancel** to exit the installation wizard.
- The `Create Database Objects for 'Hardware' Subcomponent Progress` window opens in the following instances:
  – If you previously selected the creation of a new database for the hardware subcomponent and you selected the **Create the database tables** check box
  – If you selected an existing hardware database and selected the **Drop the tables, if existing, and create new tables** check box

  A progress bar indicates the status of creating the database objects. Wait for the process to complete or click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example:

  ```
  Cancel the current operation?
  Yes No
  ```

  Be aware that if you click **Yes** to confirm the cancellation, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

b. If you previously selected the creation of a new database for the element catalog subcomponent, one of the following windows opens:

- The `Create Database for 'ElementCatalog' Subcomponent Progress` window displays a progress bar that indicates the status of the database creation task. Wait for the process to complete or click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example:

  ```
  Cancel the current operation?
  Yes No
  ```

  Be aware that if you click **Yes** to confirm the cancellation, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
- The `Error on Create Database for 'ElementCatalog' Subcomponent` window opens if the creation of a new database for the element catalog subcomponent has failed.

An error message is displayed indicating the cause of the errors that occurred while the database was being created. See the log file for details. The most frequent source of failure is naming a preexistent database. If this is the case, select the appropriate action:

- Click **Back** to select another database name to create or to select an existing database.
- Click **Cancel** to exit the installation wizard.

- The `Create Database Objects for 'ElementCatalog' Subcomponent Progress` window opens in the following cases:
  - You previously selected the creation of a new database for the element catalog subcomponent and you selected the **Create the database tables** check box.
  - You selected an existing database for the element catalog and selected the **Drop the tables, if existing, and create new tables** check box.

  A progress bar indicates the status of creating the database objects. Wait for the process to complete or click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard:

  ```
  Cancel the current operation?
  Yes No
  ```

  Be aware that if you click **Yes** to confirm the cancellation, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

c. If you previously selected the creation of a new database for the Replication Manager subcomponent, one of the following windows opens:

- The `Create Database for 'ReplicationManager' Subcomponent Progress` window displays a progress bar that indicates the status of creating the database. Wait for the process to complete or click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard:

  ```
  Cancel the current operation?
  Yes No
  ```

  Be aware that if you click **Yes** to confirm the cancellation, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

- If the creation of a new database fails, the `Error on Create Database for 'ReplicationManager' Subcomponent` window opens.

  An error message is displayed indicating the cause of the errors that occurred while the database was being created. See the log file for details. The most frequent source of failure is naming a preexistent database. If this is the case, select the appropriate action:
  - Click **Back** to select another database name to create or to select an existing database.
  - Click **Cancel** to exit the installation wizard.
- The `Create Database Objects for 'ReplicationManager' Subcomponent Progress` window opens in the following cases:

- You previously selected the creation of a new database for the Replication Manager subcomponent and you selected the **Create the database tables** check box.
- You selected an existing database and selected the **Drop the tables, if existing, and create new tables** check box.

A progress bar indicates the status of creating the database objects. Wait for the process to complete or click **Cancel** to exit the installation wizard.

Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard:

```
Cancel the current operation?
Yes No
```

Be aware that if you click **Yes** to confirm the cancellation, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

d. If you previously selected the creation of a new database for the svcHardware subcomponent, one of the following windows opens:

- The `Create Database for 'svcHardware' Subcomponent Progress` window displays a progress bar that indicates the status of creating the database. Wait for the process to complete or click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard:

  ```
  Cancel the current operation?
  Yes No
  ```

  Be aware that if you click **Yes** to confirm the cancellation, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
- If the creation of a new database fails, the `Error on Create Database for 'svcHardware' Subcomponent` window opens.

  An error message is displayed indicating the cause of the errors that occurred while the database was being created. See the log file for details. The most frequent source of failure is naming a preexistent database. If this is the case, select the appropriate action:
  - Click **Back** to select another database name to create or to select an existing database.
  - Click **Cancel** to exit the installation wizard.
- The `Create Database Objects for 'svcHardware' Subcomponent Progress` window opens in the following cases:
  - You previously selected the creation of a new database for the svcHardware subcomponent and you selected the **Create the database tables** check box.
  - You selected an existing database and selected the **Drop the tables, if existing, and create new tables** check box.

  A progress bar indicates the status of creating the database objects. Wait for the process to complete or click **Cancel** to exit the installation wizard.

Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard:

```
Cancel the current operation?
Yes No
```

Be aware that if you click **Yes** to confirm the cancellation, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

e. The Installation Progress window indicates how much of the installation has been completed.

This phase of the installation usually takes under 5 minutes, depending on the configuration of your machine. Wait for the process to complete or click **Cancel** to exit the installation wizard.

Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard:

```
Cancel the current operation?
Yes No
```

Be aware that if you click **Yes** to confirm the cancellation, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

30. When the installation is complete, the Finish window opens . Before proceeding, you might want to review the log file for any possible error messages. The log file is in the following location:

xxx\logs\rmlog.txt
where,

xxx is the destination directory where Replication Manager was installed. The rmlog.txt file contains a trace of the installation actions.

Click **Finish** to exit the installation wizard.

Note: Ordinarily, you do not need to restart your system during or after the installation of Replication Manager. However, the installation wizard might determine that a restart is necessary. Restart your system if required. After you restart the system, the installation wizard continues with the installation.

31. Click **Exit** on the LaunchPad window to end the LaunchPad program if you have not already done so.

Post-processing requirements:

1. To manually start the **IBM Director Support Program** services, follow the steps below:
   a. Click **Start –> Settings**, and then double-click the **Control Panel** icon.
   b. In the Control Panel window, double-click the **Administrative Tools** icon.
   c. In the Administrative Tools window, double-click the **Services** icon.
   d. Perform the following steps to select and start each desired service (according to the selected features at installation time):
      - From the Services window, single-click the **IBM Director Support Program** icon.
      - From the **Action** menu, select the **Start** option.
      - From the Services window, single-click on the **IBM Director Server** icon.

- From the **Action** menu, select the **Start** option.

  When you have completed these steps, the **IBM Director** icon that is located in the start tray (lower right corner of the desktop) changes to a green circle indicating that the server has started.
- Start WebSphere by clicking **Start –> Programs –> IBM WebSphere –> Application Server V5.1 –> Start the Server**.
- You must stop and restart the IBM Director server. Wait until the **IBM Director** icon that is located in the start tray (lower right corner of the desktop) changes to a green circle indicating that the server has started.

2. Start the Director Console and log in to verify successful installation.
   a. Click **Start –> Programs –> IBM Director –> IBM Director Console**.
   b. Log on to the IBM Director server. When you log on to the IBM Director Server through the IBM Director Console, the user ID and password are validated against the security subsystem for the operating system where the IBM Director server component is installed, not on the workstation where the IBM Director Console is running. The user ID and password must be valid on the operating system where the IBM Director server is running, and the user must be authorized as an IBM Director administrator.

      Complete the following fields to log on:

      IBM Director Server
      Identifies the IBM Director server you want to log in to.

      User ID
      Identifies the user ID of the person opening the console.

      Password
      Specifies the password for the user ID that was entered.
   c. After you are logged onto IBM Director, look for `Multiple Device Manager` in the Tasks pane. Click **Multiple Device Manager** to expand the task. Look for the `Manage Replication` task in the expanded list.

   Note: If you receive a `Requesting Server` status, restart the IBM Director server.

Result:

If you successfully logged on to the IBM Director, expanded the `Multiple Device Manager` task, and you can see the `Manage Replication` task, Replication Manager is properly installed.

Continue with the post installation tasks for the Replication Manager by referring to the information related to username and password restrictions, as well as configuration.

Related topics:

- Chapter 17, “Performing Multiple Device Manager configuration tasks,” on page 167
- “Installing Multiple Device Manager for Windows” on page 46
- “Installing DB2® Universal Database Workgroup Edition for Windows” on page 42
- “Installing IBM Director for Windows” on page 44
- “Installing Performance Manager for Windows” on page 59

Part 3. Installing IBM Multiple Device Manager for the Linux operating system

This part describes installation requirements and procedures to install the IBM Multiple Device Manager (MDM) for the Linux operating system.

Chapter 5. Planning for installation for Linux

Perform these tasks to plan for the installation of the Multiple Device Manager (MDM) on Linux operating systems.

Steps:

Perform the following steps during the planning phase for MDM installation:

1. Verify that your operating system is Red Hat Enterprise Linux AS 2.1 Intel x86.
2. Verify that your hardware meets the following requirements:
   - 1 GHz or faster Intel Pentium III
   - 1 GB RAM minimum; 2 GB RAM recommended
   - Ethernet or token-ring card for network connectivity

     Note: External Internet connectivity is not required to install MDM.
   - CD-ROM drive
   - (Optional) If you are installing Tivoli Storage Area Network Manager, you need to connect to the SAN fabric using a fibre-channel, host bus adapter
3. Verify that your server has 4 GB of free disk space for prerequisite software and future storage data.
4. Schedule the installation of the following software *before* you install MDM:
   - CIM Agent
   - Service Location Protocol (SLP)
5. There can be potential TCP/IP port conflicts between existing software on your system (for example, Tivoli NetView) and the ports which you will assign to WebSphere Application Server. Refer to "TCP/IP port considerations" listed in the related topics section for more information about TCP/IP port usage by WebSphere Application Server and NetView.

   The "typical" path in the MDM installation program will assume default WebSphere Application Server port usage unless it detects an active port conflict with the default WebSphere Application Server ports. If the install program detects a port conflict, it will present you with the WebSphere Application Server port panel so that you can change the default port settings.

In addition to the above preparation, you need the following prerequisite software. These products are included on your MDM CDs.

- IBM Director Version 4.1
- IBM WebSphere Version 5.1

  Notes:

  1. This installation of WebSphere Application Server must be reserved for use with Multiple Device Manager, so Multiple Device Manager and the related installation and removal programs can start and stop WebSphere Application Server as necessary.
  2. The Multiple Device Manager installation program will automatically install WebSphere Application Server 5.1 and its required components on your system. If you install WebSphere Application Server 5.1 outside of the MDM installation wizard, you will need to install the components separately. The required WebSphere Application Server 5.1 components are:

  - Admin Scripting
  - IBM HTTP Server
  - WebSphere Message Queuing
  - WebSphere Message Queuing CSD 05
- IBM DB2 Version 8.1.2

Attention: Performance Manager and Replication Manager are ordered separately and both may not be contained in your Media kit. However, at least one of them must be installed with Multiple Device Manager Base Code.

Related topics:
- "System prerequisites for Linux"
- "Installing DB2® Universal Database Workgroup Edition for Linux" on page 89
- "Installing IBM Director for Linux" on page 92
- "Installing Multiple Device Manager for Linux" on page 94
- "User names and passwords" on page 39
- "Creating SSL key files and certificates for Linux" on page 104
- "TCP/IP port considerations" on page 41
- "Avoiding port conflicts" on page 168

System prerequisites for Linux

The prerequisites for installing Multiple Device Manager (MDM) on a Linux operating system are listed in the following sections. Verify that all requirements are met before you install MDM.

MDM installation prerequisites:

Table 8 lists the MDM installation prerequisites.

Table 8. MDM installation prerequisites

Operating system	• Red Hat Enterprise Linux AS 2.1 Intel x86
Hardware	• 1 GHz Intel Pentium III or faster • 1 GB RAM minimum; 2 GB RAM recommended • Ethernet or token-ring card • CD-ROM drive • Network connectivity **Note:** External Internet connectivity is not required to install MDM. • (Optional) If you are installing Tivoli Storage Area Network Manager, connectivity to the SAN fabric using a fibre-channel, host bus adapter
Disk space	4 GB of free disk space for the prerequisite software and future storage data

Attention: If you use Enterprise Storage Server (ESS) Expert, note that MDM and Expert cannot coexist on the same server. You need to install MDM on a separate server from Expert.

LIC and CIM Agent prerequisites:

Table 9 on page 87 lists the MDM Managed I/O Subsystem Licensed Internal Code (LIC) and CIM Agent prerequisites.

Table 9. MDM Managed I/O Subsystem LIC and CIM Agent prerequisites

MDM Managed I/O Subsystem	Minimum Licensed Internal Code (LIC)	CIM Agent code levels
Enterprise Storage Server	LIC 2.63	CIM Agent for ESS 1.2.0.28 ESS CLI 2.3.0.19
SAN Volume Controller	LIC 1.2.0.0	SAN Volume Controller Console 1.2.0.2
FAStT	600, 700, and 900 (8.3 microcode)	LSI Provider 1.0.2
Brocade switches	Microcode 2.1 or higher	

Related topics:

- "Installing DB2® Universal Database Workgroup Edition for Linux" on page 89
- "Installing IBM Director for Linux" on page 92
- "Installing Multiple Device Manager for Linux" on page 94
- Chapter 12, "Removing Multiple Device Manager for Linux," on page 149
- "Related Web sites" on page 186

Installation overview for Linux

This topic gives an overview of the installation tasks for IBM TotalStorage Multiple Device Manager (MDM) and the order in which they are to be performed. It also includes descriptions of the components that must be installed.

Installation tasks overview:

This section lists the tasks you perform when installing Multiple Device Manager. You must complete these tasks in the order that they are presented:

1. Verify hardware and software prerequisites for the target Multiple Device Manager system.
2. (Required) Install DB2 Universal Database Workgroup Edition V8.1 with the DB2 V8.1.2 update (FixPak 2).
3. (Required) Install IBM Director 4.12.

   Note: You will need the DB2 user name and password for the IBM Director installation.
4. (Optional) Install the rpm-build software package if it is not already installed on your system. The Multiple Device Manager installation program uses this software to add information to the RPM database. If the rpm-build software is not present, the Multiple Device Manager installation will report the missing software. However, the installation program will allow you to choose to continue the installation even if this software is missing.

   If you do not have the rpm-build software on your system and choose to continue the installation, you can use the following command to determine the level of Multiple Device Manager on your system:

   ```
   grep -E "^ibmmdmdm\|" ~root/vpd.properties
   ```
5. (Required) Install Multiple Device Manager (MDM) Base Code and the WebSphere Application Server 5.1 including the WebSphere Message Queuing CSD 05. If the WebSphere Application Server 5.1 and its required components are already installed on your machine, the MDM Installation Wizard will detect this and it will only install Multiple Device Manager Base Code.

Note: You will need the DB2 user name and password for the MDM software installation.

6. (Optional) Install Performance Manager using IBM Performance Manager wizard.

   Note: You will need the DB2 user name and password for the Performance Manager installation.

7. (Optional) Install Replication Manager using IBM Replication Manager wizard.

Note:

See the *User names and passwords* topic listed below for more detail about the particular user name and password combinations required during the installation process.

Components to be installed:

This section lists additional detail about the components that must be installed before you can use Multiple Device Manager.

DB2 Universal Database
Multiple Device Manager uses DB2 for persistent storage needs. A copy of DB2 is shipped with MDM, and must be installed and configured for use with MDM.

IBM Director
As part of the Multiple Device Manager infrastructure IBM Director provides device discovery, device management, and other services to Multiple Device Manager users. These services are provided through a graphical user interface that gives system administrators easy access to both local and remote systems. Additional single-device, multiple-device, and cross-device configuration functions are provided by Device Manager, which has a dual role as a component of Multiple Device Manager and as part of the infrastructure of IBM Director.

Multiple Device Manager
Multiple Device Manager software is the basic component of the Multiple Device Manager product and is added to IBM Director. It provides access to single-device, multiple-device, and cross-device configuration functionality

WebSphere Application Server
The WebSphere Application Server is a high-performance, scalable transaction engine for dynamic e-business applications. WebSphere provides a single Web services-enabled application server and development environment.

Notes:

1. This installation of WebSphere Application Server must be reserved for use with Multiple Device Manager, so Multiple Device Manager and the related installation and removal programs can start and stop WebSphere Application Server as necessary.
2. The MDM uninstallation program uninstalls MDM but it does not uninstall WebSphere Application Server. Separate instructions are provided for removing Multiple Device Manager and for removing WebSphere Application Server.

Performance Manager

The Performance Manager component of Multiple Device Manager manages and monitors the performance of the storage devices that Multiple Device Manager supports. Users can track the performance of a storage device from the data that Performance Manager collects. The data can be viewed in user defined graphs. The performance advisor function shows the user how to set performance requirements for data retrieval and maintenance and how to allocate data storage to meet these requirements.

Replication Manager

Replication Manager provides a user interface for creating, maintaining, and using volume groups and for scheduling copy tasks. The User Interface populates lists of volumes using the Device Manager interface. Replication Manager provides two types of copy services, Continuous Copy and Point-in-Time Copy. These data-copy services maintain consistent copies of data on source volumes that are managed by Multiple Device Manager. A Replication Manager copy session ensures that data on multiple related heterogeneous volumes is kept consistent by managing the volume pairs in the session as a consistent unit.

Related topics:

- "User names and passwords" on page 39
- "System prerequisites for Linux" on page 86
- "Installing DB2® Universal Database Workgroup Edition for Linux"
- "Installing IBM Director for Linux" on page 92
- "Installing Multiple Device Manager for Linux" on page 94
- Chapter 12, "Removing Multiple Device Manager for Linux," on page 149
- Chapter 6, "Installing Performance Manager for Linux," on page 105
- Chapter 7, "Installing Replication Manager for Linux," on page 115

Installing DB2® Universal Database Workgroup Edition for Linux

You can use these procedures to install the DB2 Universal Database (UDB) Workgroup Edition V8.1.2 (which includes FixPak 2). If you already have DB2 Universal Database Workgroup Edition V8.1 installed on your system, you must install the DB2 V8.1.2 update (FixPak 2). The DB2 updates are available for download from IBM. See the Post-processing requirements section of this topic for more information about locating and installing DB2 updates.

Prerequisites:

- Before starting the installation of DB2 UDB Workgroup Edition, you should have already verified your hardware and software requirements.
- Perform the following steps to prepare for the installation:
  1. Log on as a user with root authority.
  2. Create a mount point or choose an existing mount point. To create a mount point called `/cdrom`, type the following command:

     ```
     mkdir /cdrom
     ```
  3. Mount the CD-ROM file system at the desired mount point. For example, to mount a compact disc inserted in a CD-ROM drive known as `/dev/cd0` at mount point `/cdrom`, type the following command:

     ```
     mount -o ro /dev/cdrom /cdrom
     ```

Steps:

Perform the following steps to install the DB2 Universal Database (UDB) Workgroup Edition V8.1.2:

1. If you have not already done so, insert the CD labeled ″DB2 Universal Database WorkGroup Server Edition Version 8.1.2 for Linux on Intel on 32-bit systems″ into the CD-ROM drive and mount it using the mounting procedure.
2. Change to the directory where the CD-ROM is mounted by typing the following command:

   ```
   cd /cdrom
   ```

   where */cdrom* represents the mount point of the CD-ROM.
3. Enter the ./db2setup command to start the DB2 Setup wizard.
4. After a moment, the IBM DB2 Setup Launchpad opens.
5. When you are ready, click **Install Products** to start the installation.
6. Select **DB2 UDB Workgroup Server Edition**. Click **Next**.
7. An installation wizard introductory page opens. Click **Next**.
8. Review and click **Accept** to accept the license. Click **Next**.
9. Select the installation type by clicking **Typical**. You can click **View Features** to view the features that will be installed. However, if you need to change the features, you should perform a custom installation. When you are ready, click **Next**.
10. On the DAS user page, set the user information for the database administration server (DAS). This user administers the DAS. Type the password and click **Next**.
11. On the Instance setup page, click **Create a DB2 instance** and click **Next**.
12. The DB2 Setup wizard creates a new user, db2inst1, in group db2grp1. On the Instance owner page, you can change user and group names, or you can configure an existing user to the new DB2 V8 instance by selecting the **Existing user** option. The default home directory is /home. Change the instance home directory to a DB2-specific directory, such as /db2home.

    Select **New user**, accept the defaults, and type the password. Click **Next**.
13. The *fenced user* is responsible for executing fenced, user-defined functions, such as UDFs and stored procedures. Once again, note the home directory location.

    On the Fenced user page, select **New user**, accept the defaults, and type the password. Click **Next** .
14. The DB2 tools catalog lets you use the task center or scheduler. This creates a database on your local machine that stores task metadata. The scheduler will not work without this repository. You can also create a DB2 tools catalog after installation, but it is much easier to let the DB2 Setup wizard create it for you.

