Load Manager Administrator's Guide

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Load Manager for Citrix Presentation Server™

Citrix Presentation Server™ 4.5 for Windows®
Citrix Access Suite™

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Welcome

Load Manager is a component of the Advanced and Enterprise Editions of Citrix Presentation Server. With Load Manager, you can optimize server resources throughout your server farm. To accommodate routine application and database maintenance, you can use Load Manager to schedule the availability of published applications on your servers.

Load Manager provides:

- **Maximized system efficiency**. Load Manager balances published application loads across your server farm based on server or published application load limits set in load evaluators. This feature allows more efficient data flow in your server farm environment.
- **Citrix default load evaluators**. Load Manager includes two load evaluators that work well in most server farm environments, simplifying your current load configuration without modification until you learn more about Load Manager.
- **Customization**. Load Manager includes a set of rules that you can use to create your own load evaluators, increasing server and published application performance in your server farm.
- **Real-time monitoring**. The Load Manager Monitor tool lets you view the statistics monitored by your load evaluators after you attach them to a server or published application.

This chapter describes what Load Manager is, the documentation provided with Load Manager, and includes additional resources to find more information about Load Manager and related Citrix products.

Important Please be sure to read the Readme.html file in the \Documentation directory of the Citrix Presentation Server CD-ROM. This file contains important information that includes last-minute documentation updates and corrections.

Citrix provides a variety of information resources online, including a complete product documentation library, documentation updates, and technical articles on the Citrix Web site at http://www.citrix.com/.

How Does Load Manager Enhance Citrix Presentation Server?

Citrix Presentation Server provides a high-performance, cost-effective, secure way to deploy business-critical applications throughout the enterprise regardless of client device or network connection. Citrix Presentation Server provides the best level of application service in multi-server farms where applications are published on as many servers as needed. Load Manager assigns the least-loaded server to run each published application. This process keeps loads lower for greater server and published application speed and efficiency. Information Services professionals find Load Manager to be an invaluable tool, because it identifies servers with high loads and provides increased server and network performance by spreading out loads more evenly.

The Load Manager Monitor tool makes it easier for you to view trouble spots on servers in the server farm so you can change load thresholds easily if bottlenecks occur.

Using Load Manager in a Mixed Environment

Citrix Presentation Server 4.0 and 4.5

Citrix Presentation Server 4.0 and 4.5 do not support interoperability mode.

If you use computers running either of these versions with computers running earlier versions of Presentation Server in the same server farm (in *interoperability mode*), you cannot enable or disable interoperability mode on the earlier versions using Citrix Presentation Server 4.0 or 4.5. You must use the appropriate earlier version of Presentation Server.

In the same scenario, where interoperability mode is originally enabled before the addition of computers running Citrix Presentation Server 4.0 or 4.5 to the server farm, loads are balanced across computers running MetaFrame Presentation Server 3.0 and earlier only.

MetaFrame Presentation Server 3.0 or Earlier

If you use computers running MetaFrame Presentation Server 3.0 or earlier in the same server farm in *interoperability mode*, Presentation Server assumes the master ICA Browser function. This allows load management among server farms to function correctly.

Load Manager Features

With Load Manager, you can set up, monitor, and adjust the server and published application loads in a server farm so that users can run the published applications they need quickly and efficiently.

Load Manager allows you to:

- **Optimize resource usage in a server farm.** When a user launches a published application, you can configure Load Manager to route the ICA connection to the published application on the server with the lightest load in the farm. By balancing published application and server loads, you can maximize the efficiency with which a server farm operates, reduce latency, and increase response time to the user.
- **Set the date and time for load management.** Using the Presentation Server Console, you can schedule the availability of a published application based on the date and time.
- **Monitor application loads across server farms.** Using the Presentation Server Console, you can chart the loads on servers that host published applications.
- **Check disk data.** Load Manager can check processes such as disk operations and disk input and output on servers that contain published applications.
- **Span subnets.** Load Manager runs efficiently in enterprises that contain multiple server farms within a single network or multiple subnets. Load Manager can improve the performance of an enterprise server farm by providing increased scalability across servers.

