# CONTROL-M on Microsoft Windows Clusters

## Implementation Guide

Supporting

CONTROL-M/Enterprise Manager 6.3.01
BMC Batch Impact Manager 6.3.01
CONTROL-M/Forecast 6.3.01
CONTROL-M/Server for Microsoft Windows 6.3.01
CONTROL-M/Agent for Microsoft Windows 6.3.01

December 2006

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  - license number and password (trial or permanent)
- operating system and environment information
  - machine type
  - operating system type, version, and service pack or other maintenance level such as PUT or PTF
  - system hardware configuration
  - serial numbers
  - related software (database, application, and communication) including type, version, and service pack or maintenance level
- sequence of events leading to the issue
- commands and options that you used
- messages received (and the time and date that you received them)
  - product error messages
  - messages from the operating system, such as `file system full`
  - messages from related software

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Chapter 1

# Introduction to cluster technologies

## Overview

This document contains technical information about how to implement CONTROL-M on Microsoft Windows clusters and is intended for system administrators and database administrators (DBAs). A relatively high level of understanding of CONTROL-M architecture and internals, as well as cluster administration, is needed to implement the content of this document. Therefore, consider contacting BMC Software personnel to assist you while you carry out these instructions.

A cluster is a group of independent computers working together as a single system to ensure that mission-critical applications and resources are as highly available as possible. The group is managed as a single system specifically designed to tolerate component failures and transparently support the addition or removal of components. The individual computers that compose the cluster are called nodes, and the collection of components on each node that perform cluster-specific activities is called a cluster service.

Cluster service is the Windows 2000 and Windows 2003 name for the cluster technology that Microsoft Corporation introduced in Windows NT 4 Server Enterprise Edition. The service was called Microsoft Cluster Server (MSCS).

In Windows 2000, Microsoft Corporation introduced two clustering technologies that can be used independently or in combination, based on the requirements of a given application or service:

- **cluster service:** This service is intended primarily to provide failover support for applications such as databases, enterprise resource planning (ERP) applications, messaging systems, and file / print services. Cluster service is ideal for ensuring the availability of critical line-of-business and other back-end systems, such as Microsoft Exchange Server, Microsoft SQL Server database, or CONTROL-M.

The number of supported nodes depends on the specifics of the operating system:

— In the Windows 2000 Advanced Server operating system, cluster service supports 2-node failover clusters.

— In the Windows 2000 Datacenter Server operating system, cluster service supports 4-node failover clusters.

— In the Windows 2003 Enterprise Edition and Datacenter Edition, cluster service supports 8-node failover clusters.

- **network load balancing (NLB):** Network load balancing (NLB): This service is available in the Windows 2000 Advanced Server operating system, Windows 2000 Datacenter Server and in all editions of the Windows Server 2003 family. It load-balances incoming Internet Protocol (IP) traffic across clusters of up to 32 nodes. NLB enhances both the availability and scalability of Internet server-based programs.

***NOTE***

CONTROL-M is not supported on an NLB service; therefore, NLB will not be further discussed in this document.

# What is in this document?

This document discusses the following topics:

- considerations related to the implementation of the CONTROL-M database

  CONTROL-M database configuration on page 15 describes the various ways to configure the CONTROL-M database in a Windows cluster environment and the installation of MS-SQL Server 2000 (Enterprise Edition) in a Windows cluster.

- guidelines for implementing CONTROL-M/Enterprise Manager in a Windows cluster environment

  The guidelines in Best practices for CONTROL-M/EM on page 25 describe the configuration steps required for CONTROL-M/Enterprise Manager to run in a Windows cluster.

Chapter 2

# Cluster architecture and terminology

This chapter describes the architecture of Windows cluster technology and explains some of the relevant components and terms.

## Server clusters

Server clusters are based on a *shared-nothing model* of cluster architecture. This model refers to how servers in a cluster manage and use local and common cluster devices and resources. In the shared-nothing cluster, each server owns and manages its local devices. Devices common to the cluster, such as a common disk array and connection media, are selectively owned and managed by a single server at any given time.

## Cluster network configuration

The nodes in a cluster can exist in a single cabinet or be physically separated and connected in a local area network (LAN).

All nodes in a cluster must be a part of the same domain, and each node can be configured as a domain controller or member server. Ideally, clusters will have at least two nodes acting as domain controllers and providing failover for critical domain services. If the domain controllers are not cluster members, the availability of the cluster resources is tied to those domain controllers.

# Private and public network addresses

Each node in a cluster is typically configured with both private network and public network addresses.

- *Private network addresses* are used for node-to-node communications; that is, transferring cluster configuration and administration data between the nodes in the cluster. This is also referred to as an *internal network*.