    On the Tools catalog page, select **Use a local database** and click **Next**.
15. Specify the instance, database, and schema in which to store the tools catalog. By default, a newly created tools catalog is placed in the home directory of the instance owner.

    Accept the defaults and click **Next**.
16. The administration contact list stores administrator contact information and is used for notifying administrators when a database requires attention. You can create a new contact list that is stored locally, or you can use an existing global contact list that resides on a remote DB2 server. If you select **Enable** notification, your system will search for an available SMTP server and set it to be used for e-mail notifications.

On the Contact list page, accept the default, **Local- Create a contact list on this system**, and click **Next**.

17. By default, a health monitor runs on the DB2 instance. The DB2 health monitor sends an e-mail notification to the person listed at the specified mail address when a health indicator threshold is exceeded. If you select **Address is for a pager**, the notification message will be sent to the contact's pager.

    Accept the default, **New contact**, and click **Next**.

18. The Installation summary page opens and summarizes your installation and configuration settings. Scroll through this window to verify that the settings are correct, and then click **Finish**.

19. A status panel opens to show the overall progress of the DB2 installation.

    The status panel has two notebook tabs, which show the following information:

    - The post-installation steps of DB2 installation
    - The installation status report of the DB2 installation

    Click **Finish** to close the status panel.

Post-processing requirements:

- After you have completed installing the DB2 Universal Database Workgroup Edition, edit the file /etc/group and add `root` to the db2grp1 group. The db2grp1 line in /etc/group should look similar to the following line:

  ```
  db2grp1:x:102:root
  ```

- The DB2 CD supplied with Multiple Device Manager installs DB2 V8.1 with the DB2 V8.1.2 update (FixPak 2) already integrated in the code. If you have installed DB2 V8.1 from another source, you may need to install the DB2 V8.1.2 update (FixPak 2). You can ensure that you have installed the correct level of the DB2 code by using the following steps:

  1. Log on as the DB2 user and type the following command:

     ```
     db2level
     ```

     The following is an example of the output of the **db2level** command:

     ```
     DB21085I  Instance "db2inst1" uses "32" bits and DB2 code
     release "SQL08012" with level identifier "02030106".
     Informational tokens are "DB2 v8.1.0.16", "s030508", "MI00048",
     and FixPak "2". Product is installed at "/opt/IBM/db2/V8.1".
     ```

     Find the FixPak level in the output from the **db2level** command. In this example output, the FixPak level is 2.

     If the FixPak level is 2 when you run the **db2level** command, your installation of DB2 is complete.

  2. If the FixPak level is less than 2, you need to download DB2 V8.1.2 update (FixPak 2) from the IBM DB2 UDB and DB2 Connect Online Support Web site at: http://www.ibm.com/software/data/db2/udb/winos2unix/support

     Each update contains a set of release notes and a README file. The README file provides instructions for installing the update. Perform the instructions in the README file to install the update.

Related topics:

- "Installing Multiple Device Manager for Linux" on page 94

Installing IBM Director for Linux

You can use these procedures to install IBM Director.

Steps:

Perform the following steps to install IBM Director:

1. Insert the IBM Director 4.12 CD into the CD-ROM drive.
2. If the CD does not mount automatically, go to step 3. If the CD does mount automatically, type the following command:
   ```
   umount /mnt/cdrom
   ```
   where */mnt/cdrom* is the mount point of the CD-ROM drive.
3. If the CD does not mount automatically, type the following command:
   ```
   mount -t iso9660 -o map=off /dev/cdrom /mnt/cdrom
   ```
   where */dev/cdrom* is the specific device file for the CD-ROM block device and */mnt/cdrom* is the mount point of the CD-ROM drive.
4. Type the following command to change to the directory where the installation script is located:
   ```
   cd /mnt/cdrom/director/server/linux/i386/
   ```
   where */mnt/cdrom* is the mount point of the CD-ROM drive.
5. If you want to customize the installation (not recommended), go to the next step. If you want to accept the default settings for the installation, type the following command:
   ```
   ./dirinstall
   ```
6. If you chose the default settings for the installation, go to the next step. If you want to customize the installation, complete these steps:
   a. Copy the installation script to a local directory.
   b. Type the following command:
      ```
      cp dirinstall /directory/dirinstall
      ```
      where */directory* is the local directory.
   c. Open an ASCII text editor and modify the ″User configuration″ section of the dirinstall script. This file is fully commented.
      You can specify the location of the Red Hat Package Manager files, select the IBM Director extensions and features that you want to install, and select the log file options.
   d. Save the modified installation script.
   e. To install IBM Director, type the following command:
      ```
      /directory/dirinstall
      ```
      where */directory* is the local directory to which you copied the installation script.
7. To unmount the CD-ROM drive, complete the following steps:
   a. Type `cd / .`
   b. Type the following command:
      ```
      umount /mnt/cdrom
      ```
      where */mnt/cdrom* is the mount point of the CD-ROM drive.

8. Remove the IBM Director 4.12 CD from the CD-ROM drive.

Post-processing requirements:

Perform the following steps after you install IBM Director to configure IBM Director to use DB2:

1. Create a file named: /etc/TWGserver/setup_env

   Add the following line to the /etc/TWGserver/setup_env file:

   ```
   . /home/db2inst1/swllib/db2profile
   ```

   where */home/db2inst1* is the directory where DB2 is installed.

   This line enables IBM Director to communicate with DB2.
2. Type the following command to set the setup_env file attributes to read-execute:

   ```
   chmod 755 /etc/TWGserver/setup_env
   ```
3. Create a file named: /opt/IBM/director/log/TWGDbInstall.output
4. Type the following command to give everyone write permissions to /opt/IBM/director/log/TWGDbInstall.output:

   ```
   chmod 666 /opt/IBM/director/log/TWGDbInstall.output
   ```
5. Create a file named /opt/IBM/director/data/TWGServer.prop if it does not exist.
6. Type the following command to give everyone write permissions to /opt/IBM/director/data/TWGServer.prop:

   ```
   chmod 666 /opt/IBM/director/data/TWGServer.prop
   ```
7. Type the following command to change the permissions on the cfgdb file:

   ```
   chmod 755 /opt/IBM/director/bin/cfgdb
   ```

   This is necessary because cfgdb must be run as the database user, not the root user, in order to configure the database for Director.
8. Log in as the database user, for example, db2inst1. You might not be able to simply type, for example, **su - db2inst1**, because you need X11 permissions to display the database configuration interface for IBM Director.
9. Type the following command to create the IBM Directory database:

   ```
   db2 create db ibmdir
   ```
10. Type the following command to catalog a tcpip node:

    ```
    db2 catalog tcpip node loopback remote 127.0.0.1 server db2c_db2inst1
    ```
11. Type the following command to catalog the database ibmdir:

    ```
    db2 catalog database ibmdir as ibmdir_r at node loopback
    ```
12. Perform the following steps to stop and restart the DB2 server:
    a. Type the following command to stop the DB2 server:

       ```
       db2stop
       ```
    b. Type the following command to restart the DB2 server:

       ```
       db2start
       ```
13. Type the following command to configure IBM Director to work with the databases that have been cataloged:

    ```
    /opt/IBM/director/bin/cfgdb
    ```
    a. Select **IBM DB2 Universal Database** and click **Next**.

b. Type `ibmdir_r` as the database to be used by IBM Director and input the database user name and password which IBM Director will use for database access. Click **Next**.

c. Select a DB2 node name. Because DB2 is installed locally, select **LOCAL**. Click **OK**.

d. A warning message is displayed, such as the following:

```
The database name specified already exists.
Do you want to use it for this configuration?
```

Click **Yes**.

e. Click **OK** to close the IBM Director DB2 Universal Database Configuration window.

14. If you want to enable encryption or change security settings, type the following command:

```
/opt/IBM/director/bin/cfgsecurity
```

Result:

IBM Director is installed.

Related topics:

- "Installing Multiple Device Manager for Linux"

Installing Multiple Device Manager for Linux

You can use these procedures to install the Device Manager component of Multiple Device Manager (MDM) and the extensions for the IBM Director Server and the IBM Director Console on a Linux operating system. You can also use these procedures to install the following additional products if they are not already installed on your system:

- IBM WebSphere Application Server (WAS)
- IBM HTTP Server
- IBM HTTP Administration

Prerequisites:

- Before you install the MDM, you should have already installed the DB2 Universal Database Workgroup Edition and IBM Director.
- Verify that the system where MDM is to be installed meets the system prerequisites.
- Perform the following steps to prepare for the installation:
  1. Log on as a user with root authority.
  2. Create a mount point or choose an existing mount point. To create a mount point called `/cdrom`, type the following command:

     ```
     mkdir /cdrom
     ```

  3. Mount the CD-ROM file system at the desired mount point. For example, to mount a compact disc inserted in a CD-ROM drive known as `/dev/cd0` at mount point `/cdrom`, type the following command:

     ```
     mount -o ro /dev/cdrom /cdrom
     ```

  4. Change the current directory to the mount point for the CD-ROM drive in the LINUX directory. For example, if the CD-ROM was mounted at the `/cdrom` mount point, type the following command:

```
cd /cdrom/LINUX
```

5. Select the destination paths for the MDM components, and be sure you have enough space available on the chosen destination.

   The installation program (installer) provides a default installation location (`/opt/IBM/mdm/dm`) for the component. You can override this location by using the installer browse function. When you click **Next**, the installer analyzes the available space for the location you provide. If there is not enough space, you will not be able to proceed to the next step in the installation process.

6. Add the user that will be your MDM super user. This username and password will be used to communicate with the MDM CIMOMs. To do this, type the following in a command window:

   ```
   useradd <username>
   ```

   where <*username*> is the name you have chosen for your MDM super user.

7. Set the password for the MDM super user. To do this, type the following in a command window:

   ```
   passwd <username>
   ```

   where <*username*> is the name you have chosen for your MDM super user.

8. Check for a readme file located in the LINUX directory on the MDM compact disc. This readme file might provide additional information that supersedes these procedures.
9. Log on to your system as root.
10. You should stop the IBM Director Server and any open IBM Director Console instances before you start the MDM installation.:
    a. Close any open IBM Director Consoles.
    b. Stop IBM Director Server by typing the following command in a separate command window:

       ```
       twgstop
       ```

11. If the IBM WebSphere Application Server software was installed prior to the installation of MDM, you should manually stop the WebSphere Application Server, IBM HTTP Server and IBM HTTP Admin.
    a. To stop WebSphere Application Server Version 5 - server1, type the following command in a separate command window:

       ```
       <WAS_dest-path>/bin/stopServer.sh server1 -username
         <username> -password <password>
       ```

       where:

       <*WAS_dest-path*> is the destination path where WebSphere Application Server v5 was installed

       <*username*> is the name of the WebSphere Application Server authentication user

       <*password*> is the password of the WebSphere Application Server authentication user

       Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:
       - You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
       - <*WAS_dest-path*> is <*dest-path*>/WebSphere/AppServer

where <*dest-path*> is the installation location for the Multiple Device Manager.

b. To stop IBM HTTP Administration 1.3.28, type the following command in a separate command window:

```
<HTTPServer_dest-path>/bin/adminctl stop
```

where:

<*HTTPServer_dest-path*>- is the destination path, where IBM HTTP Server 1.3.28 was installed.

c. To stop IBM HTTP Server 1.3.28, type the following command in a separate command window:

```
<HTTPServer_dest-path>/bin/apachectl stop
```

where:

<*HTTPServer_dest-path*> is the destination path where IBM HTTP Server 1.3.28 was installed.

Note: *Do not interrupt the program by abnormal methods* (such as, using the Ctrl+C key sequence, closing the application windows, or shutting down the power source) during the installation process. An interruption caused by an action other than clicking the **Cancel** button in the application window can have unpredictable effects on the system.

Steps:

Perform the following steps to install MDM:

1. If the MDM CD is not already mounted, insert it into the CD-ROM drive, and mount it using the previous mounting procedure.
2. Type the following command to run the installation program launcher (launchpad_linux) from the LINUX directory of the CD-ROM:

   ```
   ./launchpad_linux
   ```

   This command starts the Multiple Device Manager LaunchPad, which is a small graphic program that launches the installation setup program.

   The installation program should start within 15 - 30 seconds.
3. The following options are displayed when the LaunchPad window opens:

   IBM Multiple Device Manager overview
   Provides information about MDM.

   Readme file
   Provides any last minute product information that did not make it into these procedures.

   Installation guide
   Provides a copy of these instructions for installing MDM.

   License agreement
   Provides information about the license for MDM.

   IBM Multiple Device Manager Web site
   Provides information from the product Web site.

   Installation wizard
   Starts the MDM installation program.

Post installation tasks
Provides information about configuring MDM.

Exit Exits the MDM LaunchPad program.

4. Click **Readme file** from the LaunchPad window or open the README.txt file located in the doc or LINUX directory on the MDM CD to check for information that might supersede these procedures.
5. Click **Installation wizard** from the LaunchPad window to start the installation of the Device Manager component of MDM.

   Note: The LaunchPad window remains open behind the installation wizard so that you can access product information during the installation process. Click **Exit** if you want to close the LaunchPad.
6. There might be a slight delay while the software loads on your system. After the software loads, a command prompt window opens to display the following message:

```
Initializing InstallShield Wizard...
Preparing Java (tm) Virtual Machine ..........................
.................................................
```

7. The Welcome window opens suggesting what documentation you should review prior to installation. Click **Next** to continue, or click **Cancel** to exit the installation.
8. The License Agreement window opens. Read the license agreement information.

   Select **I accept the terms of the license agreement** if you agree, then click **Next** to accept the license agreement.

   Otherwise, keep the selection **I do not accept the terms of the license agreement** the default), and click **Cancel** to exit the installation.
9. The Destination Directory window opens. Select one of the following options:
   - Click **Next** to accept the default directory.
   - Click **Browse** to select a different directory for the installation, and then click **Next** to continue the installation process.
   - Click **Cancel** to exit the installation process.

   Note: The Multiple Device Manager Director extensions files will not be installed under the specified destination directory. They will be automatically installed under the IBM Director installation location.
10. The Select Product Type window opens. You can select one of the following two types of installations:
    - **IBM Multiple Device Manager Server**

      This option installs both server and console extensions, including all the following product features, on a system where you have installed IBM Director Server 4.12 or greater.

      Multiple Device Manager Application
      The program installs the MDM WebSphere Application Server applications. The installation program checks if there is a WebSphere Application Server 5.1 already installed on your system. If it is not installed, the program installs it.

      Director Server Extensions
      The program installs MDM server extensions for IBM Director Server 4.12 or greater.

Director Console Extensions
The program installs MDM console extensions for IBM Director Console 4.12 or greater and the Console Help System, which is implemented using Eclipse.

- **IBM Multiple Device Manager Console**

  This option installs only the MDM console extensions and the Console Help System, which is implemented using Eclipse, on a system where you have installed IBM Director Console 4.12 or greater.

Select an option, and then click **Next** to continue with the installation. If you want to exit the installation program, click **Cancel**.

Note: If you want to reinstall a particular type of product (for example, Multiple Device Manager Console), this window is skipped and you will reinstall the same type of product as before (in our example, Multiple Device Manager Console).

11. The installation program verifies that the following prerequisite products and product versions are installed on your system:
    a. If you select **IBM Multiple Device Manager Server**:
       - IBM DB2 V8.1 with the DB2 V8.1.2 update (FixPak 2)
       - IBM Director Server 4.12 (or greater)
    b. If you select **IBM Multiple Device Manager Console**:
       - IBM Director Console 4.12 (or greater)
    c. If the IBM WebSphere Application Server 5.1 was installed on your system prior to the installation of the Multiple Device Manager, the installation program will verify that all the required components of the WebSphere Application Server are installed. The required WebSphere Application Server 5.1 components are:
       - Admin Scripting
       - IBM HTTP Server
       - WebSphere Message Queuing
       - WebSphere Message Queuing CSD 05

    If the required products are installed, the installation program skips step 12 and continues.

    If one or more of the required products are not installed, the missing products are displayed in the Checking Prerequisite Products window (see step 12).
12. The Checking Prerequisite Products window opens and displays the problems that were discovered while checking for the prerequisite products. If the prerequisite products are not installed or the wrong version is installed, the installation program cannot continue. You must exit the program and correct the problem.

    Click **Cancel** to exit the installation program.
13. You can now choose whether you would like to perform a typical or advanced installation in the Installation Type window. In a typical installation, the install wizard will make port and database assignments. The advanced installation will allow you to assign these settings yourself.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.
14. The User Name Input 1 of 2 window opens. You must enter the name and password for the MDM super user. This user name must already exist in the operating system. You can change it after you log on to the IBM Director.

If the user name does not exist, an error message is displayed. Otherwise the installer will add the user name to the diradmin group (the IBM Director administrative group).

After completing all the fields, click **Next** to continue with the installation. Alternatively, you can click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

15. You also need to enter the user name and password for the IBM DB2 Universal Database Server in the User Name Input 2 of 2 window..

    Note: This user name and password will be the exact same one that you assigned to the DB2 server.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

16. If the Multiple Device Manager installation program must install WebSphere Application Server, the Node and Host window opens, asking you for the node name for WebSphere Application Server 5.1 installation.

    The node name must be unique within a cell. The node name is a logical name, so although the default is the system host name, it doesn't actually have to be the host name.

    The host name is either the Domain Name System (DNS) name or the IP address of your system.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

17. If you selected the **Typical** installation in the Installation type window, and the installer determines that none of the default WebSphere Application Server ports is in use, this step is skipped. In this case you will go directly to step 18.

    Otherwise, the IBM WAS Ports window opens. The ports that the WebSphere Application Server 5.1 uses are displayed in this window. You can accept these displayed default ports, or you can modify them to avoid conflicts with the ports already in use on your system.

    To see the ports in use on your system, type the following command:

    ```
    netstat -a
    ```

    Look at the /etc/services file.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

18. If you selected **IBM Multiple Device Manager Server**, the SSL Configuration window opens.

    You must enter the fully qualified path and name of the two server key files that were either generated previously or that must be generated during or after the MDM installation. Record the paths and names for use during the post-installation process.

    Select one of the following options in the SSL Configuration window:

    Generate a self-signed certificate
    Select his option if you want the installer to automatically generate these certificate files

    Defer the generation of the certificates to be a manual post-installation task
    Select this option if you want to manually generate these certificate files after the installation, using WebSphere Application Server ikeyman utility. In this case the next step (Generate Self-Signed Certificate) will be skipped.

19. The Generate Self-Signed Certificate window opens.

    After completing all the fields, click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

20. If you selected the **Typical** installation in the Installation type window, this step is skipped. In this case you will go directly to step 21.

    If you selected **IBM Multiple Device Manager Server**, the Select Database window opens.

    - If you select **Create a new Device Manager local database**, you will go to step 21 next.
    - If you select **Use existing Device Manager database**, you will go to step 22 next.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

21. If you selected **IBM Multiple Device Manager Server**, the Create Local Database window opens. You must enter parameters for the new database in the following fields:

    - Database name

      Note: The database name must be unique to Device Manager. You cannot share the Device Manager database with any other applications.

    - Database path
    - Database owner name
    - Password
    - Confirm the password

    If you want the program to create the database tables, select the **Create the database tables** check box.

    After completing all the fields, click **Next** to continue with the installation. Alternatively, you can click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

22. If you selected the **Typical** installation in the Installation type window, or if you selected the **Create a new Device Manager local database** in the Select Database window, this step is skipped. In this case you will go directly to step 23.

    Otherwise, if you selected **IBM Multiple Device Manager Server**, the Select Existing Database window opens. You must select the database from the list of available databases.

    After completing all the fields, click **Next** to continue with the installation. Alternatively, you can click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

23. The Preview window opens, displaying a summary of all of the choices that were made during the customization phase of the installation.

    Click **Install** to begin the installation. Alternatively, you can click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

24. The installation program begins to install the components you previously selected as follows:

    - If you previously selected to create a new database, the Create Database Progress window opens.

A progress bar indicates the status of creating the database. You can click **Cancel** to exit the installation wizard.

Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

- If you previously selected to create a new database and the creation failed (for example, you want to create a database whose name is the same as that of an existing database), the Error on Create Database window opens. An error message is displayed that indicates the location of the log file that provides details about the error. See the log file. The most frequent source of failure is naming a preexisting database. If this is the case, click **Back** to the panel to select another database name to create or to select an existing database. Alternatively, click **Cancel** to exit the installation wizard.
- If you previously selected to create a new database or you selected an existing database and also selected the **Drop the tables, if existing, and create new tables** check box, the Create Database Objects Progress window opens.

  A progress bar indicates the status of creating the database objects. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
- If the Multiple Device Manager Server installation program must install WebSphere Application Server, the IBM WAS Installation Progress window opens indicating how much of the WebSphere Application Server installation has been completed.

  Installation usually takes 20 - 25 minutes depending on the configuration of your machine. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
- The Installation Progress window opens indicating the progress of the Multiple Device Manager installation.

  Installation usually takes less than 5 minutes, depending on the configuration of your machine. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by

clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

25. The Finish window opens. Before proceeding, you might want to review the log file for any possible error messages. The log file is located in the following file:

    xxx/logs/dmlog.txt

    where:

    xxx is the destination directory where the Device Manager component of Multiple Device Managerwas installed. The dmlog.txt file contains a trace of the installation actions.

    Click **Finish** to exit the installation wizard.

26. The postinstall.txt file opens automatically, displaying the information about the tasks to be performed after a successful installation of the prerequisite products, the Device Manager component, extensions of IBM Director, and any additional products required by MDM.

27. You can now exit the LaunchPad program, if it is still open, by clicking **Exit** on the LaunchPad window.

28. Edit /etc/group and make sure the mqm and root users are both members of the mqm and mqbrkrs groups, and your MDM super user is a member of the diradmin and dirsuper groups. Your /etc/group should contain lines similar to the following:

    ```
    mqm:x:503:mqm,root
    mqbrkrs:x:504:mqm,root
    diradmin:x:506:root,<username>
    dirsuper:x:507:<username>
    ```

    where <*username*> is the MDM super user you created earlier.

29. At this point, you can install the Performance Manager or Replication Manager components of Multiple Device Manager.

30. If you want to work with MDM immediately, you must manually start the servers by performing the following steps:

    a. To start IBM Director, type the following command:

       ```
       twgstart
       ```

    b. To start WebSphere Application Server, type the following command:

       <*WAS_dest-path*>/bin/startServer.sh server1

       where:

       <*WAS_dest-path*> is the destination path where the WebSphere Application Server was installed. If it was installed by MDM, the default destination path is as follows:

       ```
       /opt/IBM/mdm/Websphere/AppServer
       ```

    c. To start IBM HTTP Server, type the following command:

       <*httpServer_dest-path*>/bin/apachectl start

       where:

       <*httpServer_dest-path*> is the destination path where the IBM HTTP Server was installed. If it was installed by MDM, the default destination path is as follows:

       ```
       /opt/IBM/mdm/IBMHTTPServer
       ```

    d. To start IBM HTTP Admin, type the following command:

       <*httpServer_dest-path*>/bin/adminctl start

       where:

<*httpServer_dest-path*> is the destination path where the IBM HTTP Server was installed. If it was installed by MDM, the default destination path is as follows:

```
/opt/IBM/mdm/IBMHTTPServer
```

31. Start the IBM Director Console and log on to verify that the installation was successful.
    a. To start IBM Director Console, type the following command:

       ```
       twgcon
       ```

    b. Log on to the IBM Director Server. When you log on to the IBM Director Server through the IBM Director Console, the user ID and password are validated against the security subsystem for the operating system where the IBM Director Server component is installed, *not* on the workstation where the IBM Director Console is running. The user ID and password must be valid on the operating system where the IBM Director Server is running, and the user must be authorized as an IBM Director administrator.

       Server name
       Identifies the IBM Director Server that you want to log on to.

       User ID
       Identifies the user ID of the person opening the console.

       Password
       Specifies the password for the user ID entered.

    c. Once you have logged on in the Director Console, check the right hand Tasks panel for the task **Multiple Device Manager**. Open the Multiple Device Manager task to reveal the subtasks such as **Configure MDM**.

Result:

If you can successfully log on and see the Multiple Device Manager tasks, MDM is properly installed.

You can continue with the post installation tasks for MDM using the procedures in the section titled: Configuring.

You can also see the post installation tasks by clicking **Post installation tasks** on the LaunchPad window.

You can now install the Performance Manager or Replication Manager components since you have installed their prerequisites.

Attention: Performance Manager and Replication Manager are ordered separately and both may not be contained in your Media kit. However, at least one of them must be installed with Multiple Device Manager Base Code.

Post-processing requirements:

Related topics:

- "Installation overview for Linux" on page 87
- "System prerequisites for Linux" on page 86
- "Installing DB2® Universal Database Workgroup Edition for Linux" on page 89
- "Installing IBM Director for Linux" on page 92

- Chapter 17, “Performing Multiple Device Manager configuration tasks,” on page 167
- Chapter 6, “Installing Performance Manager for Linux,” on page 105
- Chapter 7, “Installing Replication Manager for Linux,” on page 115
- Chapter 12, “Removing Multiple Device Manager for Linux,” on page 149

Creating SSL key files and certificates for Linux

The IBM WebSphere Application Server provides the ikeyman utility that manages Secure Sockets Layer (SSL) key files and certificates. For secure communication, you must create server key files with personal certificates. This procedure is only necessary if you chose to defer generating the SSL files and certificates during the MDM installation.

Steps:

The Multiple Device Manager installation program gives you the option to defer creating the SSL certificate files until after the installation completes. If you selected that option during the installation, you will need to follow this procedure to create the files manually.

1. **Launch the ikeyman utility:**
   a. Type the following command:
      `<WAS-destination-directory>/WebSphere/AppServer/bin/ikeyman.sh`
      where <*WAS-destination-directory*> is the directory where the WebSphere Application Server is installed on your system.
2. **Create the server SSL key file and certificate:**
   a. Open the ikeyman utility and create a new JKS (Java Key Store) key file.
   b. Name the file: MDMServerKeyFile.jks
   c. Keep a record of all the passwords for these keys.
   d. Click **Signer Certificates**, and delete all of the JKS key files listed.
   e. Click **Personal Certificates**, and then create a new self-signed certificate.
   f. Enter the appropriate information for the new certificate. It is best to include as much information as you can.
3. **Create the server SSL trust file and certificate:**
   a. Open the ikeyman utility and create a new JKS key file.
   b. Name the file: MDMServerTrustFile.jks
   c. Keep a record of all the passwords for these keys.
   d. Click **Signer Certificates** and delete all of the JKS key files listed.

Chapter 6. Installing Performance Manager for Linux

You can use these procedures to install Performance Manager on a Linux operating system.

Prerequisites:

- Before you install the Performance Manager component, you should have already installed the following products:
  - DB2 Universal Database Workgroup Edition, Version 8.1 with the DB2 V8.1.2 update (FixPak 2)
  - IBM Director, Version 4.12
  - IBM TotalStorage Multiple Device Manager
- Verify that the system where Performance Manager is to be installed meets the system requirements.
- (Optional) Install the rpm-build software package if it is not already installed on your system. The Performance Manager ainstallation program uses this software to add information to the RPM database. If the rpm-build software is not present, the Performance Manager installation will report the missing software. However, the installation program will allow you to choose to continue the installation even if this software is missing.

  If you do not have the rpm-build software on your system and choose to continue the installation, you can use the following command to determine the level of Performance Manager on your system:

  ```
  grep -E "^ibmmdmpm\|" ~root/vpd.properties
  ```
- Perform the following steps to prepare for the Performance Manager installation:
  1. Log in as a user with root authority.
  2. Create a mount point or choose an existing mount point. To create a mount point called `/cdrom`, type the following command:

     ```
     mkdir /cdrom
     ```
  3. Mount the CD-ROM file system at the desired mount point. For example, to mount a compact disc inserted in a CD-ROM drive known as `/dev/cd0` at mount point `/cdrom`, type the following command:

     ```
     mount -o ro /dev/cdrom /cdrom
     ```
  4. Change the current directory to the mount point for the CD-ROM drive in the LINUX directory. For example, if the CD-ROM was mounted at the `/cdrom` mount point, type the following command:

     ```
     cd /cdrom/LINUX
     ```
  5. Select the destination paths for the Performance Manager components, and be sure you have enough space available on the chosen destination.

     The installation program (installer) provides a default installation location (`/opt/IBM/mdm/pm`) for the component. You can override this location by using the installer browse function. When you click **Next**, the installer analyzes the available space for the location you provide. If there is not enough space, you will not be able to proceed to the next panel in the installation process.
  6. Check for a readme file located in the LINUX directory on the Performance Manager compact disc. This readme file might provide additional information that supersedes information these procedures.
  7. Log on to your system as root.

8. Type the following commands to stop the IBM Director Server and Consoles, IBM WebSphere Application Server, IBM HTTP Server, and IBM HTTP Admin , if they exist on the system:
   a. To stop IBM Director Server, type the following command in a separate command window:

      ```
      twgstop
      ```

   b. To stop IBM WebSphere Application Server Version 5 - server1, type the following command in a separate command window:

      ```
      <WAS_dest-path>/bin/stopServer.sh server1 -username
        <username> -password <password>
      ```

      where:

      <WAS_dest-path> is the destination path,where IBM WebSphere Application Server Version 5 was installed.

      <username> is the name of the WebSphere Application Server authentication user.

      <password> is the password of the WebSphere Application Server authentication user.

      Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:
      - You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
      - *<WAS_dest-path>* is *<dest-path>*/WebSphere/AppServer

        where *<dest-path>* is the installation location for the Multiple Device Manager.

   c. To stop IBM HTTP Administration 1.3.28, type the following command in a separate command window:

      ```
      <HTTPServer_dest-path>/bin/adminctl stop
      ```

      where:

      <HTTPServer_dest-path>- is the destination path where IBM HTTP Server 1.3.28 was installed.

   d. To stop IBM HTTP Server 1.3.28, type the following command in a separate command window:

      ```
      <HTTPServer_dest-path>/bin/apachectl stop
      ```

      where:

      <HTTPServer_dest-path> is the destination path where IBM HTTP Server 1.3.28 was installed.

Note: *Do not interrupt the program by abnormal methods* (such as the CTRL-C key sequence, closing the application windows, or shutting down the power source) during the installation process. An interruption caused by something other than clicking the **Cancel** button in the application window can have unpredictable effects on the system.

Steps:

Perform the following steps to install Performance Manager:

1. If the Performance Manager CD is not already mounted, insert it into the CD-ROM drive, and mount it using the previous mounting procedure.
2. Type the following command to run the installation program launcher (launchpad_linux) from the LINUX directory of the CD-ROM:

   ```
   ./launchpad_linux
   ```

   This command starts the Performance Manager LaunchPad, which is a small graphic program that launches the installation setup program.

   The Performance Manager installation program should start within 15 - 30 seconds.
3. The following options are displayed when the LaunchPad window opens:

   Performance Manager overview
   Provides information about Performance Manager.

   Readme file
   Provides any last minute product information that did not make it into these procedures.

   Installation guide
   Provides a copy of these instructions for installing Performance Manager

   License agreement
   Provides information about the license for Performance Manager.

   Performance Manager Web site
   Provides information from the product Web site.

   Installation wizard
   Starts the Performance Manager installation program.

   Post installation tasks
   Provides information about configuring Performance Manager.

   Exit Exits the Performance Manager LaunchPad program.
4. Click **Readme file** from the LaunchPad window or from the README file located in the doc or LINUX directory on the Performance Manager CD to check for information that might supersede these procedures.
5. Click **Installation wizard** from the LaunchPad window to start the installation of Performance Manager.

   Note: The LaunchPad window remains open behind the installation wizard so that you can access product information during the installation process. Click **Exit** if you want to close the LaunchPad.
6. There might be a slight delay while the software loads on your system. After the software loads, a command prompt window opens to display the following message:

   ```
   Initializing InstallShield Wizard...
   Preparing Java (tm) Virtual Machine ..... .
   ...................................................
   ```
7. The Welcome window opens suggesting what documentation you should review prior to installation. Click **Next** to continue, or click **Cancel** to exit the installation.
8. The License Agreement window opens. Read the license agreement information.

   Select **I accept the terms of the license agreement** , and then click **Next** to accept the license agreement.

Otherwise, keep the selection **I do not accept the terms of the license agreement** (the default), and click **Cancel** to exit the installation.

9. The Destination Directory window opens. Select one of the following options:
   - Click **Next** to accept the default directory.
   - Click **Browse** to select a different directory for the installation, and then click **Next** to continue the installation process.
   - Click **Cancel** to exit the installation process.

   Note: If you want to reinstall the product, this window is skipped.

10. The Select Product Type window opens. You can select one of the following two types of installations:
    - **Performance Manager Server**

      This option installs both Performance Manager server and client extensions, including all the following product features, on a system where you have installed both IBM Director Server 4.12 or greater and Multiple Device Manager Server:

      Performance Manager Application
      The program installs the Performance Manager WebSphere Application Server applications.

      Director Server Extensions
      The program installs Performance Manager extensions for IBM Director Server 4.12 or greater.

      Director Console Extensions
      The program installs Performance Manager extensions for IBM Director Console 4.12 or greater.

      Command Line Client
      The program installs the command-line client.

      Notes:

      a. If you select the **Performance Manager Server** option (including all the product features listed above), the Features Selection window is skipped.
      b. If you select the **Performance Manager Server** option on a system where you have installed only IBM Director Console, an error message is displayed in the Checking Prerequisite Products window, and the installation program stops.

    - **Performance Manager Client**

      This option installs the client product features on a system where you have installed IBM Director Console 4.12 or greater and, partially, Multiple Device Manager Console. The client product features selection is described in the next window.

      Note: If you select the **Performance Manager Client** option on a system where you have installed both IBM Director Server and Multiple Device Manager Server, an error message is displayed in the Checking Prerequisite Products window; and the installation program stops.

    Select an option, and then click **Next** to continue with the installation. If you want to exit the installation program, click **Cancel**.

    Note: This window is skipped in the following cases:

- If you want to reinstall the Performance Manager server on a system where the Performance Manager server is already installed
- If you want to reinstall the Performance Manager client on a system where one or both clients (Performance Manager Director Console Extension and Performance Manager Command Line Client) are installed

11. The Features Selection window opens in the following cases:
    - If you selected the**Performance Manager Client** option in the previous window
    - If you want to reinstall the Performance Manager client on a system where one client is installed

    You can select one or more of the following features:
    - **Director Console Extensions**

      This feature must be selected if you want to install the Performance Manager console extensions (or **Performance Manager Console**) on a system where both IBM Director Console 4.12 or greater and the Multiple Device Manager Console are installed.
    - **Command Line Client**

      This feature must be selected if you want to install the Performance Manager command-line client (or **Performance Manager CLI Client**).

    If you have previously installed one Performance Manager client feature (for example, **Director Console Extensions**), you will be given the opportunity to add additional features to the current installation or to reinstall the selected features. These already installed features are marked as `(installed)` (in our example, **Director Console Extension (installed)**).

    Note: If you want to reinstall the Performance Manager client on a system where the Performance Manager client was previously installed with all clients, this window is skipped.

    After you select the desired features (one or more), click **Next** to continue with the program installation; or click **Cancel** to exit the installation program.
12. The installation program verifies that the following prerequisite products and product versions are installed on your system:
    a. For installation of the Performance Manager server:
       - IBM DB2 V8.1 with the DB2 V8.1.2 update (FixPak 2)
       - IBM Director Server 4.12 (or greater)
       - IBM WebSphere Application Server Version 5.1
       - IBM TotalStorage Multiple Device Manager Server
       - Secure Shell (SSH) Client

    b. For installation of the Performance Manager client:
       - IBM Director Console 4.12 (or greater)
       - IBM TotalStorage Multiple Device Manager Console (only for the Performance Manager console client).

    If the required products are installed, the installation program continues, skipping the next step.

    Otherwise, the results are displayed in the Checking Prerequisite Products window (next step).
13. The Checking Prerequisite Products window opens and displays the problems that were found while checking for the prerequisite products. If the

prerequisite products are not installed or the wrong version is installed, the installation program cannot continue. You must exit the program and correct the problem.

Click **Cancel** to exit the Performance Manager installation program.

14. You can now choose whether you would like to perform a typical or advanced installation.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

15. If your selected **Typical** in the Installation Type window, you will skip this step and go directly to step 16.

    If you selected **Performance Manager Server**, the Select Database window opens. You must select the type of database want you to be dedicated to the Performance Manager server from the following options:

    - Create a new local database
    - Use an existing database

    Click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

16. If you selected **Create a new local database** in the previous window or if you selected **Typical** in the Installation Type window, the Create Local Database window opens. You must enter parameters for the new database in the following fields:

    - Database name

      Note: The database name must be unique to Performance Manager. You cannot share the Performance Manager database with any other applications.

    - Database path

    If you want the program to also create the database tables, select the **Create the database tables** check box.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

17. If you chose **Typical** in the Installation Type window, or if you created a new local database in the advanced installation path, you will skip this step.

    If you chose to use an existing database in the advanced install path, you will see the Select Existing Database window. Select a database from the list of the existing databases.

    If you want to create other tables in the selected database, select the “Drop the tables, if existing, and create new tables” check box.

    After completing all of the fields, click **Next** to continue with the installation. You can click **Back** to review what you previous selected or click **Cancel** to exit the installation program.

18. At this point, you have answered all the customization questions and the verification steps are successfully completed. The Preview window opens and displays a summary of all of the choices that you made on the previous panels.

    Click **Install** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

19. The installation program begins to install the selected features of the Performance Manager server, or client, or both, as follows:

- If you previously selected to create a new database, the Create Database Progress window opens.

  A progress bar indicates the status of creating the database. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
- If you previously selected to create a new database and the creation failed, the Error on Create Database window opens.

  An error message is displayed indicating the cause of the errors that occurred during the creation of the database. See the log file for details. The most frequent source of failure is naming a preexistent database. If this is the case, click **Back** to select another database name to create or to select an existing database. Alternatively, click **Cancel** to exit the installation wizard.
- If you previously selected to create a new database or you selected an existing database and also selected the **Drop the tables, if existing, and create new tables** check box, the Create Database Objects Progress window opens.

  A progress bar indicates the status of creating the database objects. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
- The Installation Progress window opens indicating the progress of the installation.

  This phase of the installation usually takes less than 5 minutes, depending on the configuration of your machine. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

20. The Finish window opens. Before proceeding, you might want to review the log file for any possible error messages. The log file is located in the following file:

    `xxx/logs/dmlog.txt`

    where:

    xxx is the destination directory where the Performance Manager server or client was installed.

    The pmlog.txt file contains a trace of the installation actions.

    Click **Finish** to exit the installation wizard.

21. Click **Exit** on the LaunchPad window to end the LaunchPad program if you have not already done so.
22. If you want to work with Performance Manager immediately, you must manually start the servers by performing the following steps:
    a. To start IBM Director, type the following command:

       ```
       twgstart
       ```

    b. To start IBM WebSphere Application Server, type the following command:

       ```
       <WAS_dest-path>/bin/startServer.sh server1
       ```

       where:

       <*WAS_dest-path*> is the destination path where the IBM WebSphere Application Server was installed. If it was installed by MDM, the default destination path is as follows:

       ```
       /opt/IBM/mdm/Websphere/AppServer
       ```

    c. To start IBM HTTP Server, type the following command:

       ```
       <httpServer_dest-path>/bin/apachectl start
       ```

       where:

       <*httpServer_dest-path*> is the destination path where the IBM HTTP Server was installed. If it was installed by MDM, the default destination path is as follows:

       ```
       /opt/IBM/mdm/IBMHTTPServer
       ```

    d. To start IBM HTTP Admin, type the following command:

       ```
       <httpServer_dest-path>/bin/adminctl start
       ```

       where:

       <*httpServer_dest-path*> is the destination path where the IBM HTTP Server was installed. If it was installed by MDM, the default destination path is as follows:

       ```
       /opt/IBM/mdm/IBMHTTPServer
       ```

23. Start the IBM Director Console and log on to verify if the Performance Manager installation was successful.
    a. To start IBM Director Console, enter the following command:

       ```
       twgcon
       ```

    b. Log on to the IBM Director Server. When you log on to the IBM Director Server through the IBM Director Console, the user ID and password are validated against the security subsystem for the operating system where the IBM Director Server component is installed, *not* on the workstation where the IBM Director Console is running. The user ID and password must be valid on the operating system where the IBM Director Server is running, and the user must be authorized as an IBM Director administrator.