Calculating Loads

Load Manager calculates the load on a server using *load evaluators* and *rules*. Each load evaluator contains one or more rules. Each rule defines an operational range for the server or published application to which its evaluator is assigned.

Rules

A rule queries specific conditions and performance metrics for servers or published applications. Each rule has its own unique set of parameters. With some rules, you can set two thresholds: full load or no load. If the measured parameter falls above the full load threshold, or below the no load threshold, Load Manager does not allow any further connections to the server or application. Other rules allow you to specify IP ranges for Citrix Presentation Server Clients, schedule the availability of a published application, define upper limits for ICA connections based on the number of users connected, and specify how much impact logging on has on load.

The rules included in Load Manager are:

- **Application User Load**. Limits the number of users allowed to connect to a selected published application.
- **Context Switches**. Defines a range of context switches per second for a selected server. A context switch occurs when the operating system switches from one process to another.
- **CPU Utilization**. Defines a range of processor utilization, as a percentage, for a selected server.
- **Disk Data I/O**. Defines a range of data throughput, in kilobytes, for a selected server.
- **Disk Operations**. Defines a range of disk operation, in read/write cycles per second, for a selected server.
- **IP Range**. Defines a range of allowed or denied Client IP addresses for a published application.This rule must be used in conjunction with another.
- **Memory Usage**. Defines a range of memory usage by a server.
- **Page Fault**. Defines a range of page faults per second for a selected server. A page fault occurs when the operating system tries to access data that has been moved from physical memory to disk.

- **Page Swap**. Defines a range of page swaps per second for a selected server. A page swap occurs when the operating system moves data between physical memory and the swap file.
- **Scheduling**. Schedules the availability of selected published applications.
- **Server User Load**. Limits the number of users allowed to connect to a selected server.
- **Load Throttling.** Defines the impact that logging on has on server load, which results in limiting the number of concurrent connection attempts a machine is expected to handle. This rule is usually used in conjunction with another rule, because it affects only the initial logon period, not the main part of a session.

Load Evaluators

A load evaluator consists of one or more rules and can be applied to a server or published application. Each rule is a component of how your total load configuration works. The threshold of a rule reflects a specific server parameter.

Load Manager includes two Citrix-provided load evaluators:

- **Default.** This load evaluator is attached to every server by default. It contains two rules: Server User Load, which reports a full load when 100 users log on to the attached server, and Load Throttling, which prevents the server from allowing too many concurrent connection attempts.
- **Advanced.** This load evaluator contains the CPU Utilization, Memory Usage, Page Swaps, and Load Throttling rules.

Note The Citrix-provided load evaluators, Default and Advanced, cannot be modified or deleted. You can copy the Citrix-provided load evaluators to a new load evaluator if you want to change rules or settings.

Load evaluators can vary on each server and each load evaluator can contain any combination of rule types and values. This gives you added flexibility when calculating loads for each server in the server farm.

Note The Load Throttling rule can be applied only to a server, not to an individual application.

How Load Manager Balances Loads

When a client user selects a published application to run, the client contacts the server farm to locate the address of a server that hosts the published application. Load Manager maintains a list of available host servers within the server farm. Upon receiving the client's request, Load Manager selects the server with the lowest load and returns its address to the client. The client starts a session on that server and launches the published application.

Load Manager calculates a server load using the load evaluators attached to a server or published application. When any rule for any relevant load evaluator reports full load or exceeds its threshold, Load Manager removes the load-managed server from the internal list of available servers. The next request for an ICA connection to a published application is routed to the next available load-managed server in the list.

Every Advanced Edition and Enterprise Edition server is included in the load calculation regardless of the network protocol unless the server reports full load. If a server reports full load, it is no longer available for load management until its load is reduced (for example, users log off the server or server processes consume less CPU time). After the load is reduced, the server is automatically added to the list. Servers are continuously added to and removed from the list as server load and user activity fluctuate.

Accessing Documentation

This administrator's guide is part of the Citrix Presentation Server documentation set. The documentation set includes guides that correspond to different features of Citrix Presentation Server. Documentation is provided as Adobe Portable Document Format (PDF) files.