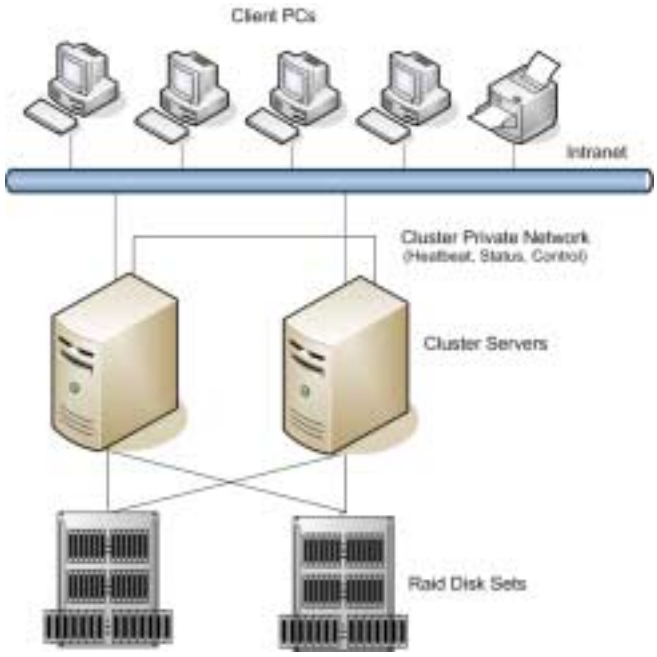
- *Public network addresses* are used for client-to-cluster communications; that is, transferring data between the applications that are configured on the cluster and the application clients. This is also referred to as an *external network*.

# Cluster storage media

In addition to the local (system) disks of each node, the active node and all backup nodes in the cluster are physically connected to a shared storage medium. The shared disk is usually divided into multiple logical volumes, where each volume can be available to only one node at a given time and will typically be used by only one application (resource group).

Figure 1 illustrates the typical two-node cluster architecture:

**Figure 1 Typical two-node cluster architecture**



**NOTE**

- This document describes installation on a two-node cluster, but the same principles apply to cluster implementations with a larger number of nodes.
- In Windows 2003 servers, a cluster technology was introduced, named Majority Node Set (MNS) clusters. This technology allows you to connect multiple Windows 2003 servers in a cluster without using a shared disk by saving a copy of the cluster configuration on the local (system) disk of each node. Because the application data is not shared between nodes in this configuration, this technology is irrelevant to CONTROL-M and therefore will not be further discussed in this document.

# Resources

The term *resource* refers to each hardware or software component within the cluster that is managed by the cluster service. They are physical or logical entities. Hardware devices such as disk drives and network interfaces are examples of physical cluster resources. Internet Protocol (IP) addresses, applications, and application databases are example of logical cluster resources.

Each node in the cluster has its own local resources. However, the nodes in a cluster also share common resources (such as a common data storage array and private cluster network) that are accessible by each node in the cluster.

Resources have the following characteristics. They can be

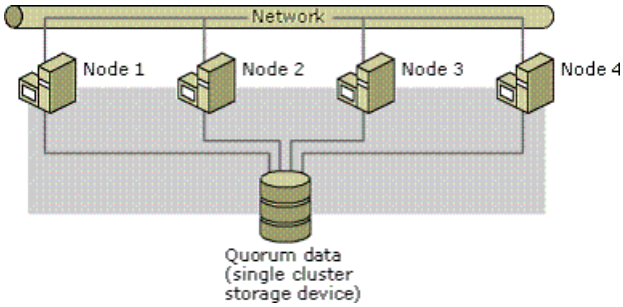
- brought online and taken offline
- managed by a cluster service
- owned by only one node at a time

A resource is online when it is available and providing service to the cluster.

# Quorum

One special common resource is the quorum resource, a physical disk in the common cluster disk array that plays a critical role in cluster operations. It must be present for node operations to occur, such as forming or joining a cluster. Figure 2 illustrates the role of the quorum resource:

**Figure 2 A quorum resource in a cluster**




The quorum resource is used as a tie-breaker to avoid “split-brain,” a situation in which all network communication links between two or more cluster nodes fails. In such a case, only the cluster partition that “owns” the quorum can continue and run the cluster applications. The rest of the cluster partitions are evicted from the cluster.

The quorum disk also contains the quorum log, which is a configuration database for the server cluster. It holds cluster configuration information such as which servers are part of the cluster, what resources are installed in the cluster, and what state those resources are in (for example, online or offline). The quorum log is located by default in **\MSCS\quolog.log** on the quorum disk.