       Server name
       Identifies the IBM Director Server that you want to log on to.

       User ID
       Identifies the user ID of the person opening the console.

       Password
       Specifies the password for the user ID entered.

Result:

If you can successfully log on to the IBM Director, expand the **Multiple Device Manager** task, and see the **Manage Performance** task, Performance Manager is properly installed.

You can continue with the post installation tasks for Performance Manager using the procedures in the section titled: Configuring.

You can also see the post installation tasks by clicking **Post installation tasks** on the LaunchPad window.

Post-processing requirements:

If you want to do SAN Volume Controller Performance Data Collection, you will need to create an SSH key pair. Perform the following steps to create an SSH key pair:

1. Check if you already have a key pair in the ~/.ssh directory.
2. If you do not have a key pair, generate the SSH key pair by typing the following command in a command window:

   ```
   ssh-keygen -t rsa
   ```

   Accept the default key location by pressing enter without entering a different location.

   When prompted for a passphrase, press enter without typing anything for an empty passphrase.

   Press enter again to confirm the empty passphrase.

   The key pair will be generated and stored in files called id_rsa and id_rsa.pub.
3. When SAN Volume Controller Performance Data Collection runs, the SSH facility will find the private key in the ~/.ssh directory.
4. You must provide the public key to the SAN Volume Controller Console to store it on the SAN Volume Controller Cluster. The following steps are a summary of this procedure:
   a. Start the browser to access the SAN Volume Controller Console.
   b. Log onto the SAN Volume Controller Console.
   c. Select **Clusters** in the left hand frame.
   d. Select the cluster in which you are interested and select **Launch the SAN Volume Controller application** to open a secondary browser window to manage your specific cluster.
   e. Expand **Service and Maintenance** in the left hand frame.
   f. Select **Maintain SSH Keys** to get to the panel where you can input the SSH public key.

   Attention: If you do not do store the SSH public key on the SAN Volume Controller cluster, the Performance Manager cannot connect to the cluster.

Related topics:

- "System prerequisites for Linux" on page 86
- Chapter 17, "Performing Multiple Device Manager configuration tasks," on page 167
- "Installing Multiple Device Manager for Linux" on page 94
- "Installing DB2® Universal Database Workgroup Edition for Linux" on page 89
- "Installing IBM Director for Linux" on page 92

Chapter 7. Installing Replication Manager for Linux

You can use these procedures to install Replication Manager on a Linux operating system.

Prerequisites:

- Before you install the Replication Manager component, you should have already installed the following products:
  - DB2 Universal Database Workgroup Edition, Version 8.1
  - IBM Director, Version 4.12
  - IBM TotalStorage Multiple Device Manager
- Verify that the system, where Replication Manager is to be installed, meets the system requirements.
- (Optional) Install the rpm-build software package if it is not already installed on your system. The Replication Manager installation program uses this software to add information to the RPM database. If the rpm-build software is not present, the Replication Manager installation will report the missing software. However, the installation program will allow you to choose to continue the installation even if this software is missing.

  If you do not have the rpm-build software on your system and choose to continue the installation, you can use the following command to determine the level of Replication Manager on your system:

  ```
  grep -E "^ibmmdmrm\|" ~root/vpd.properties
  ```
- Perform the following steps to prepare the Replication Manager installation:
  1. Log in as a user with root authority.
  2. Create a mount point or choose an existing mount point. To create a mount point called `/cdrom`, type the following command:

     ```
     mkdir /cdrom
     ```
  3. Mount the CD-ROM file system at the desired mount point. For example, to mount a compact disc inserted in a CD-ROM drive known as `/dev/cd0` at mount point `/cdrom`, type the following command:

     ```
     mount -o ro /dev/cdrom /cdrom
     ```
  4. Change the current directory to the mount point for the CD-ROM drive in the LINUX directory. For example, if the CD-ROM was mounted at the `/cdrom`, type the following command:

     ```
     cd /cdrom/LINUX
     ```
  5. Select the destination paths for the Replication Manager components, and be sure you have enough space available on the chosen destination.

     The installation program (installer) provides a default installation location (`/opt/IBM/mdm/pm`) for the component. You can override this by using the installer browse function. When you click **Next**, the installer analyzes the available space for the location you provide. If there is not enough space, you will not be able to proceed to the next panel in the installation process.
  6. Check for a readme file located in the LINUX directory on the Replication Manager compact disc. This readme file might provide additional information that supersedes information in these procedures.
  7. Log on to your system as root.

8. Type the following commands to stop the IBM Director Server and Consoles, IBM WebSphere Application Server, IBM HTTP Server, and IBM HTTP Admin , if they exist on the system:
   a. To stop IBM Director Server, type the following command in a separate command window:

      ```
      twgstop
      ```

   b. To stop IBM WebSphere Application Server Version 5 - server1, type the following command in a separate command window:

      ```
      <WAS_dest-path>/bin/stopServer.sh server1 -username
        <username> -password <password>
      ```

      where:

      <WAS_dest-path> is the destination path,where IBM WebSphere Application Server Version 5 was installed.

      <username> is the name of the WebSphere Application Server authentication user.

      <password> is the password of the WebSphere Application Server authentication user.

      Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:
      - You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
      - *<WAS_dest-path>* is *<dest-path>*/WebSphere/AppServer

        where *<dest-path>* is the installation location for the Multiple Device Manager.

   c. To stop IBM HTTP Administration 1.3.28, type the following command in a separate command window:

      ```
      <HTTPServer_dest-path>/bin/adminctl stop
      ```

      where:

      <HTTPServer_dest-path>- is the destination path where IBM HTTP Server 1.3.28 was installed.

   d. To stop IBM HTTP Server 1.3.28, type the following command in a separate command window:

      ```
      <HTTPServer_dest-path>/bin/apachectl stop
      ```

      where:

      <HTTPServer_dest-path> is the destination path where IBM HTTP Server 1.3.28 was installed.

Note: *Do not interrupt the program by abnormal methods* (such as the CTRL-C key sequence, closing the application windows, or shutting down the power source) during the installation process. An interruption caused by something other than clicking the **Cancel** button in the application window can have unpredictable effects on the system.

Steps:

Perform the following steps to install Replication Manager:

1. If the Performance Manager CD is not already mounted, insert it into the CD-ROM drive, and mount it using the previous mounting procedure.
2. Type the following command to run the installation program launcher (launchpad_linux) from the LINUX directory of the CD-ROM:

   ```
   ./launchpad_linux
   ```

   This command starts the Replication Manager LaunchPad, which is a small graphic program that launches the installation setup program.

   The Replication Manager installation program should start within 15 - 30 seconds.
3. The following options are displayed when the LaunchPad window opens:

   Replication Manager overview
   Provides information about Replication Manager.

   Readme file
   Provides any last minute product information that did not make it into these procedures.

   Installation guide
   Provides a copy of these instructions for installing Replication Manager.

   License agreement
   Provides information about the license for Replication Manager.

   Replication Manager Web site
   Provides information from the product Web site.

   Installation wizard
   Starts the Replication Manager installation program.

   Post installation tasks
   Provides information about configuring users and device communication.

   Exit Exits the Replication Manager LaunchPad program.
4. Click **Readme file** from the LaunchPad window or from the README.txt file located in the doc or LINUX directory on the Replication Manager CD to check for information that might supersede these procedures.
5. Click **Installation wizard** from the LaunchPad window to start the installation of Replication Manager.

   Note: The LaunchPad window remains open behind the installation wizard so that you can access product information during the installation process. Click **Exit** if you want to close the LaunchPad.
6. There might be a slight delay while the software loads on your system. After the software loads an window opens to display the following message:

   ```
   Initializing InstallShield Wizard...
   Preparing Java (tm) Virtual Machine ........................... .
   ................................................
   ```
7. The Welcome window opens suggesting what documentation you should review prior to installation. Click **Next** to continue, or click **Cancel** to exit the installation.
8. The *License Agreement* window opens. Read the license agreement information.

   Select **I accept the terms of the license agreement**, and then click **Next** to accept the license agreement.

Otherwise, accept the selection **I do not accept the terms of the license agreement** (the default), and click **Cancel** to exit the installation.

9. The Destination Directory window opens. Select one of the following options:
   - Click **Next** to accept the default directory.
   - Click **Browse** to select a different directory for the installation, and then click **Next** to continue the installation process.
   - Click **Cancel** to exit the installation process.
10. The Select Product Type window opens. You can select one of the following two types of installations:
    - **Replication Manager Server**

      This option installs both Replication Manager server and client extensions, including all the following product features, on a system where you have installed both IBM Director Server 4.12 or greater and Multiple Device Manager Server are installed, and contains all the product features:

      Replication Manager Application
      The program installs the Performance Manager WebSphere Application Server applications. If this feature is selected, the Replication Manager installation program checks if IBM WebSphere Application Server 5.1 is installed on your system. If it is not installed, an error message is displayed.

      Director Server Extensions
      The program installs Replication Manager extensions for IBM Director Server 4.12 or greater.

      Director Console Extensions
      The program installs Replication Manager extensions for IBM Director Console 4.12 or greater.

      Command Line Client
      The program installs the command-line client.

      Notes:

      a. If you select the **Replication Manager Server** option (including all the product features listed above), the Features Selection window is skipped.
      b. If you select the **Replication Manager Server** option on a system where you have installed only IBM Director Console, an error message is displayed in the Checking Prerequisite Products window, and the installation program stops.

    - **Replication Manager Client**

      This option installs Replication Manager client product features on a system where both IBM Director Console 4.12 or greater and Multiple Device Manager Console are installed. The Replication Manager client product features selection is described in the next window.

      Note: If you select the **Replication Manager Client** option on a system where you have installed IBM Director Server and Multiple Device Manager Server, an error message is displayed in the Checking Prerequisite Products window; and the installation program stops.

    Select an option, and then click **Next** to continue with the installation. If you want to exit the installation program, click **Cancel**.

    Note: This window is skipped in the following cases:

- If you want to reinstall the Replication Manager server on a system where the Replication Manager server is already installed
- If you want to reinstall the Replication Manager client on a system where one or both clients (Replication Manager Director Console Extension and Replication Manager Command Line Client) are installed

11. The Installation Type window opens. You can now choose whether you would like to perform a typical or advanced installation. In the typical installation, you will create a new database for each subcomponent. In the advanced installation, you can choose either to create a new database or to use an existing database for each subcomponent.

    Click **Next** to continue with the installation, click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

12. The Features Selection window opens in the following cases:
    - If you selected the**Replication Manager Client** option in the previous window
    - If you want to reinstall the Replication Manager client on a system where only one Replication Manager client was previously installed

    You can select one or more of the following features:
    - **Director Console Extensions**

      This feature must be selected if you want to install the Replication Manager extensions (or **Replication Manager Console**) on a system where both IBM Director Console 4.12 or greater and the Multiple Device Manager Console are installed.
    - **Command Line Client**

      This feature must be selected if you want to install Replication Manager command-line client (or **Replication Manager CLI Client**).

    If you have previously installed some Replication Manager features (for example, **Director Console Extensions**), you will be given the opportunity to add additional features to the current instalationl or to reinstall the selected features. These already installed features are marked as `(installed)` (in our example, **Director Console Extensions (installed)**).

    Note: If you want to reinstall the Replication Manager client on a system where the Replication Manager client was previously installed with all clients (console and CLI), this window is skipped.

    After you select the desired features (one or more), click **Next** to continue with the program installation; or click **Cancel** to exit the installation program.

13. The installation program verifies that the following prerequisite products and product versions are installed on your system:
    a. For installation of the Replication Manager server:
       - IBM DB2 8.1 (or greater)
       - IBM Director Server 4.12 (or greater)
       - IBM WebSphere Application Server 5
       - IBM TotalStorage Multiple Device Manager Server

    b. For installation of the Replication Manager client:
       - Only IBM Director Console 4.12 (or greater)
       - IBM TotalStorage Multiple Device Manager Console

    If the required products are installed, the installation program continues, skipping the next step.

Otherwise, the result is displayed in the Checking Prerequisite Products window (next step).

14. The Checking Prerequisite Products window opens and displays the problems that were found while checking for the prerequisite products. If the prerequisite products are not installed or the wrong version is installed, the installation program cannot continue. You must exit the program and correct the problem.

    Click **Cancel** to exit the Replication Manager installation program.

15. If you chose the typical installation, you will skip this step and go directly to step 16.

    If you chose the advanced installation, the Select Database for Hardware Subcomponent window opens. You must select what type of hardware database you want to be dedicated to the Replication Manager from the following:

    - Create a new local database
    - Use an existing database

    Click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

16. The Create Local Database for ″Hardware″ Subcomponent window opens. You must enter parameters for the new database in the following fields:

    - Database name

      Note: The database name must be unique to the Hardware subcomponent. You cannot share the Hardware database with any other applications or subcomponents of Replication Manager.

    - Database path

    If you want the program to also create the database tables, select the **Create the database tables** check box.

    After completing all the fields, click **Next** to continue the installation; or click **Back** to review what you previously selected; or click **Cancel** to exit the installation program.

17. If you selected the typical installation, or if you selected the **Create a new Hardware local database** option in the Select Database window, this step is skipped.

    Otherwise, the Select Existing Database for ″Hardware″ Subcomponent window opens. You must select the database from the list of available databases.

    After completing all the fields, click **Next** to continue with the installation. Alternatively, you can click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

18. If you chose the typical installation, you will skip this step and go directly to step 19 on page 121.

    If you chose the advanced installation, the Select Database for ″ElementCatalog″ Subcomponent window opens. You must select what type of element catalog database you want to be dedicated to the Replication Manager from the following options:

    - Create a new local database
    - Use an existing database

    Click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

19. The Create Local Database for ″ElementCatalog″ Subcomponent window opens. You must enter parameters for the new element catalog database in the following fields:
    - Database name

      Note: The database name must be unique to the ElementCatalog subcomponent. You cannot share the ElementCatalog database with any other applications or subcomponents of Replication Manager.
    - Database path

    If you want the program to also create the database tables, select the **Create the database tables** check box.

    After completing all the fields, click **Next** to continue the installation; or click **Back** to review what you previously selected; or click **Cancel** to exit the installation program.
20. If you selected the typical installation, or if you selected the **Create a new ElementCatalog local database** option in the Select Database for ″ElementCatalog″ Subcomponent window, this step is skipped.

    Otherwise, the Select Existing Database for ″ElementCatalog″ Subcomponent window opens. You must select the database from the list of available databases.

    After completing all the fields, click **Next** to continue with the installation. Alternatively, you can click **Back** to review what you previously selected or click **Cancel** to exit the installation program.
21. If you chose the typical installation, you will skip this step and go directly to step 22.

    If you selected the advanced installation, the Select Database for ″ReplicationManager″ Subcomponent window opens. You must select what type of Replication Manager database you want to be dedicated to the Replication Manager from the following options:
    - Create a new local database
    - Use an existing database

    Click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.
22. The Create Local Database for ″ReplicationManager″ Subcomponent window opens. You must enter parameters for the new Replication Manager database in the following fields:
    - Database name

      Note: The database name must be unique to the ReplicationManager subcomponent. You cannot share the ReplicationManager database with any other applications or subcomponents of Replication Manager.
    - Database path

    If you want the program to also create the database tables, select the **Create the database tables** check box.

    After completing all the fields, click **Next** to continue the installation; or click **Back** to review what you previously selected; or click **Cancel** to exit the installation program.
23. If you selected the typical installation, or if you selected the **Create a new ElementCatalog local database** option in the Select Database for ″ReplicationManager″ Subcomponent window, this step is skipped.

Otherwise, the Select Existing Database for ″ReplicationManager″ Subcomponent window opens. You must select the database from the list of available databases.

After completing all the fields, click **Next** to continue with the installation. Alternatively, you can click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

24. If you chose the typical installation, you will skip this step and go directly to step 25.

    The Select Database for ″svcHardware″ Subcomponent window opens. You must select what type of SVC hardware database you want to be dedicated to the Replication Manager from the following options:

    - Create a new local database
    - Use an existing database

    Click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

25. The Create Local Database for ″svcHardware″ Subcomponent window opens. You must enter parameters for the new Replication Manager database in the following fields:

    - Database name

      Note: The database name must be unique to the svcHardware subcomponent. You cannot share the svcHardware database with any other applications or subcomponents of Replication Manager.

    - Database path

    If you want the program to also create the database tables, select the **Create the database tables** check box.

    After completing all the fields, click **Next** to continue the installation; or click **Back** to review what you previously selected; or click **Cancel** to exit the installation program.

26. If you selected the typical installation, or if you selected the **Create a new svcHardware local database** option in the Select Database for ″svcHardware″ Subcomponent window, this step is skipped.

    Otherwise, the Select Existing Database for ″svcHardware″ Subcomponent window opens. You must select the database from the list of available databases.

    After completing all the fields, click **Next** to continue with the installation. Alternatively, you can click **Back** to review what you previously selected or click **Cancel** to exit the installation program.

27. If you selected IBM Replication Manager CLI Client, you are required to enter the co-server host name, port value, user name and user password to enable Performance Manager CLI access in CoServer Parameter window.

    After completing all the fields, click **Next** to continue with the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program.

28. At this point, you have answered all the customization questions and the verification steps are successfully completed. The Preview window opens and displays a summary of all of the choices that you made on the previous panels.

    Click **Install** to begin the installation, click **Back** to review what you previously selected, or click **Cancel** to exit the installation program..

29. The installation program begins to install the selected features of Replication Manager, as follows:
    a. If you previously selected the creation of a new database for the *hardware* subcomponent:
        - The Create Database for Hardware Subcomponent Progress window opens. A progress bar indicates the status of creating the database. You can click **Cancel** to exit the installation wizard.

          Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
        - If the creation of a new database has failed, the Error on Create Database for Hardware Subcomponent window opens.

          An error message is displayed indicating the cause of the errors that occurred during the creation of the database. See the log file for details. The most frequent source of failure is naming a preexistent database. If this is the case, click **Back** to select another database name to create or to select an existing database. Alternatively, click **Cancel** to exit the installation wizard.
        - If you previously selected to create a new database for the hardware subcomponent and you selected the **Create the database tables** check box, or if you selected an existing database for the hardware subcomponent and selected the **Drop the tables, if existing, and create new tables** check box, the Create Database Objects for hardware Subcomponent Progress window opens.

          A progress bar indicates the status of creating the database objects. You can click **Cancel** to exit the installation wizard.

          Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
    b. If you previously selected to create a new database for the *ElementCatalog* subcomponent:
        - The Create Database for ElementCatalog Subcomponent Progress window opens.

          A progress bar indicates the status of creating the database. You can click **Cancel** to exit the installation wizard.

          Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.
        - If the creation of a new database for the ElementCatalog subcomponent failed, the Error on Create Database for ElementCatalog Subcomponent window opens.

An error message is displayed indicating the cause of the errors that occurred during the creation of the database. See the log file for details. The most frequent source of failure is naming a preexistent database. If this is the case, click **Back** to select another database name to create or to select an existing database. Alternatively, click **Cancel** to exit the installation wizard.

- If you previously selected to create a new database for the ElementCatalog subcomponent and you selected the **Create the database tables** check box, or if you selected an existing database for the ElementCatalog subcomponent and selected the **Drop the tables, if existing, and create new tables** check box, the Create Database Objects for ElementCatalog Subcomponent Progress window opens.

  A progress bar indicates the status of creating the database objects. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

c. If you previously selected the creation of a new database for the *ReplicationManager* subcomponent:

- The Create Database for ReplicationManager Subcomponent Progress window opens. A progress bar indicates the status of creating the database. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

- If the creation of a new database has failed, the Error on Create Database for Replication Manager Subcomponent window opens.

  An error message is displayed indicating the cause of the errors that occurred during the creation of the database. See the log file for details. The most frequent source of failure is naming a preexistent database. If this is the case, click **Back** to select another database name to create or to select an existing database. Alternatively, click **Cancel** to exit the installation wizard.

- If you previously selected to create a new database for the Replication Manager subcomponent and you selected the **Create the database tables** check box, or if you selected an existing database for the Replication Manager subcomponent and selected the **Drop the tables, if existing, and create new tables** check box, the Create Database Objects for Replication Manager Subcomponent Progress window opens.

