CHAPTER 6

Clustering

The clustering feature of Cisco CallManager provides a mechanism for seamlessly distributing call processing across the infrastructure of a converged IP network. Clustering provides transparent sharing of resources and features and enables system scalability.

This section covers the following topics:

Clusters

A cluster comprises a set of Cisco CallManager servers that share the same database and resources. You can configure the servers in a cluster in various ways to perform the following functions:

- Database server (only one database server in the cluster)
- TFTP server
- Application software server

Before you install the Cisco CallManager software on subsequent servers, you must define the nodes in Server Configuration in Cisco CallManager Administration.

Using the Service Activation window in the Cisco CallManager Serviceability application, you can specify which server performs which function for the cluster. You can dedicate a particular server to one function or combine several functions on one server, depending on the size of your system and the level of redundancy that you want.

Each cluster can have only one database server (first node) and usually one TFTP server (either separate or combined).

Tip In a very large cluster, simultaneous initialization, the process that occurs after a Cisco CallManager failure, can cause an overload of the database server. To limit the number of Cisco CallManager services that will simultaneously initialize, you can configure the "Max Simultaneous Cisco CallManager Initializations" service parameter. This parameter defaults to 0 and, with this value, the number of Cisco CallManager services that can initialize simultaneously is unlimited. Any non-zero value will limit the number of services to that specific value.

Another service parameter that should be configured is the "Restart Cisco CallManager on Initialization

Exception" parameter. This parameter determines whether the Cisco CallManager service restarts if an error occurs during initialization. This parameter defaults to TRUE and, with this value, the Cisco CallManager initialization will abort when an error occurs during initialization. Setting the value to FALSE allows initialization to continue when an error is encountered. These parameters are clusterwide and can be located in the System - General subsection. Refer to "Service Parameters Configuration" in the *Cisco CallManager Administration Guide* for detailed information on configuring service parameters.

For details on cluster size and recommended configurations, refer to the *Cisco IP Telephony Solution Reference Network Design Guide*.

For details of the Service Activation window, refer to the *Cisco CallManager Serviceability System Guide* and to the *Cisco CallManager Serviceability Administration Guide*.

Intercluster Communication

In very large systems, you might have to configure more than one cluster to handle the call-processing load. Communication between the clusters occurs by means of intercluster trunks. Most large systems use one of two main types of multicluster configurations:

- Large, single campus, or metropolitan-area network (MAN)
- Multisite WAN with distributed call processing (one or more Cisco CallManagers at each site)

Because intercluster trunks in a MAN usually have sufficient bandwidth, they do not require any call admission control mechanism. Multisite WANs with distributed call processing typically use gatekeeper technology for call admission control.

Intracluster Communication

Cisco CallManager also supports intracluster communication, which is a multisite WAN with centralized call processing (no Cisco CallManager at the remote site or sites). Multisite WANs with centralized call processing use the locations feature in Cisco CallManager to implement call admission control.

Most features of Cisco CallManager do not extend beyond a single cluster, but the following features do exist between clusters:

- Basic call setup
- G.711 and G.729 calls
- Multiparty conference
- Call hold
- Call transfer
- Call park
- Calling line ID

For more information about intercluster communication and call admission control, refer to the *Cisco IP Telephony Solution Reference Network Design Guide.*

Balanced Call Processing

After installing the Cisco CallManagers that form a cluster, you can balance the call-processing load across the system by distributing the devices (such as phones and gateways) among the various Cisco CallManagers in the cluster. To distribute the devices, you configure Cisco CallManager groups and device pools and then assign the devices to the device pools in a way that achieves the type of load balancing that you want.

Cisco CallManager groups and device pools represent logical groupings of devices that you can arrange in any way that you want. For ease of administration, make sure that all the devices in a group or pool share a common and easily identified characteristic, such as their physical location on the network.

You can also use Cisco CallManager groups to establish redundancy (backup call processors) for the primary Cisco CallManager in the group. A Cisco CallManager group comprises an ordered list of up to three Cisco CallManager servers. During normal operation, the first (primary) Cisco CallManager in the group controls all device pools and devices that are assigned to that group. If the primary Cisco CallManager in a group fails, control of the device pools and devices that are registered with the primary Cisco CallManager transfers to the next Cisco CallManager in the group list.

For example, assume a simplified system that comprises three Cisco CallManagers in a cluster, with 300 existing Cisco IP Phones and provisions to auto-register new phones as they are added later.

- The configuration includes four Cisco CallManager groups: group G1 assigned to device pool DP1, group G2 assigned to device pool DP2, group G3 assigned to device pool DP3, and group G4 assigned to device pool DP4. Group G4 serves as the default group for devices that auto-register.
- CCM1 serves as the primary Cisco CallManager for the devices in DP1 and DP2, first backup for DP3, and second backup for the devices in DP4.
- CCM2 serves as the primary Cisco CallManager for the devices in DP3 and DP4, first backup for DP1, and second backup for the devices in DP4.
- CCM3 serves as the first backup Cisco CallManager for the devices in DP2 and DP4 and second backup for the devices in DP1 and DP3.

Table 6-1 provides an overview of the steps that are required to install and configure a Cisco CallManager cluster.

Table 6-1 Cluster Configuration Checklist

Configuration Steps		Procedures and Related Topics
Step 1	Install the database server (first node).	Refer to the installation documentation for the hardware components that you are installing.
Step 2	Gather the information that you need to install Cisco CallManager and any other software applications on the first node and subsequent servers. Also, determine how you will allocate the servers in the cluster.	*Cisco IP Telephony Solution Reference Network Design Guide* *Installing Cisco CallManager Release 5.0(1)* *Cisco IP IVR Installation Guide*
Step 3	Install Cisco CallManager and any additional software applications on the subsequent servers. **Note** Before installing the subsequent servers, you must define the nodes in Server Configuration in Cisco CallManager Administration.	*Installing Cisco CallManager Release 5.0(1)* *Cisco IP IVR Installation Guide* Server Configuration, *Cisco CallManager Administration Guide*

Table 6-1 Cluster Configuration Checklist (continued)

Configuration Steps		Procedures and Related Topics
Step 4	Configure device pools and use them to assign specific devices to a Cisco CallManager group.	Device Pool Configuration, *Cisco CallManager Administration Guide*
Step 5	If you are using an intercluster trunk, install and configure it as an intercluster trunk, either gatekeeper-controlled or non-gatekeeper-controlled.	*Cisco IP Telephony Solution Reference Network Design Guide* Configuring a Trunk, *Cisco CallManager Administration Guide* Trunk Configuration Settings, *Cisco CallManager Administration Guide*
Step 6	If you want to provide call admission control for an intercluster trunk, configure either a gatekeeper-controlled intercluster trunk or Cisco CallManager locations.	*Cisco IP Telephony Solution Reference Network Design Guide* Trunk Configuration, *Cisco CallManager Administration Guide* Location Configuration, *Cisco CallManager Administration Guide*

Where to Find More Information

Related Topics

- Cisco CallManager Group Configuration, *Cisco CallManager Administration Guide*
- Device Pool Configuration, *Cisco CallManager Administration Guide*
- Trunk Configuration, *Cisco CallManager Administration Guide*
- Location Configuration, *Cisco CallManager Administration Guide*

Additional Cisco Documentation

- *Cisco IP Telephony Solution Reference Network Design Guide*
- *Installing Cisco CallManager Release 5.0(1)*
- *Cisco IP IVR Installation Guide*
- *Cisco CallManager Serviceability System Guide*
- *Cisco CallManager Serviceability Administration Guide*