Since the quorum disk is critical to the cluster operation it is not recommended to install any application on it.

# Resource group

A resource group is a collection of resources managed by the cluster service as a single, logical unit. Application resources and cluster entities can be more easily managed when logically related resources are defined into a resource group. A cluster service operation performed on a resource group affects all individual resources in the group. Typically, a resource group is defined to contain all the elements needed by a specific application server and clients for successful use of the application.

Before adding an application to a resource group, whether the application can work within the cluster environment must be determined, which depends on whether the application is cluster-aware or cluster-unaware:

- **Cluster-aware applications** are those that can work within the cluster environment and support cluster events. Cluster-aware applications can register with the cluster service to receive status and notification information. CONTROL-M/Enterprise Manager, CONTROL-M/Server, and CONTROL-M/Agent are cluster-aware applications.

- **Cluster-unaware applications** do not support cluster events. Some cluster-unaware applications, however, can be assigned to resource groups and can be failed over, although failover usually requires intervention by the cluster administrator during configuration of the application resources in the cluster.

Applications that meet the following criteria can be assigned to resource groups:

- The application uses an IP-based protocol for its network communications (it cannot use NetBEUI, IPX, AppleTalk or other protocols to communicate).

- The application stores its data in a configurable location. This criterion is necessary because nodes in the cluster access the application data through shared storage devices. (If the application does not do so, the application data will not be available on failover.)

- The application client can retry and recover from a temporary loss of network connectivity that occurs during failover.

# Virtual servers

Applications and services running on a server cluster can appear to users and workstations as running on *virtual servers*. A virtual server is a resource group that contains at least one Network Name resource and one IP Address resource, in addition to the specific application resources. Multiple virtual servers representing multiple applications can be hosted in a cluster.

The user or client software that connects to an application that is running in a virtual server does not know which node is actually hosting the virtual server. To users and clients, connecting to an application or service that is running as a clustered virtual server appears no different from connecting to a single, physical server.

Services or applications not accessed by user or client applications can run on a cluster node without being managed as a virtual server.

In the event of an application or server failure, the cluster service moves the entire virtual server resource group to another node in the cluster. When such a failure occurs, the client will detect a failure in its session with the application and attempt to reconnect in exactly the same manner as the original connection. The reconnection is possible because the cluster service simply maps the published IP address of the virtual server to a surviving node in the cluster during recovery operations. The client session can reestablish the connection to the application without needing to know that the application is now physically hosted on a different node in the cluster.

Each resource in a group may depend on other resources in the cluster. Dependencies are relationships between resources that indicate which resources need to be started and available before another resource can be started. For example, a database application may depend on the availability of a disk, IP address, and network name to be able to start and provide services to other applications and clients.

Resource dependencies are identified by using cluster resource properties and enable the cluster service to control the order in which resources are brought online and offline. The scope of any identified dependency is limited to resources within the same resource group. Cluster-managed dependencies cannot extend beyond the resource group, because resource groups can be brought online and offline and moved independently.

# Cluster administration

A cluster is administered using the Cluster Administrator interface, which enables the performance of maintenance, monitoring, and failover administration. Also, the Cluster Administrator interface contains an automation tool that you can use to create cluster resources, nodes, and the cluster itself.

In Windows 2003 server platforms, the Cluster Administrator interface can be installed and used regardless of whether the server is a cluster node.

Chapter 3

# CONTROL-M database configuration

You can use the following types of implementations for the CONTROL-M database in a Windows cluster environment:

- **clustered configuration**: A single database installation on the cluster can be accessed by both nodes. The database files are located on the shared disk and the database server availability is controlled by the cluster.
- **local database configuration**: The database server is locally installed on one of the cluster nodes. Only a database client is installed on the other node.
- **remote database configuration**: The database is installed on a non-clustered server or on a cluster different from where CONTROL-M is installed. In this case, only database clients are installed on each of the CONTROL-M cluster nodes.

## Clustered configuration

This section describes a cluster configuration for both a Microsoft SQL Server 2000 Enterprise Edition and Oracle Real Application Cluster (RAC).

### Microsoft SQL Server 2000 Enterprise Edition

When you install Microsoft SQL (MS-SQL) Server 2000 Enterprise Edition on a cluster, the software binaries of the product are placed on the local drives of each one of the selected nodes and the data files are placed on the assigned disk resource on the shared drive. This configuration differs from the MS-SQL Server 7.0 configuration, in which both the binaries and the data files were placed on the assigned disk resource on the shared drive.

Also, the MS-SQL Server services (one service is created on each cluster node) are named by default as the virtual server name. When the MS-SQL resource group is moved from one node to another, the MS-SQL services are stopped on the original (primary) node and started on the alternate node.