  A progress bar indicates the status of creating the database objects. You can click **Cancel** to exit the installation wizard.

  Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by

clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

d. If you previously selected the creation of a new database for the *svcHardware* subcomponent:

   - The Create Database for svcHardware Subcomponent Progress window opens. A progress bar indicates the status of creating the database. You can click **Cancel** to exit the installation wizard.

     Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

   - If the creation of a new database has failed, the Error on Create Database for svcHardware Subcomponent window opens.

     An error message is displayed indicating the cause of the errors that occurred during the creation of the database. See the log file for details. The most frequent source of failure is naming a preexisting database. If this is the case, click **Back** to select another database name to create or to select an existing database. Alternatively, click **Cancel** to exit the installation wizard.

   - If you previously selected to create a new database for the svcHardware subcomponent and you selected the **Create the database tables** check box, or if you selected an existing database for the svcHardware subcomponent and selected the **Drop the tables, if existing, and create new tables** check box, the Create Database Objects for svcHardware Subcomponent Progress window opens.

     A progress bar indicates the status of creating the database objects. You can click **Cancel** to exit the installation wizard.

     Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

e. The Installation Progress window opens indicating the progress of the installation.

   This phase of the installation usually takes less than 5 minutes, depending on the configuration of your machine. You can click Cancel to exit the installation wizard.

   Note: If you click **Cancel**, a window opens asking you to confirm the cancellation of the installation wizard, for example: `Cancel the current operation? Yes No`. If you confirm the cancellation by clicking **Yes**, the information you entered or selected in previous windows is not saved. You must start the installation again from the first step.

30. The Finish window opens. Before proceeding, you might want to review the log file for any possible error messages. The log file is located in the following file:

    xxx`/logs/dmlog.txt`

where:

xxx is the destination directory where Replication Manager was installed.

The rmlog.txt file contains a trace of the installation actions.

Click **Finish** to exit the installation wizard.

31. The **postinstall.txt** file is open automatically, displaying the information about the tasks to be performed after a successful installation of Replication Manager.
32. Click **Exit** on the LaunchPad window to end the LaunchPad program if you have not already done so.
33. If you want to work with Performance Manager immediately, you must manually start the servers by performing the following steps:
    a. To start IBM Director, type the following command:

       ```
       twgstart
       ```

    b. To start IBM WebSphere Application Server, type the following command:

       ```
       <WAS_dest-path>/bin/startServer.sh server1
       ```

       where:

       <*WAS_dest-path*> is the destination path where the IBM WebSphere Application Server was installed. If it was installed by MDM, the default destination path is as follows:

       ```
       /opt/IBM/mdm/Websphere/AppServer
       ```

    c. To start IBM HTTP Server, type the following command:

       ```
       <httpServer_dest-path>/bin/apachectl start
       ```

       where:

       <*httpServer_dest-path*> is the destination path where the IBM HTTP Server was installed. If it was installed by MDM, the default destination path is as follows:

       ```
       /opt/IBM/mdm/IBMHTTPServer
       ```

    d. To start IBM HTTP Admin, type the following command:

       ```
       <httpServer_dest-path>/bin/adminctl start
       ```

       where:

       <*httpServer_dest-path*> is the destination path where the IBM HTTP Server was installed. If it was installed by MDM, the default destination path is as follows:

       ```
       /opt/IBM/mdm/IBMHTTPServer
       ```

34. Start the IBM Director Console and log on to verify if the Replication Manager installation was successful.
    a. To start IBM Director Console, enter the following command:

       ```
       twgcon
       ```

    b. Log on to the IBM Director Server. When you log on to the IBM Director Server through the IBM Director Console, the user ID and password are validated against the security subsystem for the operating system where the IBM Director Server component is installed, *not* on the workstation where the IBM Director Console is running. The user ID and password must be valid on the operating system where the IBM Director Server is running, and the user must be authorized as an IBM Director administrator.

       Server name
       Identifies the IBM Director Server that you want to log on to.

User ID
Identifies the user ID of the person opening the console.

Password
Specifies the password for the user ID entered.

Result:

If you can successfully log on to the IBM Director, expand the **Multiple Device Manager** task, and see the **Manage Replication** task, Replication Manager is properly installed.

You can continue with the post installation tasks for Replication Manager using the procedures in the section titled: Configuring.

You can also see the post installation tasks by clicking **Post installation tasks** on the LaunchPad window.

Related topics:

- "System prerequisites for Linux" on page 86
- Chapter 17, "Performing Multiple Device Manager configuration tasks," on page 167
- "Installing Multiple Device Manager for Linux" on page 94
- "Installing Multiple Device Manager for Linux" on page 94
- "Installing DB2® Universal Database Workgroup Edition for Linux" on page 89
- "Installing IBM Director for Linux" on page 92
- Chapter 15, "Removing Replication Manager for Linux," on page 159

Part 4. Removing from the Microsoft Windows operating system

The topics in this category provide instructions for removing Multiple Device Manager and its related components from the Microsoft Windows operating system.

Chapter 8. Removing Multiple Device Manager for Windows

You can use these procedures to remove the IBM TotalStorage Multiple Device Manager (MDM) from your Windows system.

Attention: You must remove the Performance Manager and Replication Manager components before you remove MDM. You can manually remove the IBM WebSphere Application Server after you remove MDM.

Steps:

Perform the following steps to remove MDM:

1. Log on to the system where MDM is installed. Log on with a user name that is a local system administrator.
2. Perform the following steps to stop the IBM Director services if they are started:
   a. Click **Start –> Settings**, and double-click the **Control Panel** icon.
   b. In the Control Panel window, double-click the **Administrative Tools** icon.
   c. In the Administrative Tools window, double-click the **Services** icon.
   d. In the Services window, verify that the status for each of the following services is indicated as `Stopped`. If the service is not `Stopped`, select and stop it as follows:
      1) Click the **IBM Director Support Program** service, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right click on the service name, and then click **Stop** from the popup menu.
      2) Click the **IBM Director Server** service, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right click on the service name, and then click **Stop** from the popup menu.
      3) Click the **WebSphere Embedded Messaging Publish And Subscribe** service, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right click on the service name, and then click **Stop** from the popup menu.
      4) Click the **IBM HTTP Administration 1.3.28** service, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right click on the service name, and then click **Stop** from the popup menu.
      5) Click on the **IBM HTTP Server 1.3.28** and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right click on the service name, and then click **Stop** from the popup menu.
   e. Close the Services window.
   f. Close the Administrative Tools window.
3. Stop the IBM WebSphere Application Server, if it exists on the system: **Start–>Programs–>IBM WebSphere–>Application Server v5.1–>Stop the**

Server, if the WebSphere Application Server has the global security disabled. Otherwise stop WebSphere Application Server by running from a separate Command Prompt window the following command:

```
<WAS_dest-path>/bin/stopServer.bat server1 -username <username>
-password <password>
```

where:

<*WAS_dest-path*> is the destination path, where IBM WebSphere Application Server v5.1 was installed

<*username*> is the name of a Console user having an Operator or Administrator role, when Global Security is enabled

<*password*> is the password of the entered user

Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:

- You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
- <*WAS_dest-path*> is <*dest-path*>/../WebSphere/AppServer

  where <*dest-path*> is the installation location for the Multiple Device Manager.

4. Use the Windows Add/Remove Programs facility to remove MDM:
   a. From the Windows menu bar, click **Start –> Settings –> Control Panel**.
   b. Double-click **Add/Remove Programs**.
   c. From the list of currently installed programs, click **IBM TotalStorage Multiple Device Manager**.
   d. Click **Remove** to remove the product.
5. The *IBM Multiple Device Manager Uninstaller–Welcome* window opens. Click **Next** to continue, or click **Cancel** to stop the removal of MDM.
6. The removal program runs a check to detect if any of the IBM Director or WebSphere services are running. If they are, a panel opens to instruct you to stop the services manually.
7. The *Preview* window opens. The removal program displays a summary panel of the disk location of MDM and the features to be removed. Click **Remove** to continue, **Cancel** to stop the removal of MDM, or **Back** to return to the previous window.
8. The removal program detects whether there are any services or computer management windows open. If there are, a caution window opens requesting you to close these windows manually.
9. The *Uninstallation Progress* window opens. Wait for the program to remove MDM.
10. The *Finish* window for the Uninstaller program opens. This window indicates the result of the removal process (successful or failed). It indicates whether a restart is necessary to complete the removal of MDM. Click **Finish** to complete the removal process and exit the wizard.
11. Close the **Add/Remove Programs** window.
12. Restart the system if instructed to do so in the Finish window to complete the removal process.

Result:

If the Finish window for the Uninstaller program opens and the result of the removal process is successful, MDM is removed from your Windows system.

Post-processing requirements:

The MDM removal program does not remove WebSphere Application Server V5 if it was installed by the MDM installation program. You must use the WebSphere Application Server V5 removal program to remove the WebSphere Application Server.

Modified files that were added to the Multiple Device Manager directory after the initial installation of MDM will not be removed by the removal program. If you have not yet removed WebSphere Application Server and it is installed under the Multiple Device Manager directory, you must not remove the Multiple Device Manager directory until you remove the WebSphere Application Server.

Remove the Multiple Device Manager directory manually after removing the WebSphere Application Server. Before removing the directory, check for any contents in the Multiple Device Manager directory that you want to preserve elsewhere.

Related topics:

- "Installing Multiple Device Manager for Windows" on page 46
- "Installing Performance Manager for Windows" on page 59
- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing IBM Director for Windows" on page 44

Manually completing the removal of Multiple Device Manager for Windows

If the Multiple Device Manager uninstallation program has failed, you can use this procedure to complete the removal process. You can use this procedure to clean up the following files and directories for the instance that you are removing:

- The vpd.properties file
- The system registry
- The files and directories that are left behind in the installation directory (for example, this directory might be C:\Program Files\IBM\mdm\dm)

Prerequisites:

Attention: Perform this procedure only *after* running the Multiple Device Manager uninstallation program if the uninstallation program did not complete successfully. If you perform this procedure under any other circumstances, you might delete files that are required.

Steps:

Perform the following steps to clean up your system if the uninstallation program for Multiple Device Manager has failed:

1. Clean up the vpd.properties file:
   a. Locate vpd.properties file within the %WINDIR% directory (for example, C:\WINNT\vpd.properties).

b. Create a backup copy of this vpd.properties file.
c. Edit the vpd.properties file using a text editor.
d. Delete all the lines that start with `ibmmdmdm` .

Note: Be careful not to delete other products entries. For example, the IBM TotalStorage CIM Agent for ESS V1R2 product keys start with the following string: `ibmcimagent`

e. Save the modifications.
f. Close the text editor.

2. Clean up the system registry:

Note: Use care when using the regedit.exe editor to view and edit the system registry. The editor does not warn you of editing errors, and a corrupt registry can disrupt your system to the point where your only option is to reinstall the Windows operating system.

a. Use the regback.exe program from the Windows Resource Kit to back up the registry. This step is a precaution for less experienced users.
b. From a command prompt window, type `regedit.exe` to open and edit the Windows system registry.
c. Delete the HKEY_LOCAL_MACHINE\SOFTWARE\IBM\IBM Multiple Device Manager registry key, if it exists.
d. Delete the HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Uninstall\ibmmdmdm registry key, if it exists.
e. Close the Windows system registry.

3. Delete any remaining installation files and directories:
   a. If you want to preserve any of the files or the product installation directory (for example, C:\Program Files\IBM\mdm\dm), make backup copies of those files in another directory.
   b. Delete the Multiple Device Manager installation directory (for example, C:\Program Files\IBM\mdm\dm).

Related topics:

- Chapter 8, “Removing Multiple Device Manager for Windows,” on page 131
- “Manually completing the removal of Performance Manager for Windows” on page 141
- “Manually completing the removal of Replication Manager for Windows” on page 145

Chapter 9. Removing the IBM WebSphere Application Server for Windows

You can use these procedures to remove the IBM WebSphere Application Server from your Windows system.

Attention: If the Multiple Device Manager (MDM) installation program installed the WebSphere Application Server, you must remove the IBM WebSphere Application Server *after* you remove MDM.

Attention: Before removing the WebSphere Application Server, you must remove the WebSphere Application Server Message Queuing CSD.

Steps:

The Multiple Device Manager installer installs the WebSphere Application Server Message Queuing Patch for you when it installs the WebSphere Application Server. You must remove the WebSphere Application Server Messaging Queuing Patch before uninstalling the WebSphere Application Server. Perform the following steps to remove the WebSphere Application Server Message Queuing CSD:

1. Use the Windows start menu to start the Message Queuing Patch uninstaller:
   a. a. Click **Start --> Programs --> IBM WebSphere MQ --> Remove Latest CSD**
   b. You will observe the IBM WebSphere MQ uninstallation wizard progress as follows:
      1) "Checking files; please wait."
      2) "Please wait while CSD 05 is uninstalled."
      3) "Uninstallation is Complete."
   c. Click the **Finish** button to close the wizard.

Steps:

Perform the following steps to remove the WebSphere Application Server:

1. Log on to the system where the WebSphere Application Server is installed. Log on with a user name that is a local system administrator.
2. Perform the following steps to stop the WebSphere Application Server services if they are started.

   Note: If the WebSphere Application Server was installed as part of the Multiple Device Manager installation, you must use the MDM superuser ID and password to stop the WebSphere Application Server.

   a. Click **Start –> Settings** and double-click the **Control Panel** icon.
   b. In the Control Panel window, double-click the **Administrative Tools** icon.
   c. In the Administrative Tools panel, double-click the **Services** icon.
   d. In the Services window, verify that the status for each of the following services is indicated as `Stopped`. If the service is not `Stopped`, select and stop it as follows:
      1) Click the **WebSphere Embedded Messaging Publish And Subscribe** service, and then either:

- Select the **Stop** option from the **Action** menu; or
- Right click on the service name, and then click **Stop** from the popup menu.

2) Click the **IBM HTTP Administration 1.3.28** service, and then either:
   - Select the **Stop** option from the **Action** menu; or
   - Right click on the service name, and then click **Stop** from the popup menu.
3) Click on the **IBM HTTP Server 1.3.28** and then either:
   - Select the **Stop** option from the **Action** menu; or
   - Right click on the service name, and then click **Stop** from the popup menu.

e. Close the Services window.

f. Close the Administrative Tools window.

3. Stop the IBM WebSphere Application Server, if it exists on the system: **Start**–>**Programs**–>**IBM WebSphere**–>**Application Server v5.1**–>**Stop the Server**, if the WebSphere Application Server has the global security disabled. Otherwise stop WebSphere Application Server by running from a separate Command Prompt window the following command:

   ```
   <WAS_dest-path>/bin/stopServer.bat server1 -username <username>
   -password <password>
   ```

   where:

   <*WAS_dest-path*> is the destination path, where IBM WebSphere Application Server v5.1 was installed

   <*username*> is the name of a Console user having an Operator or Administrator role, when Global Security is enabled

   <*password*> is the password of the entered user

   Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:
   - You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
   - <*WAS_dest-path*> is <*dest-path*>/../WebSphere/AppServer

     where <*dest-path*> is the installation location for the Multiple Device Manager.

4. Perform the following steps to start the WebSphere Application Server uninstallation program.

   Attention: *Do not* use the Windows Add/Remove Programs facility to remove the WebSphere Application Server. The WebSphere Application Server manual indicates you should use the uninstallation program directly from the disk location because WebSphere Messaging is installed.

   a. Open a Command Prompt window.

   b. Change (CD) to the directory where the WebSphere Application Server is installed. For example:

      ```
      c:\Program Files\IBM\mdm\WebSphere\AppServer\
      ```

   c. Change to the subdirectory called _uninst where the WebSphere Application Server uninstallation program is kept, for example:

      ```
      c:\Program Files\IBM\mdm\WebSphere\AppServer\_uinst
      ```

d. Enter the following command to start the WebSphere Application Server uninstallation program:

```
Uninstall.exe
```

5. The WebSphere Application Server Uninstallation Wizard window opens.
6. Click **Next**. Click **OK**.
7. If you want to remove the embedded messaging feature from the system, leave the default to **uninstall the embedded messaging server and client**. Click **Next** to continue with the removal of IBM WebSphere Application Server or click **Cancel** to exit.
8. The *Preview* window opens displaying the features and the directory location where WebSphere will be removed. Click **Next** to continue. You can click **Cancel** to exit or go back to the previous window by clicking **Back**.
9. The *Progress* window opens. Wait for the program to remove the WebSphere Application Server.
10. The *Finish* window for the Uninstallation wizard opens. This window indicates the result of the removal process (successful or failed). It indicates whether a restart is necessary to complete the removal of the WebSphere Application Server. Click **Finish** to complete the removal process and exit the wizard.
11. You must reboot your system after uninstalling WebSphere Application Server even if the wizard does not instruct you to reboot your system. After the reboot, the WebSphere Application Server removal process will be complete.

Result:

If the Finish window for the Uninstaller opens and the result of the removal process is successful, the IBM WebSphere Application Server is removed from your Windows system.

Post-processing requirements:

The uninstallation of the WebSphere Application Server often leaves an entry in the Windows Directory under the Start menu. You must manually remove this entry. This is very important if you intend to reinstall the Multiple Device Manager to include the installation of WebSphere Application Server:

1. Click **Start–>Run...**
2. Type *regedit* in the Open entry field and click **OK**.
3. Click **Edit** from the menu.
4. Click **Find** in the drop-down menu.
5. Type *WebSphere* in the **Find what** entry field.
6. Click **Keys** in the *Look at* section. Unselect **Values** and **Data** in the *Look at* section. Click **Find Next**.
7. The Windows Registry Editor will probably find the **IBM WebSphere** listed under the Start menu. If it does, highlight the **IBM WebSphere**, then right click and select **Delete** from the menu.
8. Click **Yes** when prompted, "Are you sure you want to delete this key?"
9. Continue with the **Find Next**/*Delete* operation to find and delete other instances of the WebSphere Application Server keys in the registry. Current experience is that only the only remnant of the WebSphere Application Server keys is in the Start menu.

10. Modified files which were added to the Multiple Device Manager directory after the initial installation Multiple Device Manager will not be removed by the uninstallation program.

    Remove the Multiple Device Manager directory manually after uninstalling the WebSphere Application Server and after you check for any contents in the former Multiple Device Manager directory that you would want to preserve elsewhere.

    Attention: The WebSphere Application Server installation program must not be reinstalled in a directory from which WebSphere Application Server was previously installed. It is very important that you delete or rename the directory structure where the WebSphere Application Server root was installed.

Related topics:

- "Installing Multiple Device Manager for Windows" on page 46
- "Installing Performance Manager for Windows" on page 59
- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing IBM Director for Windows" on page 44

Chapter 10. Removing Performance Manager for Windows

You can use these procedures to remove the Performance Manager component from your Windows system.

Attention: You must remove Performance Manager *before* you remove Multiple Device Manager.

Steps:

Perform the following steps to remove the Performance Manager:

1. Log on to the system where the Performance Manager is installed. Log on with a user name that is a local system administrator.
2. Perform the following steps to stop the IBM Director services and WebSphere Application Server services if they are started:
   a. Click **Start –> Settings –>** , and double-click the **Control Panel** icon.
   b. In the Control Panel window, double-click the **Administrative Tools** icon.
   c. In the Administrative Tools window, double-click the **Services** icon. The *Services* window opens.
   d. In the Services window, check that the status for each of the following services is indicated as `Stopped`. If the service is not `Stopped`, select and stop it as follows:
      1) Click the **IBM Director Support Program** service, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right click on the service name, and then click **Stop** from the popup menu.
      2) Click the **IBM Director Server** service, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right click on the service name, and then click **Stop** from the popup menu.
      3) Click the **WebSphere Embedded Messaging Publish And Subscribe** service, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right click on the service name, and then click **Stop** from the popup menu.
      4) Click the **IBM HTTP Administration 1.3.28** service, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right click on the service name, and then click **Stop** from the popup menu.
      5) Click on the **IBM HTTP Server 1.3.28** and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right click on the service name, and then click **Stop** from the popup menu.
   e. Close the Services window.
   f. Close the Administrative Tools window.
3. Stop the IBM WebSphere Application Server, if it exists on the system: **Start–>Programs–>IBM WebSphere–>Application Server v5.1–>Stop the**

Server, if the WebSphere Application Server has the global security disabled. Otherwise stop WebSphere Application Server by running from a separate Command Prompt window the following command:

```
<WAS_dest-path>/bin/stopServer.bat server1 -username <username>
-password <password>
```

where:

<*WAS_dest-path*> is the destination path, where IBM WebSphere Application Server v5.1 was installed

<*username*> is the name of a Console user having an Operator or Administrator role, when Global Security is enabled

<*password*> is the password of the entered user

Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:

- You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
- <*WAS_dest-path*> is <*dest-path*>/../WebSphere/AppServer

  where <*dest-path*> is the installation location for the Multiple Device Manager.