Use the *Document Center* to access the complete set of guides. The Document Center provides a single point of access to the documentation that enables you to go straight to the section of documentation that you need. The Document Center includes:

- A list of common tasks and a link to each item of documentation.
- A search function that covers all the PDF guides. This is useful when you need to consult a number of different guides.
- Cross-references between documents. You can move between documents as often as you need using the links to other guides and the links to the Document Center.

Important To view, search, and print the PDF documentation, you need to have Adobe Reader. You can download a free copy of Adobe Reader from the Adobe Systems' Web site at http://www.adobe.com/.

If you prefer to access the guides without using the Document Center, you can navigate to the component PDF files using Windows Explorer. If you prefer to use printed documentation, you can also print each guide from Adobe Reader.

More information about Citrix documentation, and details about how to obtain further information and support, is included in *Getting Started with Citrix Presentation Server*.

To provide feedback on the documentation, go to www.citrix.com and click **Support > Knowledge Center > Product Documentation**. To access the feedback form, click the Submit Documentation Feedback link.

Using Help

Help is available for the Presentation Server Console and the Access Management Console, the centralized management tools from which you implement all the features of Load Manager. It is provided in Microsoft HTML Help format.

The Load Manager Help provides steps, conceptual information, and examples about how to use Load Manager. Click the Help button or press F1 in the Console to access Load Manager help information.

Using Load Manager

This chapter explains how to install and enable Load Manager. It also lists the system requirements for Load Manager and provides an overview of the tasks you can perform with Load Manager.

The topics in this chapter include:

- "Load Manager Requirements" on page 14
- "Working with Load Evaluators" on page 15
- "Using Load Manager Monitor" on page 18
- "Uninstalling Load Manager" on page 21

Load Manager Requirements

This section lists the requirements and recommended configurations for Load Manager. For information about the system requirements of Citrix Presentation Server, refer to the *Citrix Presentation Server Administrator's Guide*.

To implement Load Manager you must have:

- The Advanced Edition or Enterprise Edition of Citrix Presentation Server installed on every computer in your server farm that you want to manage.
- Published applications that you want to load manage. All the applications you plan to use with Load Manager must first be published using Citrix Presentation Server.
- Administrator rights. You must have Citrix Administrator rights to run Citrix Presentation Server and Load Manager.
- The same protocol stack (such as TCP/IP or IPX) on each server in the server farm.

Determining which servers you want to load manage depends on how critical the performance of those servers is in your server farm.

Issues to consider:

- A published application that is unique to a small group of users does not need to be load managed.
- Published applications that require significant resources from your servers can be configured to report full loads at a lower threshold than the actual server limit.
- With the Scheduling rule, you can remove one or more published applications from the list of applications maintained by Load Manager; for example, to shut down servers and run a disk repair utility over a weekend.

Licensing Load Manager

Load Manager is included with the Advanced and Enterprise Editions of Citrix Presentation Server but you must license your edition of Citrix Presentation Server before you can use Load Manager. The default load evaluator is attached to each server automatically after licensing.

For more information on Citrix licensing, see *Getting Started With Citrix Licensing*.

Working with Load Evaluators

Load Manager attaches the Default load evaluator to each server after you add your Advanced Edition or Enterprise Edition license to the server farm. It contains two rules: Server User Load, which reports a full load when 100 users log on to the attached server, and Load Throttling, which specifies the impact that logging on has on load and limits the number of concurrent connection attempts the server is expected to handle. You can create new load evaluators based on the rules available in Load Manager. After you create your customized load evaluators, you can attach them to one or more servers, or published applications, in your farm.

Important Each server or published application can have only one load evaluator attached to them.

You can attach one load evaluator to a server and one load evaluator to each published application on the same server. For example, you can keep the Default load evaluator attached to your server and attach another load evaluator to each of your published applications on that server.

Creating New Load Evaluators

The Default and Advanced load evaluators provided with Load Manager are intended for use with computers running Citrix Presentation Server. However, they may not meet all your load management needs. You can create your own load evaluators with the rules available in Load Manager and attach them to your servers or published applications.

For example, with the Default load evaluator attached to a server, the server reports a full load when 100 users connect to it. If you find the number of user connections to the server consistently causes the server to report full load, you can either increase the limit using a new load evaluator on each server hosting the published application or publish the application on more load-managed servers.