Installation of MS-SQL Server 2000 Enterprise Edition on a Windows 2000 cluster automatically creates, in the selected resource group, the Network Name and IP Address resources, in addition to the MS-SQL services resources. At that point, the MS-SQL resource group becomes a virtual server and can be accessed by client applications by the virtual name.

***NOTE***

If, during installation, the **Virtual Server** option in the Computer Name window is disabled, you are installing an edition of MS-SQL different from the Enterprise Edition, and the MS-SQL server cannot be installed in a clustered mode.

For more information about installing MS-SQL Server 2000 Enterprise Edition on a Windows 2000 Cluster, see “SQL Server 2000 Failover Clustering” at http://www.microsoft.com/technet/prodtechnol/sql/2000/maintain/failclus.mspx.

# Oracle Real Application Cluster (RAC)

A normal Oracle installation consists of a single Oracle instance that accesses a database on the same computer system. With RAC (formerly known as Oracle Parallel Server), multiple instances on different nodes can access the same database files simultaneously. In case of a node failure, the workload of this node will be handled by the other node of the cluster.

After you prepare the system for installation, the Oracle Universal Installer (OUI) presents the list of all cluster nodes, enabling you to select a subset as targets. Then the OUI copies the Oracle software onto the first node, and then propagates the software onto the rest of the chosen nodes of the cluster. Along with all the Oracle software, Oracle Enterprise Manager (the central managing console) is automatically installed and set up. When the installation is finished, the database creation wizard and the network configuration wizard will be automatically invoked.

For more information about Oracle RAC installation, see the Oracle installation documentation or the Oracle RAC whitepapers at http://www.oracle.com/technology/products/database/clustering/RACWhitepapers.html.

***NOTE***

Oracle high availability features are only relevant for CONTROL-M/Enterprise Manager.

# Local database configuration

This configuration is based on the concept of installing the database server on one of the cluster nodes and the database clients on the rest of the cluster nodes. In this way, the database can be accessible to all the nodes in the cluster, but it will not be maintained in a highly available manner. This configuration is not recommended for CONTROL-M when implemented in a clustered configuration.

# Remote database configuration

When the database server is located on a remote node (not one of the cluster nodes), you can install a database client on each of the cluster nodes and connect them to the remote database server. In this type of implementation, you do not need to install additional database software on the cluster (besides the database client).

This configuration is common when database platforms reside in a centralized location. However, the availability of CONTROL-M in this type of configuration is tied to and dependent on the remote database server availability.

Chapter 4

# Best practices for CONTROL-M/Server and CONTROL-M/Agent

CONTROL-M / Server and CONTROL-M / Agent are cluster-aware applications and can be installed on Windows clusters. The complete installation procedures are provided in the installation guides, so they are not discussed in this document. This chapter presents tips, hints, and best-practices information for the implementation of version 6.3.01 of CONTROL-M / Server and CONTROL-M / Agent.

## Creating IP Address and Network Name cluster resources

CONTROL-M / Server and CONTROL-M / Agent installations require that the Physical Disk, Network Name, and IP Address virtual resources are created before you begin. When you install CONTROL-M / Agent to the same virtual server (resource group) as CONTROL-M / Server, you do not need to manually create the Network Name and IP address cluster resources.

When you install CONTROL-M / Server or CONTROL-M / Agent into a new resource group or a resource group that does not include Physical Disk, Network Name, and IP Address resources, use the following procedures to create these cluster resources and bring them online.

***NOTE***

To install CONTROL-M / Server and CONTROL-M / Agent in a Windows cluster environment you require administrator privileges on all the relevant cluster nodes.

### To create the IP Address resource

1 From the Cluster Administrator interface, select the relevant resource group.

2 Right-click an empty space in the group and choose **New => Resource**.

3 In the New Resource window perform the following steps, and then click **Next**:

A Enter the name that will be assigned to the IP address cluster resource (for example, **AG630 – IP Address**).

B Enter a description for the IP address cluster resource (for example, **Virtual IP Address**).

C Select resource type **IP Address**.

D Ensure that the selected group is the CONTROL-M/Server or CONTROL-M/Agent resource group (for example, **AG630**).

4 In the Possible Owners window, ensure that all the nodes on which the CONTROL-M/Server r CONTROL-M/Agent can be brought online are listed in the **Possible owners** column, and then click **Next**:

5 In the Dependencies window click **Next**.

6 In the TCP/IP Address Parameters window perform the following steps, and then click **Finish**:

A Enter the CONTROL-M/Server or CONTROL-M/Agent virtual IP address.