4. Use the Windows Add/Remove Programs facility to remove the Performance Manager:
   a. From the Windows menu bar, click **Start –> Settings –> Control Panel**.
   b. Double-click **Add/Remove Programs**.
   c. Click **IBM TotalStorage Performance Manager Server/Console/CLI Client/Console and CLI Client** from the list of currently installed programs.
   d. Click **Remove** to remove the product.
5. The IBM TotalStorage Performance Manager Uninstaller–Welcome window opens. Click **Next** to continue, or click **Cancel** to stop the removal of Performance Manger.
6. The removal program runs a check to detect if any of the IBM Director or WebSphere services are running. If they are, a panel opens to instruct you to stop the services manually.
7. The Preview window opens. The removal program displays a summary panel of the disk location of Performance Manager and the features to be removed. Click **Remove** to continue with the removal of Performance Manager. Click **Cancel** to stop the removal of Performance Manager, or **Back** to return to the previous window.
8. The removal program detects whether there are any services or computer management windows open. If there are, a caution window opens requesting you to close these windows manually.
9. The Uninstallation Progress window opens. Wait for the program to remove Performance Manager.
10. The Finish window for the Uninstallion wizard opens. This window indicates the result of the removal process (successful or failed). It indicates whether a restart is necessary to complete the removal of Performance Manager. Click **Finish** to complete the removal process and exit the wizard.
11. Close the **Add/Remove Programs** window.

12. Restart the system if instructed to do so in the Finish window to complete the removal process.

Result:

If the Finish window for the Uninstaller opens and the result of the removal process is successful, Performance Manager is removed from your Windows system.

Post-processing requirements:

Modified files which were added to the Performance Manager directory after the initial installation of Performance Manager will not be removed by the removal program. Manually remove the Performance Manager directory after you check for any contents that you want to preserve elsewhere.

Related topics:

- "Installing Performance Manager for Windows" on page 59
- "Installing Multiple Device Manager for Windows" on page 46
- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing IBM Director for Windows" on page 44

Manually completing the removal of Performance Manager for Windows

If the Performance Manager uninstallation program has failed, you can use this procedure to complete the removal process. You can use this procedure to clean up the following files and directories for the instance that you are removing:

- The vpd.properties file
- The system registry
- The files and directories that are left behind in the installation directory (for example, this directory might be for example, C:\Program Files\IBM\mdm\pm)

.

Prerequisites:

Attention: Perform this procedure only *after* running the Performance Manager uninstallation program if the uninstallation program did not complete successfully. If you perform this procedure under any other circumstances, you might delete files that are required.

Steps:

Perform the following steps to clean up your system if the uninstallation program for Performance Manager has failed:

1. Clean up the vpd.properties file:
   a. Locate vpd.properties file within the %WINDIR% directory (for example, C:\WINNT\vpd.properties).
   b. Create a backup copy of this vpd.properties file.
   c. Edit the vpd.properties file using a text editor.
   d. Delete all the lines that start with `ibmmdmpm` .

Note: Be careful not to delete other products entries. For example, the IBM TotalStorage CIM Agent for ESS V1R2 product keys start with the following string: `ibmcimagent`

e. Save the modifications.

f. Close the text editor.

2. Clean up the system registry:

   Note: Use care when using the regedit.exe editor to view and edit the system registry. The editor does not warn you of editing errors, and a corrupt registry can disrupt your system to the point where your only option is to reinstall the Windows operating system.

   a. Use the regback.exe program from the Windows Resource Kit to back up the registry. This step is a precaution for less experienced users.

   b. From a command prompt window, type `regedit.exe` to open and edit the Windows system registry.

   c. Delete the HKEY_LOCAL_MACHINE\SOFTWARE\IBM\IBM Performance Manager registry key, if it exists.

   d. Delete the HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows \CurrentVersion\Uninstall\ibmmdmpm registry key, if it exists.

   e. Close the Windows system registry.

3. Delete any remaining installation files and directories:

   a. If you want to preserve any of the files or the product installation directory (for example, C:\Program Files\IBM\mdm\pm), make backup copies of those files in another directory.

   b. Delete the Multiple Device Manager installation directory (for example, C:\Program Files\IBM\mdm\pm).

Related topics:

- Chapter 10, “Removing Performance Manager for Windows,” on page 139
- “Manually completing the removal of Multiple Device Manager for Windows” on page 133
- “Manually completing the removal of Replication Manager for Windows” on page 145

Chapter 11. Removing Replication Manager for Windows

You can use these procedures to remove Replication Manager from your Windows system.

Attention: You must remove Replication Manager before you remove the Multiple Device Manager.

Steps:

Perform the following steps to remove Replication Manager:

1. Log on to the system where Replication Manager is installed. Log on with a user name that is a local system administrator.
2. Perform the following steps to stop the IBM Director services and WebSphere Application Server services if they are started:
   a. Click **Start –> Settings –>** , and double-click the **Control Panel** icon.
   b. In the Control Panel window, double-click the **Administrative Tools** icon.
   c. In the Administrative Tools window, double-click the **Services** icon.
   d. In the Services window, check that the status for each of the following services is indicated as `Stopped`. If the service is not `Stopped`, select and stop the service as follows:
      1) Click **IBM Director Support Program**, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right-click on the service name, and then left-click **Stop** from the popup menu.
      2) Click**IBM Director Server**, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right-click on the service name, and then left-click **Stop** from the popup menu.
      3) Click **WebSphere Embedded Messaging Publish and Subscribe**, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right-click on the service name, and then left-click **Stop** from the menu.
      4) Click **IBM HTTP Administration 1.3.28**, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right-click on the service name, and then left-click **Stop** from the popup menu.
      5) Click **IBM HTTP Server 1.3.28**, and then either:
         - Select the **Stop** option from the **Action** menu; or
         - Right-click on the service name, and then left-click **Stop** from the popup menu.
   e. Close the Services window.
   f. Close the Administrative Tools window.
3. Stop the IBM WebSphere Application Server, if it exists on the system: **Start–>Programs–>IBM WebSphere–>Application Server v5.1–>Stop the Server**, if the WebSphere Application Server has the global security disabled.

Otherwise stop WebSphere Application Server by running from a separate Command Prompt window the following command:

```
<WAS_dest-path>/bin/stopServer.bat server1 -username <username>
-password <password>
```

where:

<*WAS_dest-path*> is the destination path, where IBM WebSphere Application Server v5.1 was installed

<*username*> is the name of a Console user having an Operator or Administrator role, when Global Security is enabled

<*password*> is the password of the entered user

Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:

- You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
- <*WAS_dest-path*> is <*dest-path*>/../WebSphere/AppServer

  where <*dest-path*> is the installation location for the Multiple Device Manager.

4. Perform the following steps to remove Replication Manager using the Windows Add/Remove Programs facility:
   a. From the Windows menu bar, click **Start –> Settings –> Control Panel**.
   b. Double-click **Add/Remove Programs**.
   c. Click **IBM Replication Manager Server/Client (Console and/or CLI Client)** from the list of currently installed programs.
   d. Click **Remove** to remove the product.
5. The IBM Replication Manger Uninstaller Welcome window opens. Click **Next** to continue, or click **Cancel** to stop the removal of Replication Manger.
6. The uninstallation program for IBM Replication Manager Server runs a check to detect if any of the IBM Director or IBM WebSphere Application services is running. If any of the services is running, a message cautions you to stop the services manually.
7. The Preview window opens. The uninstallation program displays a summary panel of the disk location of Replication Manager and the features to be removed. Click **Remove** to continue or click **Cancel** to stop the removal of the Replication Manager Server/Client. Click **Back** to return to the previous window.
8. The uninstallation program detects whether there are any services or computer management windows open. If there are, a caution message requests you to manually close those windows.
9. The Uninstallation Progress window opens. Wait for the program to remove the Replication Manager Server/Client.
10. The Finish window for the uninstallation program opens. This window indicates the result of the removal process (successful or failed). It indicates if you need to restart your computer to complete the removal of the Replication Manager Server/Client. Click **Finish** to complete the removal process and exit the wizard.
11. Close the Add/Remove Programs window.
12. Restart the system if instructed to do so in the Finish window to complete the removal process.

Result:

If the Finish window for the uninstallation program opens and the result of the removal process is successful, the Replication Manager Server/Client is removed from your Windows system.

Post-processing requirements:

The uninstallation program does not remove any modified files that were added to the Replication Manager directory after the initial installation of Replication Manager. Remove the Replication Manager directory manually after you ensure you have preserved any required contents elsewhere.

Related topics:

- "Installing Replication Manager for Windows" on page 69
- "Installing Performance Manager for Windows" on page 59
- "Installing Multiple Device Manager for Windows" on page 46
- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing IBM Director for Windows" on page 44
- Chapter 17, "Performing Multiple Device Manager configuration tasks," on page 167

Manually completing the removal of Replication Manager for Windows

If the Replication Manager uninstallation program has failed, you can use this procedure to complete the removal process. You can use this procedure to clean up the following files and directories for the instance that you are removing:

- The vpd.properties file
- The system registry
- The files and directories that are left behind in the installation directory (for example, this directory might be C:\Program Files\IBM\mdm\rm)

Prerequisites:

Attention: Perform this procedure only *after* running the Multiple Device Manager uninstallation program if the uninstallation program did not complete successfully. If you perform this procedure under any other circumstances, you might delete files that are required.

Steps:

Perform the following steps to clean up your system if the uninstallation program for Replication Manager has failed:

1. Clean up the vpd.properties file:
   a. Locate vpd.properties file within the %WINDIR% directory (for example, C:\WINNT\vpd.properties).
   b. Create a backup copy of this vpd.properties file.
   c. Edit the vpd.properties file using a text editor.
   d. Delete all the lines that start with `ibmmdmrm` .

Note: Be careful not to delete other products entries. For example, the IBM TotalStorage CIM Agent for ESS V1R2 product keys start with the following string: `ibmcimagent`

e. Save the modifications.

f. Close the text editor.

2. Clean up the system registry:

   Note: Use care when using the regedit.exe editor to view and edit the system registry. The editor does not warn you of editing errors, and a corrupt registry can disrupt your system to the point where your only option is to reinstall the Windows operating system.

   a. Use the regback.exe program from the Windows Resource Kit to back up the registry. This step is a precaution for less experienced users.

   b. From a command prompt window, type `regedit.exe` to open and edit the Windows system registry.

   c. Delete the HKEY_LOCAL_MACHINE\SOFTWARE\IBM\IBM Replication Manager registry key, if it exists.

   d. Delete the HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Uninstall\ibmmdmrm registry key, if it exists.

   e. Close the Windows system registry.

3. Delete any remaining installation files and directories:

   a. If you want to preserve any of the files or the product installation directory (for example, C:\Program Files\IBM\mdm\rm), make backup copies of those files in another directory.

   b. Delete the Multiple Device Manager installation directory (for example, C:\Program Files\IBM\mdm\rm).

Related topics:

- Chapter 11, "Removing Replication Manager for Windows," on page 143
- "Manually completing the removal of Multiple Device Manager for Windows" on page 133
- "Manually completing the removal of Performance Manager for Windows" on page 141

Part 5. Removing from the Linux operating system

The topics in this category provide instructions for removing Multiple Device Manager and its related components from the Linux operating system.

Chapter 12. Removing Multiple Device Manager for Linux

You can use these procedures to remove Multiple Device Manager from your Linux system.

Prerequisites:

Attention: You must remove the Performance Manager component, the Replication Manager component, or both before you remove the Multiple Device Manager. You can manually remove WebSphere Application Server after you remove Multiple Device Manager.

Steps:

Perform the following steps to remove Multiple Device Manager (MDM):

1. Log on as root to the system where MDM is installed.
2. You must stop any of the following processes and the applications that use them that are running on your system:
   - IBM Director Server and Consoles
   - IBM WebSphere Application Server
   - IBM HTTP Admin
   - IBM HTTP Server

   Type the appropriate stop commands, as follows:
   - To stop IBM Director Server, type the following command in a separate command window:

     ```
     twgstop
     ```
   - To stop IBM WebSphere Application Server, Version 5 - server1, type the following command in a separate command window:

     ```
     <WAS_dest-path>/bin/stopServer.sh server1 -username
       <username> -password <password>
     ```

     where:

     <WAS_dest-path> is the destination path where IBM WebSphere Application Server, Version 5 was installed.

     <username> is the name of the WebSphere Application Server authentication user.

     <password> is the password of the WebSphere Application Server authentication user.

     Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:
     - You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
     - is *<dest-path>*/WebSphere/AppServer

       where *<dest-path>* is the installation location for the Multiple Device Manager.

- To stop IBM HTTP Administration 1.3.28, type the following command in a separate command window:

  ```
  <HTTPServer_dest-path>/bin/adminctl stop
  ```

  where:

  <HTTPServer_dest-path> is the destination path where IBM HTTP Server 1.3.28 was installed.
- To stop IBM HTTP Server 1.3.28, type the following command in a separate command window:

  ```
  <HTTPServer_dest-path>/bin/apachectl stop
  ```

  where:

  <HTTPServer_dest-path> is the destination path where IBM HTTP Server 1.3.28 was installed.

3. Type the following command to run the uninstallation program (uninstall), from the _uninst subdirectory of the path where MDM is installed:

   ```
   <dest-path>/_uninst/uninstall
   ```

   where:

   <dest-path> is the path where MDM is installed.

   If, for some reason, the uninstallation program was not created during installation, run the following command:

   ```
   <dest-path>/_jvm/jre/bin/java -jar <dest-path>/_uninst/uninstall.jar
   ```

   where:

   <dest-path> is the path where MDM is installed.
4. The IBM Multiple Device Manager Uninstaller Welcome window opens. Click **Next** to continue, or click **Cancel** to stop the removal of MDM.
5. The uninstallation program runs a check to detect whether any of the IBM Director or WebSphere processes are running. If they are, a panel opens cautioning you to stop those services manually.
6. The Preview window opens. The uninstallation program displays a summary panel of the disk location of Multiple Device Manager Server, Console, and features that will be uninstalled. Click **Remove** to continue, or click **Cancel** to stop the removal of the Multiple Device Manager Server and Console. Alternatively, click **Back** to return to the previous window.
7. The Uninstallation Progress window opens. Wait for the program to remove the Multiple Device Manager Server and Console.
8. The Finish window for the uninstallation program opens. This window indicates the result of the removal process (successful or failed). Click **Finish** to complete the removal process and exit the wizard.

Result:

If the Finish window for the uninstallation program opens and the result of the removal process is successful, the Multiple Device Manager Server and Console are removed from your Linux system.

Post-processing requirements:

Running the uninstallation program to remove the Multiple Device Manager Server will not remove the WebSphere Application Server, Version 5, if it was

installed by the Multiple Device Manager Server installation program. You must use the WebSphere Application Server, Version 5, uninstallation program to remove WebSphere Application Server.

Modified files that were added to the Multiple Device Manager directory after the initial installation of MDM will not be removed by the uninstallation program. If you have not yet uninstalled WebSphere Application Server and it is installed under the Multiple Device Manager directory, you must *not* remove the Multiple Device Manager directory until you uninstall WebSphere Application Server.

After you uninstall WebSphere Application Server, check for any contents in the former Multiple Device Manager directory that you might want to preserve elsewhere. Then remove the Multiple Device Manager directory manually.

Related topics:

- "Installing Multiple Device Manager for Linux" on page 94
- Chapter 6, "Installing Performance Manager for Linux," on page 105
- Chapter 7, "Installing Replication Manager for Linux," on page 115
- "Installing DB2® Universal Database Workgroup Edition for Linux" on page 89
- "Installing IBM Director for Linux" on page 92

Manually completing the removal of Multiple Device Manager for Linux

If the Multiple Device Manager uninstallation program has failed, you can use this procedure to complete the removal process. You can use this procedure to clean up the following files and directories for the instance that you are removing:

- The vpd.properties file
- The system registry
- The files and directories that are left behind in the installation directory (for example, this directory might be /opt/IBM/mdm/rm)

Prerequisites:

Attention: Perform this procedure only *after* running the Multiple Device Manager uninstallation program if the uninstallation program did not complete successfully. If you perform this procedure under any other circumstances, you might delete files that are required.

Steps:

Perform the following steps to clean up your system if the uninstallation program for Multiple Device Manager has failed:

1. Clean up the vpd.properties file:
   - Locate vpd.properties file within the root home directory (for example, /root/vpd.properties).
   - Create a backup copy of this vpd.properties file.
   - Edit the vpd.properties file using a text editor.
   - Delete all the lines that start with `ibmmdmdm` .

     Note: Be careful not to delete other products entries. For example, the IBM TotalStorage CIM Agent for ESS V1R2 product keys start with the following string: `ibmcimagent`

- Save the modifications.
- Close the text editor.

2. Clean up the rpm database by running the following command in a separate command window:

   ```
   rpm -e $(rpm -qa | grep ibmmdmdm)
   ```

3. Delete any remaining installation files and directories:
   - If you want to preserve any of the files or the product installation directory (for example, /opt/IBM/mdm/dm), make backup copies of those files in another directory.
   - Delete the Multiple Device Manager installation directory (for example, /opt/IBM/mdm/dm directory).

Related topics:

- "Manually completing the removal of Performance Manager for Linux" on page 157
- "Manually completing the removal of Replication Manager for Linux" on page 161

Chapter 13. Removing the IBM WebSphere Application Server for Linux

You can use these procedures to remove the IBM WebSphere Application Server from your Linux system.

Steps:

Perform the following steps to remove the WebSphere Application Server:

1. Log on as root to the system where WebSphere Application Server is installed.
2. You must stop any of the following processes and the applications that use them that are running on your system:
   - IBM WebSphere Application Server
   - IBM HTTP Admin
   - IBM HTTP Server

   Type the appropriate stop commands, as follows:
   - To stop WebSphere Application Server, Version 5 - server1, type the following command in a separate command window:

     ```
     <WAS_dest-path>/bin/stopServer.sh server1 -username
       <username> -password <password>
     ```

     where:

     <*WAS_dest-path*> is the destination path where WebSphere Application Server, Version 5 was installed.

     <*username*> is the name of the WebSphere Application Server authentication user.

     <*password*> is the password of the WebSphere Application Server authentication user.
   - To stop IBM HTTP Administration 1.3.28, type the following command in a separate command window:

     ```
     <HTTPServer_dest-path>/bin/adminctl stop
     ```

     where:

     <*HTTPServer_dest-path*> is the destination path where IBM HTTP Server 1.3.28 was installed.
   - To stop IBM HTTP Server 1.3.28, type the following command in a separate command window:

     ```
     <HTTPServer_dest-path>/bin/apachectl stop
     ```

     where:

     <*HTTPServer_dest-path*> is the destination path where IBM HTTP Server 1.3.28 was installed.
3. Type the following command in a command window to run the WebSphere uninstallation wizard:

   ```
   <WAS_installPath>/WebSphere/AppServer/_uninst/uninstall
   ```

where <*WAS_installPath*> is the location where WebSphere was installed. If WebSphere Application Server was installed by Multiple Device Manager, this is the same path where Multiple Device Manager was installed.

4. The WebSphere Application Server uninstallation wizard window opens. Select the appropriate language, then click **Next**.
5. Continue through the uninstallation wizard until you see a message such as:

   ```
   Gskit will not be uninstalled, as it may be shared with other programs
   ```

   Click **OK**.

Post-processing requirements:

After you have uninstalled WebSphere Application Server, you can uninstall MQSeries. Type the following commands in a command window:

```
rpm -e $(rpm -qa | grep -E "MQSeries.*-U")
rpm -e $(rpm -qa | grep MQSeries)
```

Related topics:

- "Installing Multiple Device Manager for Linux" on page 94

Chapter 14. Removing Performance Manager for Linux

You can use these procedures to remove the Performance Manager component from your Linux system.