Attaching the Advanced load evaluator to a server or application allows you to control the CPU utilization, memory usage, virtual memory available, and the number of concurrent connection attempts the server can handle.

To create a new load evaluator

1. In the Presentation Server Console, select **Load Evaluators** in the left pane of the Console.
2. From the **Actions** menu, select **Load Manager > New Load Evaluator** or click the **New Load Evaluator** button on the toolbar. The **New Evaluator** dialog box appears.
3. Enter a **Name** and **Description** for the new load evaluator.

4. Select one or more rules from the **Available Rules** list and add them to the **Assigned Rules** list.
5. Select each rule in the **Assigned Rules** list and configure it as required.
6. Click **OK** to close the **New Evaluator** dialog box and save your new load evaluator.

Attaching Load Evaluators

To participate in load management, each server or published application must have a load evaluator attached to it. The rules and their settings determine how the load of a particular server or published application is managed.

For example, if you have a published application that uses a significant percentage of a server's memory and processing capabilities, you can attach the Advanced load evaluator (included with Load Manager) to every server hosting the application. By doing so, Load Manager distributes the available memory and processor demand across the load-managed servers.

Each server or published application can have only one load evaluator attached to it.

Note If you include the Load Throttling rule in an evaluator, then attach that evaluator to an application, the rule will be ignored.

To attach a load evaluator to a server

1. In the Access Management Console, select the server to which you want to attach a load evaluator.
2. From the **Action** menu, select **All Tasks > Assign load evaluator**. The **Assign Load Evaluator** dialog box appears.
3. Select the required load evaluator and click **OK**.

To attach a load evaluator to a published application

1. In the Access Management Console, select the published application to which you want to attach a load evaluator.
2. From the **Action** menu, select **All Tasks** > **Load Manage Application**. The **Load Manage Application** dialog box appears.
3. Select one or more servers from the Configured Servers list and click **Edit** to change the load evaluator. These application load evaluators are used in addition to the server load evaluators.
4. Click **OK**.

Updating Load Evaluator Properties

As you monitor the server and published application loads across your farm, you may want to change the settings or even the rules included in a load evaluator.

For example, suppose you have created a load evaluator using the Server User Load rule to specify that full load is reported when 50 connections are in use. After attaching the load evaluator to a set of servers, you realize that the limit is too high. You can edit the Server User Load rule to report full load when 25 connections are in use.

Important The Default and Advanced load evaluator properties cannot be edited.

To change the properties of a load evaluator

1. In the Presentation Server Console, select **Load Evaluators** in the left pane of the Console.
2. Select the load evaluator that you want to edit.
3. From the **Actions** menu, select **Load Manager > Load Evaluator Properties** or click the **Load Evaluator Properties** button on the toolbar. The **Evaluator Properties** dialog box appears.
4. Make your required changes and click **OK**.

From the **Evaluator Properties** dialog box you can:

- Change the name of the load evaluator
- Change the description for the load evaluator
- Change the rules assigned to the load evaluator
- Change the settings for each rule

Copying and Deleting Load Evaluators

As you become more familiar with the use of Load Manager, you can develop a range of rule parameters that you may want to apply to multiple load evaluators. For example, you may have set up a load evaluator with four rules but you want the settings for the rules to be different. Load Manager allows you to copy an existing load evaluator rather than create a new one each time you want to change the properties of a load evaluator or one of its rules.

To copy a load evaluator

1. In the Presentation Server Console, select **Load Evaluators** in the left pane of the Console.
2. Select the load evaluator that you want to copy.
3. From the **Actions** menu, select **Load Manager > Duplicate Load Evaluator** or click the **Duplicate Load Evaluator** button on the toolbar. The **Duplicate Evaluator** dialog box appears.
4. Edit the name, description, and rules for the new load evaluator and click **OK**.

If you accumulate a large number of load evaluators and find that some of them are no longer required, you can remove them from the Console.

Important You cannot delete a load evaluator that is attached to a server. If you want to delete a load evaluator that is in use, you must attach another load evaluator to the server first.

To delete a load evaluator

1. In the Presentation Server Console, select **Load Evaluators** in the left pane of the Console.
2. Select the load evaluator that you want to remove.
3. From the **Actions** menu, select **Load Manager > Delete Load Evaluator(s)** or click the **Delete Load Evaluator** button on the toolbar.
4. Click **Yes** to delete the selected load evaluator.