The **Subnet mask** field is automatically set.

B Select **Network** type **External**.

C Select the **Enable NetBIOS for this address** check box.

### To create the Network Name resource

1 From the Cluster Administrator interface, select the relevant resource group.

2 Right-click an empty space in the group and choose **New => Resource**.

3 In the New Resource window, perform the following steps, and then click **Next**:

A Enter the name that will be assigned to the Network Name cluster resource (for example, **AG630 – Network Name**).

B Enter a description for the Network Name cluster resource (for example, **AG630 – Network Name**).

C Select resource type **Network Name**.

D Ensure that the selected group is the CONTROL-M/Server or CONTROL-M/Agent resource group (for example, **AG630**).

4 In the Possible Owners window ensure that all the nodes on which the CONTROL-M/Server or CONTROL-M/Agent can be brought online are listed in the **Possible owners** column, and then click **Next**.

5 In the Dependencies screen, select the Network Name cluster resource that you are creating and click **Add** to add it to the resource dependencies list in the right column.

6 In the Network Name Parameters window enter the name for the CONTROL-M/Server or CONTROL-M/Agent virtual server, and then click **Finish**.

### To bring the resources online

1 From the Cluster Administrator interface, select the CONTROL-M/Server or CONTROL-M/Agent resource group.

2 Right-click the group and choose **Bring Online**.

# Job disappearance workaround

Every time a job is submitted, a **ctmrjobwin2k.exe** process is created to monitor the job and report about its completion. When the **ctmrjobwin2k.exe** process is started (with each job), it creates the PROCID file for the job.

In a normal scenario, the **ctmrjobwin2k.exe** process detects the job completion, updates the PROCID file and sends a trigger to the Agent Tracker (**p_ctmat.exe**) about the completion. The **p_ctmat.exe** then sends the update to CONTROL-M/Server.

In a failover scenario, while the job is still executing, the agent process is stopped and the agent partition is disconnected from the first host. In this case the job can keep running, but the PROCID file will not be updated when the jobs completes (the agent partition will be mapped to the backup node). Therefore, when the agent is started on the backup node, and the next Track-All time arrives, it will find the original PROCID file but it will not find the actual process. This is why the job is marked as disappeared.

As an optional workaround, you can define a JLOST ON statement for the jobs that run on the clustered agent (Statement=*, Code=**JLOST**) and execute a DO RERUN command. In this case the jobs will be automatically restarted (rerun) on the backup server when CONTROL-M/Server finds they have disappeared.

***NOTE***

You must enter value greater than 0 in the MAX RERUN parameter in order for the job to be resubmitted.

# Implementing CONTROL-M control modules in cluster installations

***NOTE***

The section is relevant when installing CONTROL-M control modules versions earlier than 6.2.01.

When CONTROL-M/Agent is installed in cluster mode (as opposed to local mode), every CONTROL-M/Agent must have a unique name so that they can all run on the same cluster node. In such an installation, the default agent installation is disabled. CONTROL-M control modules (CMs) versions earlier than version 6.3.01 are supported only on default agents. Use the following procedure to work around this problem and implement CMs local Windows cluster nodes:

1. Install a local CONTROL-M/Agent on each of the relevant cluster nodes.
2. Install the relevant CONTROL-M/CM on each of the local agents.
3. Apply the latest software updates (maintenance updates, fix packs, and so forth).

4 After the CONTROL-M/CM accounts are created on one of the nodes, copy the account file from that node to the others.

5 In CONTROL-M/Server, create a node group that includes the physical host names of all the relevant cluster nodes.

6 When creating the relevant skeleton in CONTROL-M/EM for the CM jobs, use the node group name.

***NOTE***

The node group name can be different from the CONTROL-M/Server virtual host name in case another agent is implemented in clustered mode in the CONTROL-M/Server virtual server.

# Starting and stopping CONTROL-M/Server and CONTROL-M/Agent

When CONTROL-M/Server or CONTROL-M/Agent is installed in a Windows cluster environment, only use either one of the following for starting and stopping CONTROL-M/Server or CONTROL-M/Agent:

- the Cluster Administrator
- the **cluster.exe** utility

***NOTE***

When CONTROL-M/Server is managed in a cluster, the cluster software starts, stops, and monitors CONTROL-M/Server actions. When used in a cluster, if the CONTROL-M/Server is defined on CONTROL-M Configuration Manager, the CONTROL-M/Server desired state defined on CONTROL-M Configuration Manager should be set to value **ignore**.