Prerequisites:

Attention: You must remove the Performance Manager component before you remove Multiple Device Manager (MDM).

Steps:

Perform the following steps to remove Performance Manager:

1. Log on as root to the system where Performance Manager is installed.
2. You must stop the following products, if they exist on the system:
   - IBM Director Server and Consoles
   - IBM WebSphere Application Server
   - IBM HTTP Admin
   - IBM HTTP Server

   Type the appropriate stop commands, as follows:
   a. To stop IBM Director Server, type the following command in a separate command window:

      ```
      twgstop
      ```

   b. To stop IBM WebSphere Application Server, Version 5 - server1, type the following command in a separate command window:

      ```
      <WAS_dest-path>/bin/stopServer.sh server1 -username
        <username> -password <password>
      ```

      where:

      <WAS_dest-path> is the destination path where IBM WebSphere Application Server, Version 5 was installed.

      <username> is the name of the WebSphere Application Server authentication user.

      <password> is the password of the WebSphere Application Server authentication user.

      Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:
      - You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
      - *<WAS_dest-path>* is *<dest-path>*/WebSphere/AppServer

        where *<dest-path>* is the installation location for the Multiple Device Manager.

   c. To stop IBM HTTP Administration 1.3.28, type the following command in a separate command window:

      ```
      <HTTPServer_dest-path>/bin/adminctl stop
      ```

where:

<*HTTPServer_dest-path*> is the destination path where IBM HTTP Server 1.3.28 was installed.

d. To stop IBM HTTP Server 1.3.28, type the following command in a separate command window:

```
<HTTPServer_dest-path>/bin/apachectl stop
```

where:

<*HTTPServer_dest-path*> is the destination path where IBM HTTP Server 1.3.28 was installed.

3. Type the following command to run the uninstallation program (uninstall), from the _uninst subdirectory of the path where Performance Manager is installed:

```
<dest-path>/_uninst/uninstall
```

where:

<*dest-path*> is the path where Performance Manager is installed.

If, for some reason, the uninstallation program was not created during installation, run the following command:

```
<dm_dest-path>/_jvm/jre/bin/java -jar <dest-path>/
  _uninst/uninstall.jar
```

where:

<*dm_dest-path*> is the path where MDM is installed.

<*dest-path*> is the path where Performance Manager is installed.

4. The Performance Manager Uninstaller Welcome window opens. Click **Next** to continue, or click **Cancel** to stop the removal of Performance Manager.
5. The uninstallation program for Performance Manager runs a check to detect whether any of the IBM Director Server (only for server) or Console, WebSphere (only for server), or IBM HTTP processes are running. If they are, a panel opens cautioning you to stop those services manually.
6. The Preview window opens. The uninstallation program displays a summary panel of the disk location of Performance Manager server, console, and features to be uninstalled. Click **Remove** to continue, or click **Cancel** to stop the removal of the Performance Manager server and console. Alternatively, click **Back** to return to the previous window.
7. The Uninstallation Progress window opens. Wait for the program to remove the Performance Manager server and console.
8. The Finish window for the uninstallation program opens. This window indicates the result of the removal process (successful or failed). Click **Finish** to complete the removal process and exit the wizard.

Result:

If the Finish window for the uninstallation program opens and the result of the removal process is successful, the Performance Manager server and console are removed from your Linux system.

If the removal process has failed for an unknown reason, see "Manually completing the removal of Performance Manager for Linux" on page 157 for instructions on how to clean your system of the remnants of a Performance Manager uninstallation.

Post-processing requirements:

Modified files which were added to the Performance Manager directory after the initial installation of Performance Manager server and client will not be removed by the uninstallation program. Check for any contents in the Performance Manager directory that you might want to preserve elsewhere. Then remove the Performance Manager directory manually.

Related topics:

- Chapter 6, "Installing Performance Manager for Linux," on page 105
- "Installing Multiple Device Manager for Linux" on page 94
- "Installing DB2® Universal Database Workgroup Edition for Linux" on page 89
- "Installing IBM Director for Linux" on page 92
- Chapter 7, "Installing Replication Manager for Linux," on page 115
- Chapter 17, "Performing Multiple Device Manager configuration tasks," on page 167

Manually completing the removal of Performance Manager for Linux

If the Performance Manager uninstallation program has failed, you can use this procedure to complete the removal process. You can use this procedure to clean up the following files and directories for the instance that you are removing:

- The vpd.properties file
- The system registry
- The files and directories that are left behind in the installation directory (for example, this directory might be /opt/IBM/mdm/rm)

.

Prerequisites:

Attention: Perform this procedure only *after* running the Performance Manager uninstallation program if the uninstallation program did not complete successfully. If you perform this procedure under any other circumstances, you might delete files that are required.

Steps:

Perform the following steps to clean up your system if the uninstallation program for Performance Manager has failed:

1. Clean up the vpd.properties file:
   - Locate vpd.properties file within the root home directory (for example, /root/vpd.properties).
   - Create a backup copy of the vpd.properties file.
   - Edit the vpd.properties file using a text editor.
   - Delete all the lines that start with `ibmmdmpm`.

     Note: Be careful not to delete other products entries. For example, the IBM TotalStorage CIM Agent for ESS V1R2 product keys start with the following string: `ibmcimagent`
   - Save the modifications.
   - Close the text editor.

2. Clean up the rpm database by running the following command in a separate command window:

   ```
   rpm -e $(rpm -qa | grep ibmmdmpm)
   ```

3. Delete any remaining installation files and directories:
   - If you want to preserve any of the files or the product installation directory (for example, /opt/IBM/mdm/pm), make backup copies of those files in another directory.
   - Delete the Performance Manager installation directory (for example, /opt/IBM/mdm/pm directory).

Related topics:

- "Manually completing the removal of Multiple Device Manager for Linux" on page 151
- "Manually completing the removal of Replication Manager for Linux" on page 161

Chapter 15. Removing Replication Manager for Linux

You can use these procedures to remove the Replication Manager component from your Linux system.

Prerequisites:

Attention: You must remove the Replication Manager component before you remove Multiple Device Manager (MDM).

Steps:

Perform the following steps to remove Replication Manager:

1. Log on as root to the system where Replication Manager is installed.
2. You must stop the following products, if they exist on the system:
   - IBM Director Server and Consoles
   - IBM WebSphere Application Server
   - IBM HTTP Admin
   - IBM HTTP Server

   Type the appropriate stop commands, as follows:
   a. To stop IBM Director Server, type the following command in a separate command window:

      ```
      twgstop
      ```

   b. To stop IBM WebSphere Application Server, Version 5 - server1, type the following command in a separate command window:

      ```
      <WAS_dest-path>/bin/stopServer.sh server1 -username
        <username> -password <password>
      ```

      where:

      <WAS_dest-path> is the destination path where IBM WebSphere Application Server, Version 5 was installed.

      <username> is the name of the WebSphere Application Server authentication user.

      <password> is the password of the WebSphere Application Server authentication user.

      Note: If WebSphere Application Server was installed as part of the Multiple Device Manager installation:
      - You can use the Multiple Device Manager superuser ID or a Console user having an Operator or Administrator role to stop WebSphere Application Server.
      - *<WAS_dest-path>* is *<dest-path>*/WebSphere/AppServer

        where *<dest-path>* is the installation location for the Multiple Device Manager.

   c. To stop IBM HTTP Administration 1.3.28, type the following command in a separate command window:

      ```
      <HTTPServer_dest-path>/bin/adminctl stop
      ```

where:

<*HTTPServer_dest-path*> is the destination path where IBM HTTP Server 1.3.28 was installed.

d. To stop IBM HTTP Server 1.3.28, type the following command in a separate command window:

```
<HTTPServer_dest-path>/bin/apachectl stop
```

where:

<*HTTPServer_dest-path*> is the destination path where IBM HTTP Server 1.3.28 was installed.

3. Type the following command to run the uninstallation program (uninstall), from the _uninst subdirectory of the path where Replication Manager is installed:

```
<dest-path>/_uninst/uninstall
```

where:

<*dest-path*> is the path where Replication Manager is installed.

If, for some reason, the uninstallation program was not created during installation, run the following command:

```
<dm_dest-path>/_jvm/jre/bin/java -jar <dest-path>
  /_uninst/uninstall.jar
```

where:

<*dm_dest-path*> is the path where MDM is installed.

<*dest-path*> is the path where Replication Manager is installed.

4. The Replication Manager Uninstaller Welcome window opens. Click **Next** to continue, or click **Cancel** to stop the removal of Replication Manager.
5. The uninstallation program for Replication Manager Server runs a check to detect whether any of the IBM Director or IBM WebSphere Application processes are running. If they are, a panel opens cautioning you to stop those services manually.
6. The Preview window opens. The uninstallation program displays a summary panel of the location of Replication Manager and the features to be uninstalled. Click **Remove** to continue, or click **Cancel** to stop the removal of the Replication Manager server and client. Alternatively, click **Back** to return to the previous window.
7. The Uninstallation Progress window opens. Wait for the program to remove the Replication Manager server and client.
8. The Finish window for the uninstallation program opens. This window indicates the result of the removal process (successful or failed). Click **Finish** to complete the removal process and exit the wizard.

Result:

If the Finish window for the uninstallation program opens and the result of the removal process is successful, the Replication Manager server and client are removed from your Linux system.

Post-processing requirements:

Modified files that were added to the Replication Manager directory after the initial installation of Replication Manager will not be removed by the uninstallation

program. Check for any contents in the Replication Manager directory that you might want to preserve elsewhere. Then remove the Replication Manager directory manually.

Related topics:

- Chapter 7, "Installing Replication Manager for Linux," on page 115
- Chapter 6, "Installing Performance Manager for Linux," on page 105
- "Installing Multiple Device Manager for Linux" on page 94
- "Installing DB2® Universal Database Workgroup Edition for Linux" on page 89
- "Installing IBM Director for Linux" on page 92
- Chapter 17, "Performing Multiple Device Manager configuration tasks," on page 167

Manually completing the removal of Replication Manager for Linux

If the Replication Manager uninstallation program has failed, you can use this procedure to complete the removal process. You can use this procedure to clean up the following files and directories for the instance that you are removing:

- The vpd.properties file
- The system registry
- The files and directories that are left behind in the installation directory (for example, this directory might be /opt/IBM/mdm/rm)

Prerequisites:

Steps:

Perform the following steps to clean up your system if the uninstallation program for Replication Manager has failed:

1. Clean up the vpd.properties file:
   - Locate the vpd.properties file within the root home directory (for example, /root/vpd.properties).
   - Create a backup copy of the vpd.properties file.
   - Edit the vpd.properties file using a text editor.
   - Delete all the lines that start with `ibmmdmrm`.

     Note: Be careful not to delete other products entries. For example, the IBM TotalStorage CIM Agent for ESS V1R2 product keys start with the following string: `ibmcimagent`
   - Save the modifications.
   - Close the text editor.
2. Clean up the rpm database by running the following command in a separate command window:

   ```
   rpm -e $(rpm -qa | grep ibmmdmrm)
   ```
3. Delete any remaining installation files and directories:
   - If you want to preserve any of the files or the product installation directory (for example, /opt/IBM/mdm/rm), make backup copies of those files in another directory.
   - Delete the Replication Manager installation directory (for example, /opt/IBM/mdm/rm directory).

Related topics:

- "Manually completing the removal of Multiple Device Manager for Linux" on page 151
- "Manually completing the removal of Performance Manager for Linux" on page 157

Part 6. Configuring Multiple Device Manager

This chapter describes configuration procedures for the Multiple Device Manager (MDM).

The following topics are described in this chapter:

Chapter 16. Setting the IBM Multiple Device Manager universal user ID and password

You can use these procedures to set your IBM Multiple Device Manager (MDM) universal user ID and password. An MDM superuserid and password must be created and be the same for all CIMOMs that MDM is to discover.

Before starting MDM discovery, you must first configure the Common Information Model object manager (CIMOM). The following example shows how to configure the CIMOM using the command-line interface in the IBM TotalStorage Enterprise Storage Server.

Note: If you have already configured the CIMOM, proceed to step 3.

Steps:

The following list summarizes the steps you need to take to install MDM. You must complete these steps in the order that they are presented.

1. Check if the CIMOM is registered with the Service Location Protocol as follows:
   a. Click **Start–> Program Files –> IBM TotalStorage CIM Agent for ESS –> Check CIMOM registration**.

   A DOS prompt displays a list of registered CIMOMs, for example:

   ```
   service:wbem:https://N8A6755C:5989,65535
   service:wbem:https://n054196c:5989,65535
   service:wbem:https://9.37.241.108:5989,65535
   ```

   Each line consists of a service registration and has the following syntax:

   $service:service-type:url
2. If the service registration does not include the Web address of the desired CIMOM, ensure that the CIMOM is started. If the CIMOM is started but the desired service Web address is not displayed, you can add it manually using the **slptool** command with the register option. For example, type the following command:

   ```
   $ slptool register service:wbem:https://myhost.com:port
   ```

   where:
   myhost.com is the name of the server hosting the CIMOM, and
   port is the port number of the service, such as `5989`
3. The MDM extension for the IBM Director requires that each CIMOM that is to be discovered by the IBM Director needs to have a superuser ID and password across those CIMOMs. For those CIMOMs, use the **adduser** command to create a superuser ID (the default is `superuser`) and password (the default is `mdmsupw`). Remember the values you set. For example, type:

   ```
   adduser defaultsuperuser and defaultmdmsupw
   ```

   Note: When adding a user to a SAN Volume Controller, it is recommended that you do so using the Web UI and not the command line interface.

Related topics:

- "System prerequisites for Windows" on page 36
- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing IBM Director for Windows" on page 44
- "Installing Multiple Device Manager for Windows" on page 46
- "Installing Performance Manager for Windows" on page 59
- Chapter 17, "Performing Multiple Device Manager configuration tasks," on page 167

Chapter 17. Performing Multiple Device Manager configuration tasks

Select **Configure MDM** in the IBM Director Task pane to set your Multiple Device Manager (MDM) storage user name and password and to identify the DB2 configuration. You can also configure Tivoli Storage Area Network Manager when you select **Configure MDM**.

Prerequisites:

Tivoli Storage Area Network Manager must be installed on your server before configuration fields for it are displayed when the Configure MDM window opens.

Static devices are not supported in MDM. *Static devices* are devices that are statically defined to a common information model object manager (CIMOM) but are not connected to real devices.

Only one CIMOM per device is supported.

Steps:

Perform the following steps to configure MDM:

1. In the IBM Director Groups pane, click **Storage Devices**. The storage devices are listed in the IBM Director Group Contents pane.
2. Double-click **Multiple Device Manager** in the Task pane.

   Note: These tasks are for users who have administrator level authority when they log on to IBM Director.
3. Double-click on the **Configure MDM** icon, or right-click on the **Task** icon and left-click **Open**. The Configure MDM window opens.
4. Type the MDM user name in the **User name** field. The user name must be registered with the operating system and must be a member of the DirAdmin group.

   The user ID and password must also exist or be created on the integrated configuration assistant tool (ICAT) for each device that you want MDM to be able to discover and manage. For example, you can use **Configure CIMOM Users** from the CIM Agent for ESS start menu folder to add a user with the **adduser** command.
5. Type the MDM password in the **Password** field.

   Configuring the user name and password enables access to MDM functions.
6. Type the password again in the **Confirm password** field.
7. Type the DB2 port information in the **DB2 port** field.

   Configuring DB2 and password enables MDM to connect to DB2.

   Note: The DB2 host field is read-only.

   Note: If the WebSphere Application Server is down you might not be able to enter or change DB2 information.
8. Type the DB2 user name and password in the respective fields.

9. Type the DB2 password again in the **Confirm password** field.
10. If the Tivoli Storage Area Network Manager section is displayed, enter the Tivoli SAN Manager host name in the **TSANM Host** field.

    Note: If the WebSphere Application Server is down you might not be able to enter or change the Tivoli Storage Area Network Manager information.
11. Type the Tivoli SAN Manager port and password in the respective fields.
12. Type the Tivoli SAN Manager password again in the **Confirm Password** field.
13. Click **OK** to save your configuration entries. Alternatively, click **Cancel** to cancel this task. Your entries are not saved.

Related topics:

• "Changing Multiple Device Manager user names and passwords" on page 172

Avoiding port conflicts

This topic lists configuration procedures for avoiding port conflicts between WebSphere Application Server and Tivoli NetView. Additionally, instructions are given for enabling IBM Director to forward SNMP traps to Tivoli NetView.

The following configuration procedures are recommended to avoid port conflicts between WebSphere Application Server and Tivoli NetView.

Steps:

Changing the Tivoli NetView Topology Manager Daemon port: There is a potential for conflict between the WepSphere Application Server SOAP connector port and the Tivoli NetView Topology Manager Daemon port. The Tivoli NetView Topology Manager Daemon should be installed on port 8981 by default. However, depending on the system setup, it can also be installed on another conflicting port.

1. Check the 8981 port value in the \WINNT\system32\drivers\etc\SERVICES file on Microsoft Windows.

   You should see the following entry:

   ```
   ovtopmd          8981/tcp                  # Tivoli NetView Topology
   Manager daemon
   ```
2. If necessary, change this port number to another unused port number that is not conflicting with WebSphere Application Server.
3. Restart Tivoli NetView.
4. Check that all daemons have started successfully by referring to the nv.log file.

Note: It is also possible to set the WAS SOAP Connector port value during installation. You will have this option if you choose the 'advanced' installation path. Otherwise, the panel will be presented to you in the 'typical' path if the installation program detects a conflict.

Enabling the IBM Director to forward trap events to Tivoli NetView: It is possible that IBM Director and Tivoli NetView might have a conflict over the listening port for SNMP traps. The following steps describe how to avoid this conflict:

1. Change the default port number (162) that NetView listens on for SNMP traps to another unused port number.
   a. Select **Start --> Run Multiple Device Manager**.

b. Type the command **regedit** and click **OK**. This action starts the Registry Editor.

c. Select HKEY_LOCAL_MACHINE\SOFTWARE\Tivoli\NetView\CurrentVersion.

d. Right click on the registry value name called trapdSharePort162 and click **Modify**. Change the value in the **Value Data** window from 1 to 0.

Note: Ensure that "Decimal" is selected in the "Base" section when you enter the new value.

e. Right click anywhere in the free space of the registry value names listing (except on an existing registry value) and select **New --> DWORD Value**. A new registry value entry should appear highlighted, called **New Value #1**. Enter the name **trapdTrapReceptionPort**.

f. Right click on this new registry value and click **Modify**. Change the value in the **Value Data** window to an unused port number.

Note: Ensure that "Decimal" is selected in the "Base" section when you enter the new port number.

This new port will be the one that Tivoli NetView will listen on for incoming SNMP traps.

g. Stop the Tivoli NetView console.

h. Restart the Tivoli NetView console and ensure that all the daemons are running by checking **Options --> Server Setup**. All daemons should be initialized and functioning properly. You can consult the nv.log file located in \usr\ov\logs, which will list any problems encountered.

2. Configure IBM Director to forward SNMP traps to NetView.

a. Open the SNMPServer.properties file located in \<IBMDirectorInstallationDirectory>\data\snmp.

b. Ensure that the snmp.trap.port is set to 162. This is the port where IBM Director listens to incoming SNMP trap events.

c. Set the snmp.trap.v1.forward.address.1 value to the host name of the machine where NetView is running.

Note: Ensure the host name will resolve.

d. Set the snmp.trap.v1.forward.port.1 value to XXXX, where XXXX represents the port on which NetView is listening for SNMP traps.

Note: The same procedure can be used to set V2 traps.

After completing the installation and configuration, it can be possible that IBM Director still does not see SNMP traps in the event log. This situation can be due to the following dependencies:

a. IBM Director Service is started.

b. After IBM Director has started, the Tivoli NetView service can be started which will in turn start the SNMTrap Service.

Note: If the Tivoli NetView service has started *before* the IBM Director service, then you will not see any SNMP trap events in the event console, nor will they be forwarded to the NetView console.

Changing the Tivoli Storage Area Network Manager user information: The Tivoli Storage Area Network Manager user information specified in the 'TSANM information' section of the Configure MDM panel must match the password that

was entered during Tivoli SAN Manager installation. You can only change this password during the Tivoli SAN Manager installation process.