Note The Default and Advanced load evaluators cannot be deleted from the Console.

Using Load Manager Monitor

The features of Load Manager extend beyond the manipulation of rules and load evaluators. You can keep track of the loads on a server using the real-time graphing capabilities of Load Manager Monitor. The frequency with which Load Manager data is transmitted within the farm can also be customized to your communication needs. For more information about relationships among your load evaluators, published applications, and load-managed servers, you can view usage reports generated by Load Manager.

To review all ICA connection requests made to load managed servers, you can enable Load Manager logging and save the contents of the log as separate text files.

Monitoring Server Loads

The Load Manager Monitor checks recent loads for load managed servers and displays them as a graph of load against time. The reported evaluator loads continuously change, based on the rules you set in a load evaluator and how much load activity there is.

To view the Load Manager Monitor for a server

1. In the Presentation Server Console, select the server that you want to monitor.
2. Select the Load Manager **Monitor** tab.

You can open the Load Manager Monitor in a separate window, allowing you to keep track of the loads on a server while you perform other administrative tasks.

To view the Load Manager Monitor in a separate window

1. In the Presentation Server Console, select the server that you want to monitor.
2. From the **Actions** menu, select Load Manager **Monitor** or click the **View Monitor In Separate Window** button on the toolbar. The Load Manager **Monitor** dialog box appears.
3. To restart monitoring for the selected server, from the **Actions** menu select **Load Manager Monitor > Clear Monitor Display** or select the **Clear Monitor Display** button on the toolbar.

Using the Load Manager Log

The Load Manager log records ICA connection requests to load managed servers in the server farm and can store up to 16KB of text messages.

Note Message logging for Load Manager is disabled by default.

To enable the Load Manager log

1. In the Presentation Server Console, select **Load Evaluators** in the left pane of the Console.
2. Select the **Log** tab.
3. From the **Actions** menu, select **Log** > **Enable Logging** or click the **Enable Logging** button on the toolbar.

The Load Manager log is not populated with information until a client user attempts to launch a published application on a load managed server.

To view the Load Manager log

1. In the Presentation Server Console, select **Load Evaluators** in the left pane of the Console.
2. Select the **Log** tab.

You can save the contents of the Load Manager log by selecting **Log > Save Log** from the **Actions** menu or by clicking the **Save Log** button on the toolbar.

You can empty the Load Manager log by selecting **Log > Clear Log** from the **Actions** menu or by clicking the **Clear Log** button.

Setting the Frequency of Information Updates

The information displayed in the Load Manager Monitor and the loads reported by servers are updated at defined intervals—every minute for the Load Manager Monitor and every five minutes for load evaluator data. You can change the frequency with which information is updated to meet your requirements.

To set the update frequency for Load Manager

1. In the Presentation Server Console, select **Load Evaluators** in the left pane of the Console.
2. From the **Actions** menu, select **Load Manager > Load Manager Settings**. The **Load Manager Settings** dialog box appears.
3. Click and drag the slider bars to set your required update frequency.
4. Click **OK** to save your new Load Manager settings and close the dialog box.

Viewing Usage Reports

With Load Manager, usage reports provide quick and easy access to the distribution of load evaluators in use across your server farm.

To view the usage reports for load evaluators

1. In the Presentation Server Console, select **Load Evaluators** in the left pane of the Console.
2. Click the **Usage Reports** tab.
3. Select the type of report you want to view:
   - **By Server**. The default view lists each server in the server farm and the load evaluator attached to it.
   - **By Application**. This option lists the published applications, including published desktops, the load evaluators attached to them, and the servers on which they are installed.

- **By Evaluator**. This option lists each load evaluator, the published applications, including published desktops, and the servers to which they are attached.

Uninstalling Load Manager

Load Manager is a component of the Advanced and Enterprise Editions of Citrix Presentation Server and is installed with Citrix Presentation Server by default. Removal of Load Manager can be achieved only by uninstalling Citrix Presentation Server.

See the *Citrix Presentation Server Administrator's Guide* for information about uninstalling Citrix Presentation Server.

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