Chapter 5

# Best practices for CONTROL-M/EM

This chapter comprises the following phases, which help you install CONTROL-M/Enterprise Manager (CONTROL-M/EM) to work on Windows clusters:

"Phase 1 Pre-installation considerations" on page 26

"Phase 2 Installing CONTROL-M/EM on the cluster machine" on page 28

"Phase 3 Post-installation procedures" on page 29

In the implementation of CONTROL-M/EM on Windows Clusters, the CONTROL-M/EM server components are not managed by the CONTROL-M Configuration Manager. Instead each EM server component is defined as a cluster resource and is managed by the Cluster Administrator.

When CONTROL-M/EM is installed in a Windows Cluster environment the installation creates the CONTROL-M/EM Configuration Agent service with the Startup Type set to "Manual" so the CONTROL-M/EM Configuration Agent will remain down during normal operation.

The CONTROL-M Configuration Manager can be used to view the status of each CONTROL-M server component.

***NOTE***

To avoid a conflict between the Cluster Administrator and the CONTROL-M/EM Configuration Agent service, the Desired State for each CONTROL-M/EM component being monitored must remain in the "Ignore" state.

# Phase 1 Pre-installation considerations

Review the following notes if you will be installing CONTROL-M/EM in a Microsoft Windows cluster environment:

- Do not share the IP and Network Name resources that identify the cluster with a CONTROL-M/EM cluster instance.
- Disk, IP, and Network Name resources must be online in the virtual server group where an instance of CONTROL-M/EM on Microsoft Windows is to be installed.
- Silent installation of CONTROL-M/EM is not supported for Microsoft Windows cluster environments.

CONTROL-M/EM version 6.3.01 installation require Disk, Network Name and IP Address virtual resources to be created before you begin. When you install CONTROL-M/EM to the same virtual server (resource group) as CONTROL-M/Server or MS-SQL Server, you do not need to manually create the Network Name and IP address cluster resources. They are automatically created by the CONTROL-M/Server or MS-SQL Server installation.

When you install CONTROL-M/EM into a new resource group or a resource group that does not include Disk, Network Name and IP Address resources, use the following procedures to create these cluster resources and bring them online.

### To create the IP Address resource

1. From the Cluster Administrator interface, select the relevant resource group.
2. Right-click an empty space in the group and choose **New => Resource**.
3. In the New Resource window, perform the following steps, and then click **Next**:
   - A. Enter the name that will be assigned to the IP address cluster resource (for example, **EM630 – IP Address**).
   - B. Enter a description for the IP address cluster resource (for example, **Virtual IP Address**).
   - C. Select resource type **IP Address**.
   - D. Ensure that the selected group is the CONTROL-M/EM resource group (by default, **EM630**).
4. In the Possible Owners window, ensure that all the nodes on which the CONTROL-M/EM can be brought online are listed in the **Possible owners** column, and then click **Next**.

5 In the Dependencies window, click **Next**.

6 In the TCP/IP Address Parameters window, perform the following steps, and then click **Finish**:

A Enter the CONTROL-M/EM virtual IP address. The **Subnet mask** field is automatically set.

B Select **Network** type **External**.

C Select the **Enable NetBIOS for this address** check box.

### To create the Network Name resource

1 From the Cluster Administrator interface, select the relevant resource group.

2 Right-click an empty space in the group and choose **New => Resource**. The New Resource window is displayed.

3 In the New Resource window, perform the following steps, and then click **Next**:

A Enter the name that will be assigned to the Network Name cluster resource (for example, **EM630 – Network Name**).

B Enter a description for the Network Name cluster resource (for example, **EM630 – Network Name**).

C Select resource type **Network Name**.

D Ensure that the selected group is the CONTROL-M/EM resource group (by default, **EM630**).

4 In the Possible Owners window, ensure that all the nodes on which the CONTROL-M/EM can be brought online are listed in the **Possible owners** column, and then click **Next**.

5 In the Dependencies screen, select the IP Address cluster resource that you are creating and click **Add** to add it to the resource dependencies list in the right column.

6 In the Network Name Parameters window, enter the name for the CONTROL-M/EM virtual server, and then click **Finish**.

### To bring the resources online

1 From the Cluster Administrator interface, select the CONTROL-M/EM resource group.

2 Right-click the group and choose **Bring Online**.

3 To ensure the network name and IP address are published in the network, ping the CONTROL-M/EM virtual server, as defined in step 6 of the "To create the Network Name resource"task, from the command prompt.

# Phase 2 Installing CONTROL-M/EM on the cluster machine

***NOTE***

CONTROL-M/EM must be installed on the shared disk that was designated for the CONTROL-M/EM Resource Group in the cluster environment.

Follow the instructions for installing CONTROL-M/EM as described in the "Installing CONTROL-M/EM on Windows" section located in *CONTROL-M/Enterprise Manager Installation Guide Version 6.3.01*.