Related topics:

- Chapter 2, "Planning for installation for Windows," on page 35
- Chapter 5, "Planning for installation for Linux," on page 85
- "TCP/IP port considerations" on page 41

Setting up Multiple Device Manager discovery preferences

In order to use MDM effectively you need to set discovery intervals and to configure Service Location Protocol (SLP) directory agents in the Discovery Preferences panel.

Multiple Device Manager uses Service Location Protocol (SLP) discovery, which requires that all of the CIMOMs that MDM discovers are registered using the Service Location Protocol (SLP).

SLP can only discover CIMOMs that are registered in its IP subnet. For CIMOMs outside of the IP subnet, you need to use an SLP DA and register the CIMOM using **slptool**. Ensure that the CIM_InteropSchemaNamespace and Namespace attributes are specified.

Steps:

Perform the following steps to set discovery preferences:

1. Click **Options** on the IBM Director Menu bar.
2. Click **Discovery Preferences**.

   The *Discovery Preferences* window opens. This window allows you to set the following MDM discovery preferences:

   - SLP Directory Agent Configuration
   - Discovery Intervals
3. Select the **MDM SLP Configuration** tab.
4. In the **SLP directory agent host** field, type either the host name or the IP address of the workstation that is running the SLP service. For example, you might type either `hostname` or `xxx.xxx.xxx.xxx`.
5. Click the **Add** button.

   Note: You can add additional SLP directory agents by entering new host information and clicking the **Add** button after each addition.
6. Set the discovery intervals in the Discovery Intervals fields:
   a. Select the number of hours for the automatic discovery interval in the Auto discovery interval field.

      This field sets the interval for automatic discovery of MDM supported storage devices
   b. Select the number of minutes for a presence check interval in the **Presence check interval** field. (The default is 15 minutes.)

      This field sets frequency for MDM to check the operational availability of the MDM Managed Objects.
7. Click **OK** to commit the changes.

Related topics:

- "SLP directory agent configuration"

SLP directory agent configuration

The Service Location Protocol (SLP) directory agent is an optional component in the SLP architecture, and is primarily used to simplify SLP administration and to improve SLP performance in the environment. You can add, change, or delete an SLP directory agent by performing this task.

The SLP directory agent acts as an intermediate tier in the SLP architecture, placed between the user agents and the service agents, such that both user agents and service agents communicate only with the directory agent, instead of with each other. Configuring an SLP directory agent eliminates a large portion of the multicast request and reply traffic on the network.

Steps:

Perform the following steps to configure an SLP directory agent:

1. In the IBM Director menu bar select **Options–>Discovery Preferences**.
2. Click the **MDM SLP Configuration** tab.
3. Perform the following tasks from the SLP Directory Agent Configuration box:
   a. Configure (add) a Directory Agent by performing the following steps:
      1) Type a valid Internet host name or an IP address in the SLP Directory Agent Host field.
      2) Click **Add**. The information you entered is displayed in the Configured Directory Agent Hosts box.
   b. Change the information about a Directory Agent by performing the following steps:
      1) Select an Internet host name or an IP address in the Configured Directory Agent Hosts box. The information for the selected item is displayed in the SLP Directory Agent Hosts field.
      2) Enter changes to the Internet host name or IP address.
      3) Click **Change**.
      4) Click **OK**.
   c. Delete a Directory Agent by performing the following steps:
      1) Select an Internet host name or an IP address in the Configured Directory Agent Hosts box. The information for the selected item is displayed in the SLP Directory Agent Hosts field.
      2) Click **Remove**. The selected item is removed from the Configured Directory Agent Hosts box.
4. Click **OK** to save the changes and exit the panel.

Related topics:

- "Setting up Multiple Device Manager discovery preferences" on page 170
- "Discovery intervals" on page 172

Discovery intervals

You can select an interval for automatic discovery of MDM supported storage devices by performing this task using the Discovery Preferences panel.

Steps:

Set the discovery intervals by performing the following steps:

1. Invoke discovery by clicking the **Discovery icon** on Director toolbar or by selecting Tasks ->Discover Systems->MDM storage devices/SAN Elements from the Director menu bar.
2. Click **Discovery Preferences**. The Discovery Preferences panel opens.
3. From the Discovery Preferences panel set the following options:
   - *Auto discovery interval* (in hours): You can select an interval for automatic discovery of MDM supported storage devices.
   - *Presence check interval* (in minutes): You can select a frequency for MDM to check the operational availability of the MDM managed objects.

Related topics:

- "Setting up Multiple Device Manager discovery preferences" on page 170
- "SLP directory agent configuration" on page 171

Changing Multiple Device Manager user names and passwords

You can follow these procedures to change user names and passwords for MDM authentication.

MDM does not directly manage users. However, when you make changes to user names or passwords for either the MDM user ID, DB2, or Tivoli Storage Area Network Manager, you will also need to reflect these changes within MDM for successful authentication.

Note: Only users who have administrator privileges can perform this task.

The MDM superuser and the DB2 user are managed by the operating system. Tivoli Storage Area Network Manager manages its own users.

Steps:

Changing MDM user information: The MDM user ID specified in the 'MDM user information' section of the Configure MDM panel must be a valid operating system user ID, which means it must be in the DirSuper and DirAdmin groups.

1. Changing the MDM user ID
   a. Create a new MDM user on the associated operating system (Microsoft Windows or Linux).
   b. Open the MDM configuration panel by clicking the **IBM Director Task pane --> Multiple Device Manager --> Configure MDM**. You will make changes in the **MDM user information** section of this panel.
   c. In the **User name** field, change the user name to match the new name entered on the operating system in step 1a.
   d. Type the password in the **Password** field. (This password must be the same one specified for the associated user on the operating system.)
   e. Type the password again in the **Confirm password** field.

f. Click **OK**.

2. Changing the MDM user password
   a. Open the MDM configuration panel by clicking the **IBM Director Task pane --> Multiple Device Manager --> Configure MDM**. You will make changes in the **MDM user information** section of this panel.
   b. Change the MDM user password on the operating system (Microsoft Windows or Linux).
   c. In the **Password** field, change the password to match the new password entered on the operating system in step 2b.
   d. Type the password again in the **Confirm password** field.
   e. Click **OK**.
3. Procedure to recover when the MDM user names or passwords are not in synch between the operating system and MDM.
   a. Open the MDM configuration panel by clicking the **IBM Director Task pane --> Multiple Device Manager --> Configure MDM**. Only the MDM user information is displayed because the other information cannot be retrieved at this point. You will make changes in the **MDM user information** section of this panel.
   b. In the **User name** field, change the user name to match the name entered on the operating system.
   c. In the **Password** field, change the password to match the password on the operating system.
   d. Type the password again in the **Confirm password** field.
   e. Click **OK**.
   f. If opened again, the remaining information on the Configure MDM panel should display.

Changing DB2 user information in MDM: The DB2 user ID specified in the 'DB2 information' section of the Configure MDM panel must be a valid operating system user ID. A few extra steps are needed for this procedure because the DB2 user information is also stored in WebSphere Application Server as 'alias.'

1. Changing the DB2 user ID
   a. Create a new DB2 user on the associated operating system (Microsoft Windows or Linux).

      Notes:

      1) The DB2 user needs to be defined as a system user with system administrator privileges. To assign these privileges in Windows, the DB2 user must be in the Administrators group; on Linux the user must be in a group with SYSADM privileges, which is typically db2grp1.
      2) The DB2 user is also mapped to the MDM WebSphere Application Server JMS role.

   b. Open the MDM configuration panel by clicking the **IBM Director Task pane --> Multiple Device Manager --> Configure MDM**. You will make changes in the **DB2 information** section of this panel.
   c. In the **DB2 user name** field, change the user name to match the new name entered on the operating system in step 1a.
   d. Type the password in the **DB2 password** field. (This password should be the same one specified for the associated user on the operating system.)
   e. Type the password again in the **Confirm password** field.

f. Click **OK**. This action will propagate the new user ID to the mdm.properties file and it will be set for WebSphere Application Server, but not yet used.

g. Restart WebSphere Application Server for the new settings to become effective.

2. Changing the DB2 user password
   a. Open the MDM configuration panel by clicking the **IBM Director Task pane --> Multiple Device Manager --> Configure MDM**. You will make changes in the **DB2 information** section of this panel.
   b. In the **DB2 password** field, change the password.
   c. Type the password again in the **Confirm password** field.
   d. Click **OK**.
   e. Stop WebSphere Application Server.
   f. Change the DB2 user password on the operating system (Microsoft Windows or Linux) to match the password you entered in step 2b.
   g. Restart WebSphere Application Server for the new settings to become effective.
3. Procedure to recover when the DB2 user names or passwords are not in synch between the operating system and MDM.
   a. Open the WebSphere Application Server administrative console.
   b. From the left side of the panel, click **Security --> JAAS Configuration --> J2C Authentication Data**.
   c. Select **DMCoservAlias**.
   d. Type a user name and password to match what is specified in MDM.
   e. Click **OK**.
   f. The following message appears: "Changes have been made to your local configuration. Click **Save** to apply changes to master configuration." Save the new server configuration by clicking **Save**.
   g. Another panel displays on which you need to click **Save** again.
   h. Stop WebSphere Application Server.
   i. Restart WebSphere Application Server.
   j. Open the MDM configuration panel by clicking the **IBM Director Task pane --> Multiple Device Manager --> Configure MDM**. You will make changes in the **DB2 information** section of this panel.
   k. In the **DB2 user name** field, change the user name to match the name entered on the operating system and in WebSphere Application Server.
   l. In the **Password** field, change the password to match the password on the operating system and in WebSphere Application Server.
   m. Type the password again in the **Confirm password** field.
   n. Click **OK**. All DB2 settings should now be in synch.

Changing the Tivoli Storage Area Network Manager user information: The Tivoli Storage Area Network Manager user information specified in the 'TSANM information' section of the Configure MDM panel must match the password that was entered during Tivoli SAN Manager installation. You can only change this password during the Tivoli SAN Manager installation process.

Related topics:

• "System prerequisites for Windows" on page 36

- "Installing DB2® Universal Database Workgroup Edition for Windows" on page 42
- "Installing IBM Director for Windows" on page 44
- "Installing Multiple Device Manager for Windows" on page 46
- Chapter 17, "Performing Multiple Device Manager configuration tasks," on page 167

Chapter 18. Starting Multiple Device Manager discovery

Multiple Device Manager (MDM) provides discovery of support Storage Management Initiative Specification (SMIS) based storage subsystems on the Storage Area Network (SAN).

Prerequisites:

Perform the following tasks before you start MDM discovery:

- Set the MDM preferences
- Configure the SLP Directory Agent
- Set the discovery intervals

IBM Director provides several ways to invoke MDM discovery:

- From Options on the Menu bar. Select the MDM SLP configuration tab from the SLP Preferences menu.
- From the tool bar. Select the hammer icon.
- From the Scheduler:

  Select the calendar icon on the tool bar, or

  Select the Scheduler option from the Task menu on the Menu bar.

Remove any unreal ("fictitious") devices that are discovered.

Related topics:

- "SLP directory agent configuration" on page 171
- "Starting Service Location Protocol (SLP) discovery from the menu bar" on page 180
- "Starting the Multiple Device Manager discovery task from the tool bar"
- "Setting up Multiple Device Manager discovery preferences" on page 170
- "Scheduling SLP discovery" on page 180

Starting the Multiple Device Manager discovery task from the tool bar

Perform this task to start the Multiple Device Manager discovery task from the IBM Director tool bar.

Steps:

Perform the following steps to start the Multiple Device Manager (MDM) discovery task:

1. Click the **Discovery icon** from the IBM Director tool bar.

   Note: This task can also be performed from the Tasks option on the Director menu bar.
2. Click **Discover Systems** from the list of options.
3. Click **MDM storage devices/SAN Elements)** from the list of available discovery operations.
4. Save and name the discovery task.

Related topics:

- "Setting up Multiple Device Manager discovery preferences" on page 170
- "Scheduling SLP discovery" on page 180

Chapter 19. Setting up the Service Location Protocol Directory Agent

You can use these procedures to set up the Service Location Protocol (SLP) Directory Agent (DA) so that MDM can discover devices that reside in subnets other than the one in which MDM resides.

Steps:

Perform the following steps to set up the SLP DAs:

1. Identify the various subnets that contain devices that you want MDM to discover.
2. Each device is associated with a CIM Agent. There might be multiple CIM Agents for each of the identified subnets. Pick one of the CIM Agents for each of the identified subnets. (It is possible to pick more than one CIM Agent per subnet, but it is not necessary for discovery purposes.)
3. Each of the identifed CIM Agents contains an SLP service agent (SA), which runs as a daemon process. Each of these SAs is configured using a configuration file called **slp.conf**. Find the **slp.conf** file in the CIM Agent installation directory and perform the following steps to edit the file:
   a. Make a backup copy of this file and name it slp.conf.bak.
   b. Open the **slp.conf** file and scroll down until you find (or search for) the line `;net.slp.isDA = true`. Remove the semi-colon (;) at the beginning of the line. Ensure that this property is set to true (= true) rather than false. Save the file.
   c. Copy this file (or replace it if the file already exists) to the the main windows subdirectory for Windows machines (for example `c:\winnt`), or in the /etc directory for UNIX machines.
4. Restart the daemon process and the CIMOM process for the CIM Agent (refer to the CIM Agent documentation for your operating system for more details).

   Note: The CIMOM process might start automatically when you restart the SLP daemon.
5. You have now converted the SLP SA of the CIM Agent to run as an SLP DA instead. The CIMOM is not affected and will register itself with the DA instead of the SA. However, the DA will automatically discover all other services registered with other SLP SAs in that subnet.
6. Go to the MDM Discovery Preference settings panel, and enter the host names or IP addresses of each of the machines that are running the SLP DA that was set up in the prior steps.

   Note: Enter only a simple host name or IP address; do not enter a protocol and port number.

Result:

When a discovery task is started (either manually or scheduled), MDM will discover all devices on the subnet on which MDM resides, and it will discover all devices with affinity to the SLP DAs that were configured.

Related topics:

- "Setting up Multiple Device Manager discovery preferences" on page 170

SLP discovery startup methods

This topic lists the various methods for starting Service Location Protocol discovery.

Steps:

You can start the Service Location Protocol (SLP) discovery in one of the following ways:

1. Click the **Discovery** icon on the Director toolbar.
2. From the Director menu bar, select **Tasks –>Discover Systems–>Storage systems**.
3. **Scheduled Discovery.** Use the IBM Director scheduler to schedule the discovery task.
4. Set the **Auto discovery** function on the Discovery Preferences panel.

Note: Discovery might take several minutes depending on how many storage devices MDM is managing.

Related topics:

- "Setting up Multiple Device Manager discovery preferences" on page 170

Starting Service Location Protocol (SLP) discovery from the menu bar

You can start SLP discovery from the IBM Director menu bar.

Steps:

1. Click **Tasks** on the IBM Director menu bar.

   Note: This task can also be performed from the IBM Director tool bar.
2. From the **Tasks** menu, click **Discover Systems**.
3. Click **MDM storage devices/SAN Elements** from the list of available discovery operations.
4. Save and name the discovery task.

Related topics:

- "Setting up Multiple Device Manager discovery preferences" on page 170
- "Scheduling SLP discovery"

Scheduling SLP discovery

Perform this task to schedule a Service Location Protocol (SLP) discovery. Use the IBM Director Scheduler interface to run the task immediately or at a later date and time.

An MDM discovery task appears as a noninteractive task in the Director Scheduler. This task is not created, nor can it be changed or modified by a user.

Steps:

Perform the following steps to define or change the schedule for an SLP discovery task:

1. On the IBM Director menu bar, click **Task**.
2. From the **Task** menu, cllick **Scheduler**. The Scheduler interface opens.
3. Click the **Task** tab. The list of SLP discovery tasks (and performance collection tasks) are displayed in the New Scheduled Job notebook.
4. Select the SLP discovery task to be scheduled.
5. Click the **Date/Time** tab in the New Scheduled Job notebook to set or change the date and time for the selected SLP discovery task.
6. Click **OK** to save the job and name it.
7. (Optional) Right-click on the saved job to display the context menu. You can perform the following optional tasks from the menu:
   a. Click **Execute now** to run a scheduled job immediately.
   b. Click **Delete** to delete a scheduled job at any time.

Result:

The IBM Director activates the SLP discovery task on the dates and times specified in the scheduler.

Related topics:

- "Setting up Multiple Device Manager discovery preferences" on page 170
- "Starting Service Location Protocol (SLP) discovery from the menu bar" on page 180

Chapter 20. Customize Performance Manager to run San Volume Controller cluster data-collection tasks

Perform this task to provide the the Secure Shell Client (SSH Client) *private* key from an SSH Client key pair to Performance Manager to enable SAN Volume Controller (SVC) performance data collection. You must also provide the SSH Client *public* key from the SSH Client key pair to all SVC clusters from which you will do performance data collection.

If you provided the SSH Client private key during the installation of Performance Manager, this task is complete and you do not have to perform this task manually. If you did not provide the SSH Client key at that time or if you want to change the SSH Client key, perform this task.

Steps:

Perform the following steps from a Windows system to provide your SSH Client private PuTTY key to Performance Manager:

1. Identify an SSH Client key pair which you will make available to Performance Manager. The easiest and fastest way to provide Performance Manager with a valid SSH Client key pair is to reuse your SAN Volume Controller Console SSH Client private key which is already working with your SAN Volume Controller clusters. The SSH Client private key, *icat.ppk*, can be found under the SAN Volume Controller Console CIMOM directory. The default location is:

   c:\Program Files\IBM\svcconsole\cimom\icat.ppk
2. If you cannot find this key pair, you can create a new PuTTY SSH key pair. The SAN Volume Controller Configuration Guide (“Master Console Overview - Generating an SSH Key Pair using the SSH Client called PuTTY”) contains instructions on how to make the PuTTY key pair. You can also use the SSH Client sample key pair provided in the pmgrkey directory discussed in step 4.
3. Put the SSH Client private key in the Performance Manager directory. PuTTY was installed on your system as a prerequisite to installing Performance Manager. The default PuTTY home directory is c:\Program Files\PuTTY. Look in the PATH environment variable to find the PuTTY directory if it was not installed in a non-default location.
4. Find (create if absent) a directory named *pmgrkey* under the PuTTY home directory. Put your PuTTY private key in the pmgrkey directory with the name “icat.ppk”.

To store a new SSH public client key on the SAN Volume Controller cluster, perform the following steps:

1. Start the browser to access the SAN Volume Controller Console, *Http://<svccip>:9080/ica*, where <svccip> is the IP internet address for the SAN Volume Controller Console.
2. Log onto the SAN Volume Controller Console.
3. Select “Clusters” in the left hand frame.
4. Select the cluster in which you are interested and select “Launch the SAN Volume Controller application” to open a secondary browser window to manage your specific cluster.

5. Expand “Service and Maintenance” in the left hand frame.
6. Select “Maintain SSH Keys” to access the panel where you can enter the SSH public key that is to be saved on the cluster.

Before submitting a data collection task you can validate the Performance Manager SSH Client keypair connectivity by manually checking for SSH connectivity from your Performance Manger system to the SAN Volume Controller clusters:

1. Open a Command Prompt.
2. Change directory to the PuTTY home directory, the default directory is: C:\Program Files\PuTTY.
3. Type: **plink admin@x.x.x.x -ssh -2 -i pmgrkey\icat.ppk**, where x.x.x.x is the IP address of your SAN Volume Controller cluster.

   Note: When you create Performance Manager tasks to do performance collection tasks, you must enter the “admin” user name as the “SVC user name”. This is consistent with the network user name you enter for HTTPS access to the SVC cluster. Do *not* use the MDM super user name.

Appendix.

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Related Web sites

Table 10 lists Web sites that have information about Multiple Device Manager or related products or technologies.

Table 10. Web sites

Type of information	Web site
Multiple Device Manager support	http://www.ibm.com/storage/support/mdm/

Table 10. Web sites (continued)

Type of information	Web site
Technical support for IBM storage products	http://www.ibm.com/storage/support/

Legal Information

The topics in this category provide legal information about Multiple Device Manager, including notices and trademarks.

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IBM TotalStorage Multiple Device Manager
Installation and Configuration Guide
Version 1.1

Publication No. SC26-7588-00

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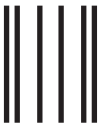

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