***NOTE***

As part of the CONTROL-M/EM cluster aware installation procedure, TAO CORBA settings and CONTROL-M/EM server component parameters are configured to work with the Virtual Hostname that is being provided by the user during the installation process.

## CONTROL-M/Forecast feature (optional)

After installing CONTROL-M/EM, the user has the option of installing CONTROL-M/Forecast. It is intended only for customers who are licensed to use CONTROL-M/Forecast. To install CONTROL-M/Forecast in the cluster environment see the *Release Notes for CONTROL-M/Forecast Version 6.3.01*.

If you are installing CONTROL-M/Forecast on a cluster, it should be installed on the primary node only.

## BMC Batch Impact Manager (optional)

Installing BMC Batch Impact Manager is optional. It is intended only for customers who are licensed to use BMC Batch Impact Manager. To install BMC Batch Impact Manager in the cluster environment see the chapter on installation in the *BMC Batch Impact Manager Version 6.3.01 User Guide*. See also *"Running BMC Batch Impact Manager web application under cluster environment (optional)" on page 32* below.

If you are installing BMC Batch Impact Manager on a cluster, it should be installed on the primary node only.

# Phase 3 Post-installation procedures

## Set up the host and listener

The cluster environment on Oracle required you to perform the following actions:

1. Change the HOST parameter to the new host name in the Oracle configuration files tnsnames.ora and listener.ora. The files are located in the **<*oracleHome*>\ora1010\network\admin** folder.

2. Stop and then restart the **listener** service.

## Create CONTROL-M/EM Gateway cluster resource

CONTROL-M/EM Gateway cluster resources must be defined manually after installation of CONTROL-M/EM had been completed as the location of CONTROL-M/Server is not available during the installation.

### To create the CONTROL-M/EM Gateway cluster resource

1. Define CONTROL-M/Server definition using the CONTROL-M Configuration Manager. The **Desired State** parameter for the gateway must be set to **ignored**.

2. For each CONTROL-M/Server defined, define a cluster resource for each gateway component. Create a new "generic application" resource using the details in the following table:

**Table 1 CONTROL-M/EM Gateway resource definition**

| Resource<br>Attribute | CONTROL-M-EM-Gateway (*CTM/SRVName*) |
|---|---|
| Description | CONTROL-M/EM Gateway |
| Resource type | generic application |
| Group | EM630 |
| Dependencies | CONTROL-M-EM-NuTCRACKER |
| Command line | <*emRoot*>\bin\ecs_gtw.exe<br>-dc *dcName* |
| Current directory | <*emRoot*>\bin |
| Use network name | Yes (select check box) |
| Pending timeout (seconds) | 10 |

***NOTE***

Before defining the CONTROL-M/EM Gateway cluster resource, the CONTROL-M/Server should be defined using the CONTROL-M Configuration Manager.

Create a gateway cluster resource for each CONTROL-M/Server that is connected to CONTROL-M/EM. In the **Command line** attribute, specify the CONTROL-M/Server name for the value of the -dc parameter.

# Verifying a cluster installation

On each failover node, perform the following steps:

1. Verify that the owner of the CONTROL-M on Microsoft Windows Clusters cluster group is the primary node on which you installed the Full CONTROL-M on Microsoft Windows Clusters installation.

2. Open a command prompt and navigate to the **<*rootFolder*>\3rd** folder on the installation DVD or CD.

3. run **setup.bat**.

4. Restart the computer.

5. Check that the current node of CONTROL-M on Microsoft Windows Clusters cluster group is online by performing the following steps:

A Issue the **Move Group** command to move the CONTROL-M on Microsoft Windows Clusters cluster group to the current node.

B Verify that the disc on which you installed CONTROL-M on Microsoft Windows Clusters is accessible from this node.

C Issue the **Bring Online** command to bring the CONTROL-M on Microsoft Windows Clusters cluster group on this node online and

D Verify that the current node is online in the Windows **Cluster Administrator** window.

# Install and log on to CONTROL-M/EM client components

1 Ensure that the virtual host name is properly defined in the DNS or host file so it can be accessed by name or IP address from Microsoft Windows.

2 During installation, enter the virtual host name as the location for the:

- CONTROL-M Configuration Server
- GUI Server
- CORBA Naming Service

3 When logging on to the CONTROL-M/EM GUI, use the virtual host name configured by the installation to connect to the CORBA Naming repository.

Enter the virtual host name in the **Host Name** field, which is displayed after clicking **Advanced**. This name is resolved by the network and must be identical to the name configured by the CONTROL-M/EM cluster aware installation.

4 The server name is automatically displayed once the connection to the CORBA Naming service is established.

5 By default, CONTROL-M/EM client components are configured to reconnect to the GUI Server upon disconnection. If the failover time of the resource group is longer than the value for **Max reconnection retries** times the value for **Wait seconds between reconnection attempts**, change the values for these parameters in the CONTROL-M/EM Reconnection panel of the Options menu.

If the CONTROL-M/EM installation, which is on the cluster machine, is configured to function in a firewall environment and orbconfigure is activated, the following commands must be executed from the cluster machine command line to correctly configure the local CONTROL-M/EM client components. For more information, see the section on configuring CONTROL-M/EM in a firewall environment in the *CONTROL-M/Enterprise Manager Administrator Guide*.

The change is required because the CORBA configuration on the cluster nodes is configured to publish the CONTROL-M/EM virtual network name while the components of these clients run locally.

- **orbadmin variable modify -scope GUI -value "iiop://" -ORBListenEndpoints**
- **orbadmin variable modify -scope Desktop -value "iiop://" -ORBListenEndpoint**
- **orbadmin variable modify -scope CLI -value "iiop://" -ORBListenEndpoints**
- **orbadmin variable modify -scope Sweep -value "iiop://" -ORBListenEndpoints**

# Running BMC Batch Impact Manager web application under cluster environment (optional)

This procedure is optional. It is intended only for customers who are licensed to use BMC Batch Impact Manager (BIM) and have installed BMC Batch Impact Manager in the cluster environment.

1 Install the web application server on the shared disk where the entire CONTROL-M/EM installation was installed.

***NOTE***

Refer to Appendix A for an example of installing Apache Tomcat in a cluster environment.

2 Deploy the BMC Batch Impact Manager web application according to the instructions provided in the *BMC Batch Impact Manager User Guide*.

3 Using the Cluster Administrator interface, create the web application server resource in the CONTROL M/EM resource group (see Appendix A, “Example of installing Apache Tomcat on Windows clusters”).

4 Bring online the BMC Batch impact Manager and the web application server cluster resources.

5 Open the web browser and enter the following URL:

`http://virtualName:8080/bim`

6 Click **Advanced**.

7 Modify the following field values:

| Field | Value |
|---|---|
| Host | By default, the host name indicates the physical host name of the cluster node. Replace the default host name with the CONTROL-M/EM virtual host name. |

8 Click **Add Host**.

9 Click **Login** to log on to BMC Batch Impact Manager.

# Updating BMC Batch Impact Manager and CONTROL-M/Forecast cluster resources

If BMC Batch Impact Manager or CONTROL-M/Forecast were installed on a cluster, the cluster resource properties must be changed manually from **do not restart** to **restart**.

## To change the cluster resource properties

1 From the cluster administration application, open the **BMC-BIM-Server Properties** dialog box or the **CONTROL-M-EM-Forecast Properties** dialog box as required.

2 Select the **restart** option button.

3 If you are working on a Windows 2000 cluster, open the **BMC Batch Impact Manager Cluster** resource and clear the **Use network name** check box. If the check box is not cleared, the BMC Batch Impact Manager process will not start.

# Example of installing Apache Tomcat on Windows clusters

This appendix provides an example of installing Apache Tomcat version 5.0.28 on Windows clusters. This version of Apache Tomcat requires JAVA SDK version 1.4.x or later to be installed on each of the cluster nodes.

***NOTE***

You can download Apache Tomcat from http://jakarta.apache.org/tomcat.

1. Install Apache Tomcat on each the cluster nodes.
2. Ensure that you are installing the software on the local drive (for example, **D:\Program Files\Apache Software Foundation\Tomcat 5.0**).
3. During the installation, select the Service component.
4. When you are prompted for the JAVA virtual machine location, enter the JAVA SDK installation folder.
5. When the installation is finished, do not start the Apache Tomcat Windows service.
6. On each of the cluster nodes (TLVD0006, TLVD0007) modify the Apache Tomcat Windows service to start in Manual mode.
7. Using the Cluster Administrator interface, create the Apache Tomcat resource in the CONTROL M/EM resource group:

**Table 2 Attributes for the Apache Tomcat resource**

| Attribute | Value |
|---|---|
| Resource Name | Apache Tomcat |
| Description | Apache Tomcat Web Server |
| Resource Type | generic service |
| Group | EM630 |
| Dependencies | EM630 - Network Name |
| Service name | Tomcat5 |
| Use network name | Yes (select check box) |

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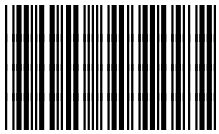

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